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REQUIREMENTS ANALYSIS

PHILIPPINE AIRPORTS AND AIRWAYS

AGENCY FOR INTERNATIONAL DEVELOPMENT- MANILA, R.P. JUNE 1967

PHILIPPINE AIRPORTS AND AIRWAYS

PREFACE

An adequate air transportation system is a sine qua non for economic development and well-being. In the Philippines, comprised as it is of some 7,100 islands spread over a total land area of nearly 115,000 square miles, air transportation should have special application. It provides a flexible means of transport to overcome surface movement deficiencies and impediments with a minimum investment in plant. It provides easy accessibility to all parts of the Philippines, equal in measure to the total land area. It provides rapid mobility between centers of production and consumption of varying sizes and of varying movement needs. Aside from the economic considerations, air transportation affords for any country, in any stage of development, an efficient and effective instrument for promoting political integration, cultural interchange, and National Defense.

Concomitantly, it may be recognized that air transportation is not a substitute for surface movement capability. Some needs can be logically met by air transportation, but there are other needs which can be best met by surface transportation. Given its appropriate place in the overall transportation mix, the air aspect, if it is to play its full role in the economic, political, cultural and military affairs of a nation, must be properly planned for and properly provided for. The planning function calls for an accurate and complete picture of the existing air transport plant, capabilities, and the present and future plant requirements. The provision function calls for an effective and efficient supply of the required plant resources, operations, and maintenance. The end-product is--or should be--economic, safe air transportation for the Nation and the People.

This report is concerned with the planning function. It contains, pursuant to the assigned terms of reference, a plan with costs for use by the Philippine Government in developing and improving its airports and airways and for use by the Philippine Government in considering and exploring alternate means of financing for the fulfillment of the plan. It was developed by expertise, whose names and specialties appear later, of the United States Federal Aviation Administration and of the United States Civil Aeronautics Board, on the basis of field surveys and desk analyses conducted in the Philippines in the period of December 1966 - 31 March 1967, for presentation by the Agency for International Development, an activity of the United States Department of State, to the Government of the Philippines, at the latter's request for such a report and plan. Further considered, the terms of reference call for a schedule of projects with a price tag, arranged in

X 3

accordance with priority needs, for implementation in a five-year period.

The scope of work for the report includes the following subjects and areas, inter alia: Pertinent legislation, aviation agencies of the government, and agency personnel and finances; national airport and aircraft inventories; air operators; carrier routes, flight equipment, and service; volume and distribution of air traffic (passenger, freight, mail, and aircraft); political, economic, and transportation developments and trends bearing on aviation; population growth concentrations; and the national system of airports and airways, as now constituted (considering facilities, equipment, procedures, operations, maintenance, and management); and cost benefits. Authority for the report is contained in Project Implementation Order/Technical Services (PIO/T) No. 492-160-2-70010, dated 15 November 1966, of the Agency for International Development.

In the course of the work, discussions were held with officials of the Philippine Government, military personnel of the United States Air Force and the United States Navy, executives of airlines, and other appropriate individuals and organizations. Various publications and reports were reviewed and studied, and pertinent information was noted and abstracted. Fifty-three airports were selected on the basis of traffic and other criteria, and these were visited. Inspections were carried out of facilities, equipment, and other aspects. (In the period allowed for the survey and analysis, it was not possible or necessary to visit each and every national airport--76 in number, not counting the number of private airports.) These activities were then followed by an intensive period of analysis at Manila of the various data collected and observations made. On the basis of the analysis, the report was then written, in consultation with interested and concerned persons.

Source material for the report included annual reports, statistical material, and special submissions (prepared at our request) of the Philippine Civil Aeronautics Administration and the Civil Aeronautics Board; publications of the International Civil Aviation Organization (ICAO), at Montreal; studies of the Institut du Transport Aerien (ITA), at Paris; researches of the Stanford Research Institute (SRI); and news items from the local press. The availability of accurate and complete data on a current and historical basis is a fundamental requirement in the type of study at hand. With the partial exception of the Manila (MIA) International Airport (comprising both MIA Domestic and MIA International), it was possible to develop aircraft movement statistics on a yearly basis for the different national airports for only 1965 and 1966, utilizing monthly summary reports of the Civil Aeronautics Administration on aircraft movements. The subject summary reports were available for only some months in 1963 and 1964, due to the partial destruction of records by a typhoon, and for no months prior to 1963 for other reasons.

Statistical data on passenger arrivals and departures at different airports are reported in bi-weekly "caretaker" reports of the Civil Aeronautics Administration for all but a few national airports which report under a different system. The caretaker reports were not always readable, and it would have required an enormous amount of time to run through thousands of such reports to develop statistics for any meaningful period of time. However, we did manage to develop airport passenger statistics for one year, and only one year--namely, 1965--based on statistics supplied to us by the Civil Aeronautics Board (which it had developed, in turn, from caretaker reports for its own needs) and obtained from other sources. It was necessary to turn to the three domestic scheduled air carriers for passenger and freight traffic statistics for airports and routes. Two of the carriers were very cooperative, and gave us all the traffic statistics we asked for. Unfortunately, the major domestic carrier (doing four-fifths of the hauling in the nation) chose not to provide us with station passenger statistics, segment flow data, or passenger origin and destination (O&D) statistics, giving as its reason its need to protect itself for reasons of competition. This refusal obliged us to analyze airline schedules for a period of several years, a time-consuming operation, in order to develop some concept of traffic growth and its distribution. Under the circumstances, we did not feel that we were in a position to forecast air traffic, apart from Manila International, electing rather to deal with the magnitudes of air activity and the obvious, known air growth centers.

As a matter of convenience and order, the report is organized into seven sections. Section I reviews on a broad plane the government responsibilities and functions with respect to Philippine Civil Aviation and their organizational and financial implementation. Section II examines the volume and distribution of air traffic--aircraft and passenger--and the related trends and prospects, subject to the limitations described above. Sections III and IV analyze the existing system resources and capabilities as they relate to airports, airways, navigational aids, air traffic, and communications, and determines what is needed in the way of hardware and other needs to provide a fully working system. Section V studies the supporting services and identifies the needs here. Section VI covers, for its part, the training needs as distinct from other needs. Section VII consists of a resumé of conclusions and recommendations contained in preceding sections. It brings together the various system requirements into a "plan" with a "price tag", and considers briefly the subject of implementation.

No attempt is made in the report to inventory information which is readily available elsewhere. Only information which is essential to the analysis is included. Acknowledgments of assistance received during the course of the survey and analysis and writing are given on page x, a summary of the report is presented on page xi. By way of a final note, the findings, views, conclusions, and recommendations of this report are those of the individuals named below, and do not necessarily reflect the official views and policies of the United States Agency for International Development nor of the participating United States agencies, namely, the Federal Aviation Administration and the Civil Aeronautics Board.

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10

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TABLE OF CONTENTS

Page

x
8

9

X
10

11

Part Three. Implementation Aspect

SECTION VII. CONCLUSIONS AND RECOMMENDATIONS.

X
12

EXHIBITS

13

Page

Page

TABLES

X
16

Page

17

ABBREVIATIONS

AB	- Air Base
ACC	- Area Control Center
ACS	- Airway Communications Station
ADC	- Aerodrome Control (Tower)
ADC/ACS	- Combined Aerodrome Control and Airway Communications Station
ADC/APP	- Combined Aerodrome Control and Approach Control Facility
AIP	- Aeronautical Information Publication
AIS	- Aeronautical Information Service
ALS	- Approach Lighting System
AM	- Amplitude Modulation (when used in connection with radio equipment)
AMI	- Air Manila Incorporated
AMIS	- Aircraft Movement Information Service
ANSCC	- Air Navigation Services Coordinating Committee
AOD	- Airways Operations Division
APP	- Approach Control Facility
ASR	- Airport Surveillance Radar
ATC	- Air Traffic Control
ATCRBS	- ATC Radar Beacon System
ATIS	- Airport Terminal Information Service
BUTEL	- Bureau of Telecommunications

18

CAA	- Civil Aeronautics Administration
CAB	- Civil Aeronautics Board
CTA	- Control Area
DME	- Distance Measuring Equipment
FAA	- U. S. Federal Aviation Administration
FAS	- Flight Assistance Service
FASCO	- Flight Assistance and Control Office
FIR	- Flight Information Region
FIS	- Flight Inspection Service
FL	- Flight Level, i. e., FL240 means 24,000 ft.
GCA	- Ground Controlled Approach
HF	- High Frequency
IATA	- International Air Transport Association
ICAO	- International Civil Aviation Organization
IFR	- Instrument Flight Rules
ILS	- Instrument Landing System
ISB	- Independent Sideband
KHz	- Kilo Hertz (formerly kilo cycles)
LF	- Low Frequency
LSB	- Lower Sideband
LRR	- Long Range Radar
MET	- Meteorological Service
MHz	- Mega Hertz (formerly Mega cycles)

19

MIA - Manila International Airport

NAS - Naval Air Station

NAVAID - Navigational Aid

NDB - Non-directional Beacon

NM - Nautical Mile

NOTAM - Notice to Airmen

OFACS - Overseas Foreign Aeronautical Communications Station (old term)

PAF - Philippine Air Force

PAL - Philippine Air Lines

RAPCON - Radar Approach Control Facility

RCAG - Remote Center Air/Ground

RCC - Rescue Coordination Center

RCO - Remote Communication Outlet

RCV - Receive

RTR - Remote Transmitter Receiver

SAR - Search and Rescue

SSB - Single Sideband

TACAN - Tactical Air Navigation

UHF - Ultra High Frequency

UN - United Nations

USAF - U. S. Air Force

USAID - United States Agency for International Development

USB - Upper Sideband

VASI	- Visual Approach Slope Indicator
(AVASI)	- Abbreviated VASI
VFR	- Visual Flight Rules
VHF	- Very High Frequency
VOR	- Very High Frequency Omnidirectional Range
VOT	- VOR Test Facility
WB	- Weather Bureau
XMT	- Transmit

21

SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

This report is the result of a study to determine the current status of civil aviation in the Philippines. The purpose of the report is to assist the Philippine Government in developing a system to serve the air space users of today and to meet the challenge of tomorrow.

An examination of the government function leads to the conclusion that the agency charged with responsibility for civil aviation has not been effective due principally to lack of financial support. The spread between appropriations and released funds is wide and cumulative increases make it virtually impossible for the CAA to plan for or accomplish significant capital improvements, not to mention maintain or operate the present system. The high percentage of "casual" or "daily" employees, particularly in the professional categories such as airways operations and engineering smothers initiative and is a prime source of inefficiency and discontent among employees who are denied permanent status and promotions.

Our findings were generally that the nation would benefit from passage of the proposed "National Aviation Commission Act", that the effectiveness and efficiency of the Civil Aeronautics Administration and the Civil Aeronautics Board would increase if certain organizational and personnel changes we have proposed were adopted, and that the Civil Aeronautics Administration is not in a financial position to conduct a major capital investment without outside national or international help.

A summary of aircraft and movement statistics reveals that as of November 1966 there were 378 registered aircraft in the Philippines and that general aviation accounted, by far, for the largest number (258). There are twelve international carriers serving Manila International Airport and three domestic carriers (one of which operates internationally) serving 58 points in the nation. The analysis reveals that aircraft and passenger traffic is highly concentrated at certain airports and over certain airways. Of the 76 national airports in the Philippines, only 13 could be considered to have adequate runway surfacing, and some of these are badly in need of attention. Where asphalt has been used, deterioration is evident through lack of maintenance. Many airports must be closed during rainy weather and with few exceptions terminal buildings are either inadequate or non-existent. Recommendations are submitted outlining a five year airport improvement program based on safety factors as a primary consideration.

The airways system of the Philippines composed of navigational aids, communications and air traffic control is not adequately serving the flying public. Aside from the threat to safety, the carriers themselves are suffering economic penalties due to inherent delays caused by malfunctioning of all phases of the system. The Survey Team reached the unanimous conclusion that lack of a properly functioning airway system is the most serious problem facing the nation today. The report points out that aside from mechanical problems or "cockpit trouble" airplanes crash trying to get from one airport to another --not after they arrive at the airport. It is estimated that "enroute" accidents, aside from the loss of life, cost the Philippine economy an average of $1.5 million annually from 1962 through 1965. These accidents might have been averted had there been adequate navigational aids, weather information and communications. Corrective action should begin immediately with the objective of creating a safer environment for present users of the airspace and developing a system to handle the traffic potential of the future. A two-phase attack is proposed involving a rehabilitation effort with a price tag of approximately $614,000 to be followed as funding becomes available by a substantial airways development program estimated at $9.7 million.

A discussion of some of the more important behind-the-scenes activities, referred to as Support Services, reveals accomplishment ranging from fair to good in some areas while in others unsatisfactory conditions exist. The importance of a very active flight inspection program is emphasized, and it is pointed out that lack of an adequate aviation weather reporting and dissemination service endangers the flying public, and an inexpensive method of correcting the condition is suggested. It was found that although general aviation constitutes the bulk of air activity in the nation they receive minimal service. The report proposes establishment of flight advisory service in conjunction with airway communications stations as a means of assisting this segment of aviation. Lack of logistic support for field facilities is discussed and the conclusion reached that deterioration of the present aviation system has been partially due to failure in this area and that any lasting improvement from a new system can only be achieved through implementation of an effective property management program within CAA.

The report submits an estimate of future staffing requirements for operation and maintenance of the airways system and presents recommendations for an expanded training program to supplement present efforts in this area. Throughout, concern is expressed over lack of adequately trained personnel and emphasizes the necessity for continued training and retraining of personnel in all Divisions of the Civil Aeronautics Administration.

23

Finally, a plan is submitted which in effect is a summary of proposed courses of action contained in each section. Costs and benefits are discussed and an opinion advanced that aside from intangible benefits accruing from an adequate aviation structure, justification could easily be found in a logical assumption that overall air travel will continue to grow at an average rate of 10% annually. It is further set forth that international travel to the Philippines will move ahead rapidly once the tourist potential of the country is developed. It is also noted that restrictions on international frequencies are depriving the nation of (a) landing and other fees at MIA and (b) tourist dollars.

PART ONE

Basic Considerations

SECTION I
GOVERNMENT ROLE

This section reviews in broad terms the responsibilities of the Government of the Philippines relating to the facilitation and regulation of civil aviation. In this capacity, it considers the legislative or legal basis for the civil aviation responsibilities, the agencies charged with carrying out these responsibilities, the personnel resources of the agencies in question, and the respective agency finances. It provides an appropriate area and starting point for our inquiry into the airport and airway needs of the Philippines.

A. Legislation

Civil aviation in the Philippines is provided for, and regulated, under Republic Act 776, which is entitled "The Civil Aeronautics Act of the Philippines." The general purpose of the Act, as stated in Section 2, "...is the reorganization of the Civil Aeronautics Board and the Civil Aeronautics Administration, defining their powers and duties and making certain adjustment of funds and personnel in connection therewith; and the regulation of civil aeronautics." The Act became effective on 20 June 1952 with the signature and approval of the President.

In general, the responsibilities and powers assigned to the Civil Aeronautics Administration relate to the operational and technical aspects of civil aviation, while those of the Civil Aeronautics Board relate to the economic aspect. This arrangement is similar to the situation obtaining in the United States where civil aviation responsibilities and powers in the central government are shared by the Federal Aviation Administration (formerly, the Federal Aviation Agency) and the Civil Aeronautics Board. This division of economic, operational, and technical responsibilities and powers between the two agencies for civil aviation recognizes a logical and needed separation of functions.

The essential responsibilities and powers of the Civil Aeronautics Administration relate to the national airports and airways. Relevantly, under Section 32 of Act 776, the CAA is called upon:

> "(2) To designate and establish civil airways, and to acquire, control, operate and maintain along such airways, air navigation facilities..."

> "(14) To plan, design, acquire, establish, construct, operate, improve, maintain, and repair necessary aerodromes and other air navigation facilities..."

"(24) To administer, operate, manage, control, and maintain and develop the Manila International Airport and all government-owned aerodromes except military airports."

A fundamental question raised is the type of airport ownership and operation--public or private or a combination of these--that best meets the needs of the Philippines.

In the United States, with the exception of the Dulles Airport and the National Airport, which serve Washington, D. C., and which are owned and operated by the Federal Government through the Federal Aviation Administration, airports other than military are owned and operated by local governments and private interests. In the bordering countries of Canada and Mexico, however, airports serving the general public are owned and operated by the national governments. Almost without exception, Asian airports and supporting facilities are owned and operated by the government.

The European countries present a somewhat different picture. In Austria, the airports are operated by private limited companies, although the land is owned by the Austrian Government. In France, the airports are, for the most part, state-owned and operated by chambers of commerce, the exceptions being Paris Airport and Bale-Mulhouse. In Germany, the Federal Government has administrative legal control over the airports. The 10 Federal German airports are operated, however, in the legal form of private limited companies or joint stock companies. The sole shareholders and proprietors are the Federal Government, the Lander, and local authorities. In the Netherlands, the airports are privately owned and operated. Amsterdam-Schiphol Airport is owned and operated privately, but with the participation of the state and the towns of Amsterdam and Rotterdam. The United Kingdom, with the exception of the airports in the London area, intends to operate all British airports as private companies, along German lines, with towns, countries, and regions having a share in the airport companies.[1]

Each country situation is recognizably different. In principle, we favor local government control for airports, insofar as the local governments (including cities, counties, and states) are the best judges of their particular needs, and the most interested parties. The actual

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1/ Traffic Growth, Planned Expansion and Investment Requirements of Federal German Airports Up to 1970, ITA Document 65/6-E (Based on a German report released in May 1964), Institut du Transport Aerien, Paris, France, 1965, pp. 23 and 29.

operation of an airport under a system of local government ownership may be instrumented in a corporate entity, privately or publicly controlled, as circumstances dictate. In Boston and New York separate governmental bodies, namely, the Boston Port Authority and the New York Port Authority, have been established to run airports, bus terminals, and other transportation terminal facilities.

In the case of the Philippines, the present system of nationally owned and operated public airports seems the best arrangement for the time being.2/ It is doubtful that any airport need would be fully met if the matter of ownership responsibilities were left entirely up to the local governments. They do not have the resources (planners, engineers, and money) available to the national government, actually or potentially. Under the present arrangement, the Civil Aeronautics Administration provides automatically a single focal point in the nation for ownership, establishment, development, operation, and maintenance of airports, and this seems to us a decided advantage at the moment, with the possible exception of Manila International. This airport already operates pretty much as an accounting entity of the Civil Aeronautics Administration. It receives revenues from landing charges and other sources, and has thus a certain earning power. And it is otherwise a possible candidate for operation as, say, a government-owned and controlled corporation or as, say, part of a port authority. The feasibility and desirability of changing the status of Manila International--or any national airport for that matter--would require, in the final analysis, a full feasibility study.

The ownership and operation of the airways system represents an entirely different matter. Complete control of the national airspace is a logical function of the national government. It would not be practical for several reasons for private ownership and operation to apply to the airspace. On the other hand, a private citizen (including by this definition an air carrier) can feasibly and desirably own and operate navigational aids for his own use. Such ownership and operation exists in the Philippines and in other countries of the world. However, where there is more than one natural user of privately owned and operated navigational aids (and communication facilities and capacity), there is no question in our mind that such aids should be owned and operated by the national government for the use and good of all.

Further considered, section 32 provides the Civil Aeronautics Administration with the important economic responsibility and power:

2/ It may be noted here that the airports at Gingoog and Lebak are owned and operated by the respective municipal governments.

X 26

"(15) To impose and fix, except those mentioned in section forty, paragraph twenty-five and hereinafter provided, reasonable charges and fees for the use of government aerodromes or air navigation facilities; for services rendered by the Civil Aeronautics Administration in the rating of any aerodrome or air navigation facilities, . . ." 3/

"(25) To determine, fix, impose, collect and receive landing fees, parking space fees, royalties on sales or deliveries, direct or indirect, to any aircraft for its use of aviation gasoline, oil and lubricants, spare parts, accessories, and supplies, tools, other royalties, fees or rental for the use of any of the property under its management and control."

urrently, user and service charges (landing, take-off, parking, space rental, and other types of charges and fees) are collected at only one national airport, namely, Manila Domestic and International, pursuant to Administrative Order No. 4, Series of 1966, dated 10 October 1966. The Civil Aeronautics Administration proposes to collect user and service charges at other national airports. Administrative Order No. 5, Series of 1966, has been prepared to this effect, and signed off in the CAA. However, as of 15 April 1967, the order had not been published in the Official Gazette or otherwise implemented. As matters stand, there is no actual, current experience regarding the ability of the national system of airports and airways to produce revenues from user and service charges, apart from Manila.

Monies collected by the Civil Aeronautics Administration from user and service charges and fees are put into revolving funds, in accordance with the provisions of Section 52 of Republic Act 776, as follows:

"Section 52. Disposition of receipt. --All money collected by the Civil Aeronautics Administration under the provisions of this Act shall constitute a revolving fund and shall be disbursed for the construction, repair, maintenance and improvement of government air navigation facilities: Provided, however, that any and all sums to be derived and collected for the Manila International Airport as well as cash and collections on accounts receivable standing to the credit of the National Airports Corporation and the Manila International Airport

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3/ And civil aviation schools, aircraft repair stations, and aviation radio and telecommunication stations, and to impose and collect charges and fees for aircraft registration and for aircraft and airmen licenses.

Division shall accrue to the Manila International Airport revolving fund which shall be disbursed by the Civil Aeronautics Administration for the operation of the Manila International Airport and for such other expenses as may be necessary, appropriate or incidental in connection therewith." 4/

Pursuant to this legal requirement, there are in operation two revolving funds, one for the Civil Aeronautics Administration based on revenues derived from charges and fees imposed by it, separate from the Manila International Airport Division, and one for the Manila International Airport Division based on the charges and fees imposed by it at Manila International.

The Civil Aeronautics Administration cannot take, or bleed off, monies from the MIA Revolving Fund for its own purposes, that is, for purposes other than for Manila International. It can--and does--charge off directly related, support activities of the CAA to the MIA Revolving Fund. The monies available from the CAA Revolving Fund are, in comparison to the MIA Revolving Fund, limited, as we shall see directly.

Turning to the Civil Aeronautics Board, whose responsibilities and powers are provided for in Act 776, the CAB, as distinct from the Civil Aeronautics Administration, plays--or can--a vital role in the development and improvement of the national airports and airways. Its policies, decisions, and rulings dictate importantly the volume and distribution of commercial air traffic and generally the character of civil aviation. The exact volume and distribution of air traffic affords, in turn, the basis for allocating resources to particular airport and airway projects and also the basis for recovering costs from airport and airway users, including aircraft operators, passengers, and shippers.

Both the Civil Aeronautics Administration and the Civil Aeronautics Board are called upon, in Section 4 of the Act, to consider, inter alia, "The promotion of adequate, economical and efficient service by air carriers at reasonable charges, without unjust discriminations, undue preferences or advantages, or unfair or destructive competitive

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4/ The National Airports Corporation was created by Republic Act 224, approved 5 June 1948. Its purpose was to serve as an agency of the Government for the development, administration, operation, and management of government-owned airports other than military. It was abolished on 10 November 1950 by Executive Order 365.

practice;" and "Competition between air carriers to the extent necessary to assure the sound development of an air transportation system properly adapted to the need of the foreign and domestic commerce of the Philippines, of the Postal Service, and of the National Defense." Section 10 provides the Civil Aeronautics Board with the general responsibility and power to regulate the economic side of air transportation. It further provides the Board with the specific powers, among others: (a) to issue temporary permits and certificates of public convenience and necessity for air transportation services; (b) to determine and fix air transportation charges, rates, and fares; (c) to specify routes and points to be served; (d) to allocate and regulate frequencies of both domestic and foreign carriers; (e) to authorize domestic and international charters; and (f) to request traffic and other needed information from carriers.

With respect to the last item, we interpret Section 10, and Section 11, of the Act, as giving, despite the lack of specific reference to the particular type of traffic statistics in question, the Civil Aeronautics Board the right to demand and receive such traffic statistics as it may feel it needs from the carriers to do its job. We include in this interpretation statistics having to do with the origin and destination of passengers and goods, the number of passengers boarded and off-loaded by a carrier at its route segment, and other kinds of traffic statistics. Without accurate, complete statistics on the movement of passengers and goods, it is not possible to provide for the effective economic regulation of the air transport industry. The right of a government to receive traffic statistics from transport carriers is understood, insofar as any carrier--surface or air--is a public utility, clothed with the public need, and is a servant of the People.

We interpret the contents of Act 776 as giving the Civil Aeronautics Board a clear mandate to promote and regulate air transport competition in the nation. The results of competition are communicated in the form of improved service, lower fares, and increased traffic. Some routes may not be able to support competition due to the limited volume of the traffic and because of the high costs of the route. Short feeder routes are generally in this category. Such routes may require carrier subsidies--direct or indirect--for their operation in the National Interest. However, on the heavy traffic routes, "regulated" competition is very definitely in the interest of the traveling public and the nation at large.5/

5/ Mail payments to carriers by the Government can represent, for example, an indirect subsidy.

The Congress of the Philippines has, under its power to create public utilities, franchised three carriers for scheduled air services, namely, Air Manila (AMI), Filipinas Orient Airways (FOA), and Philippine Air Lines (PAL). The first two were franchised only recently--in 1965 and 1964, respectively--commencing domestic scheduled air operations in 1965. Until that time, Philippine Air Lines had had an exclusive monopoly in scheduled domestic and international air services. The three carriers compete currently on several domestic routes. (PAL continues to be the only flag-carrier engaged in international air operations.) Thus, it was the Congress and not the Civil Aeronautics Board that introduced scheduled carrier competition into the domestic scene. The Board was, for its part, presented with a fait accompli. The fact that both the CAB and the Congress can put carriers into the market place makes certain implications for effective economic regulation, it should also be added.

The introduction of scheduled air carrier competition in the Philippines highlights the need to update and detail the economic responsibilities and powers of the Civil Aeronautics Board. Act 776 is a good piece of legislation viewed generally from the coverage afforded and the period represented. Since its enactment in 1952, however, a tremendous expansion in civil aviation activities has taken place. As presently written, Act 776 is silent on the subject of air taxi operators, air freight forwarders, pooling arrangements, and on other aspects of what has become a sophisticated world business. The proposed "National Aviation Act of the Philippines," as contained in House Bill 5147, which has passed the House and is awaiting its third reading in the Senate, recognizes deficiencies in the present aviation legislation and meets other aviation needs. In essence, the Bill affords new and expanded language on the economic, operational, and technical regulation of civil aviation; provides for the continued operation of a national system of airports and airways; and creates a new organization structure for civil aviation in the national government.

Regarding the last item, the Bill would create a National Aviation Commission. The Commission would exercise control over the Civil Aviation Agency and the Air Transport Board, successor organizations of the Civil Aeronautics Administration and the Civil Aeronautics Board, respectively. The activities of the Commission would be presided over by a Commissioner of National Aviation who would be appointed by, and report to, the President. He would hold the rank of a department head, and would hold office at the pleasure of the President. Among his other powers, the Commissioner of National Aviation would advise the President on aviation policy matters, participate in international air transport negotiations, and supervise the work of the Civil Aviation Agency and the Air Transport Board. The post of a

Deputy Commissioner of National Aviation, to be filled by presidential appointment, would also be created.

The Air Transport Board would "...be composed of three members, to be appointed by the President of the Philippines with the consent of the Commission on Appointments. Of the members of the Board to be appointed, the first one shall hold office for ten years and shall be Chairman thereof; the second, for eight years; and the third, for six years. The Chairman and the members of the Board shall not be reappointed upon the expiration of their terms of office." The Board would have the power, inter alia, to issue temporary or provisional operating permits and certificates of public convenience and necessity (with the approval of the President, in the case of foreign carriers); to determine and fix fares, and capacity needs; to grant letters of authority for charter flights, domestic and international, and for special air services (which is defined to include air freight forwarders and travel and ticket agencies); to inquire into the management of the business of any air carrier; and to investigate air accidents, reporting facts and making recommendations to the Commissioner of National Aviation. This last provision acts, in effect, to transfer the accident investigation responsibility from the CAA to the CAB.

The Civil Aviation Agency would "...be headed by a Director of Civil Aviation who shall be appointed by the President with the consent of the Commission on Appointments, shall hold office during good behaviour, unless sooner removed by provisions of law, and shall receive an annual basic salary of not less than twenty thousand pesos." The qualifications of the Director of Civil Aviation would include "...actual experience in aviation as a pilot for at least ten years prior to his appointment." (This requirement could prove a stumbling block for an otherwise qualified candidate.) The Director is provided with the power to develop, operate, and maintain national airports and airways, and with the power to fix and collect user and service charges. All revenues so collected would constitute a revolving fund for use by the National Aviation Commission and the two agencies. "The Director of Civil Aviation is directed to make long-range plans and to formulate policies with respect to the orderly development and use of the navigable airspace, and the orderly development and location of landing areas, national airports, radar installations and all other aids and facilities for air navigation..." The post of a Deputy Director of Civil Aviation is also created.

We support and indorse the proposed "National Aviation Act of the Philippines" from the standpoint of the need to update the economic, operational, and technical functions of the CAA and the CAB or their successors. And we indorse it from the standpoint of the need to create an independent aviation body in order that the proper recognition, balance, and flexibility is afforded civil aviation in its current state of development in the Philippines. By way of proviso, we would expect that the decisions and orders of the Air Transport Board to be final, not subject to reversal by the Commissioner, but subject only to judicial review by a court of law.

B. Agencies

As noted, there are two agencies of the Government of the Republic of the Philippines which are directly concerned with and involved in civil aviation affairs of the nation. The Civil Aeronautics Administration--one of the two agencies--forms a part of the Department of Public Works and Communications. (See Exhibit I-A) The Civil Aeronautics Board--the other agency--is under the Department of Commerce and Industry. (Formerly, pursuant to Section 26 of Act 776, the CAA came under the Department of Commerce and Industry, but this was subsequently changed by executive order.) The two departments form, in turn, a part of the Executive Branch of the Government.

1. Civil Aeronautics Administration

The present internal organizational structure of the Civil Aeronautics Administration consists of 18 organizational components. (See Exhibit I-B) They are, in the directive zone of administration and management, 6/ as follows: The Director of Civil Aviation (and Director of the Civil Aeronautics Administration), the

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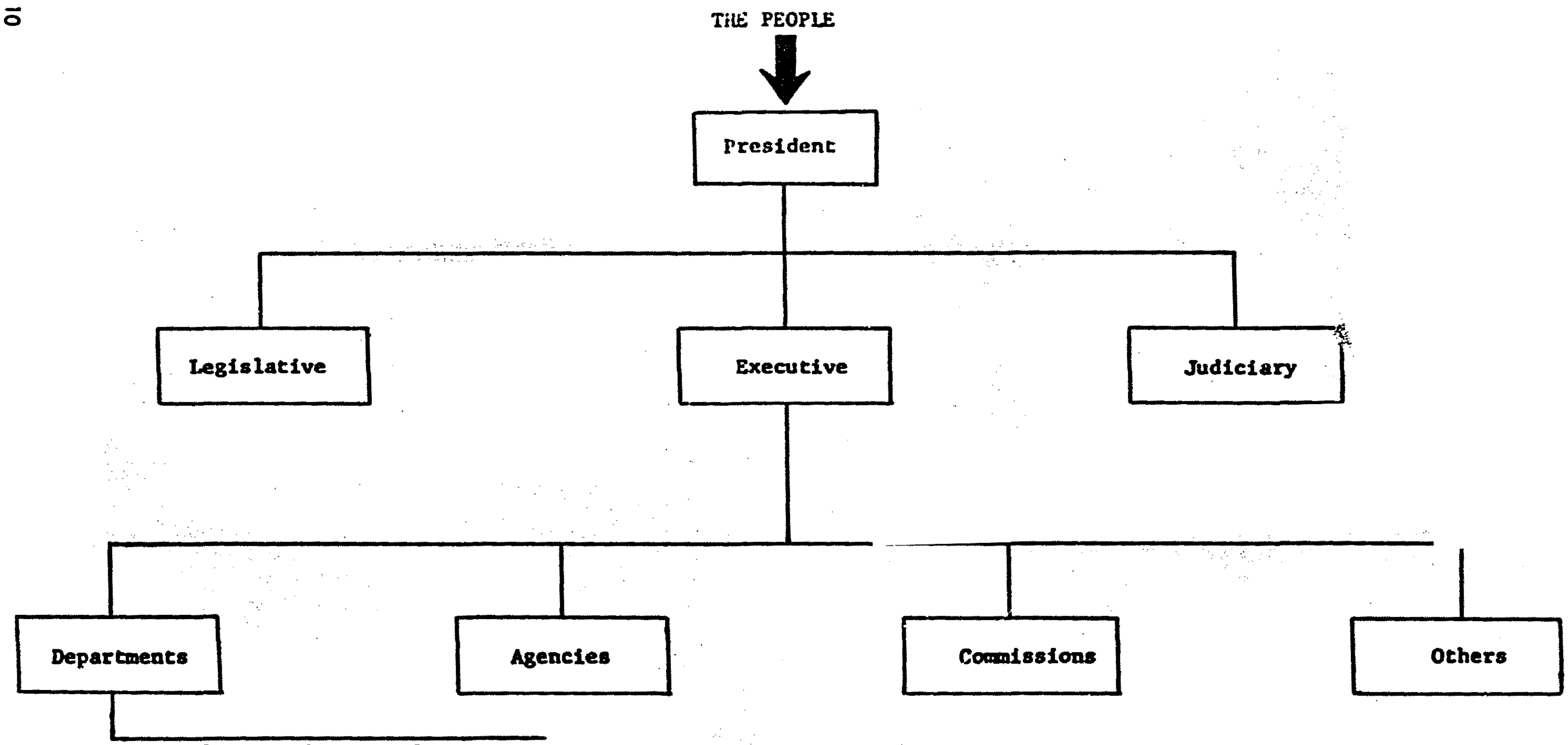
6/ The concept of three zones of management or organization was developed by Professor Holden, at Stanford University. As defined, the directive zone contains the organizational components and elements (or functions and activities) which are finally concerned with and responsible for the management of an organization. Here rests leadership at the apex of the pyramid. The facilitative zone contains functions and activities which support a purpose, but they do not achieve or represent the purpose itself. Examples of such functions and activities are legal advice, research and statistics, economic analysis, personnel administration, and others. They may or may not involve an element of control. The operational zone contains functions and activities which are directly and immediately concerned with the achievement of a purpose for which the organization was created. Without the subject functions and activities, there would be no purpose for the organization to exist. They are, in military jargon, the front-line outfits.

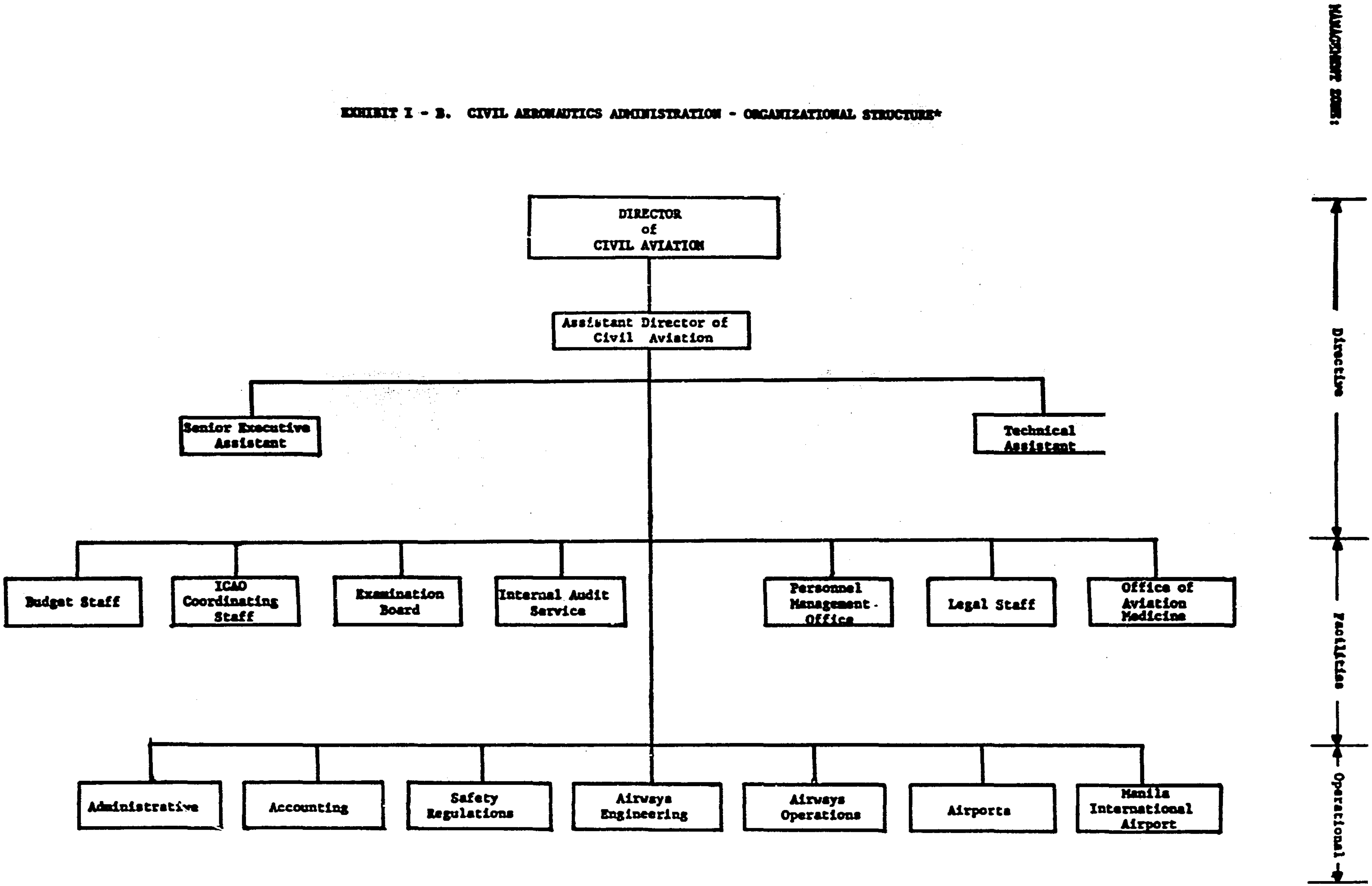
EXHIBIT I - A. ORGANIZATION OF THE GOVERNMENT OF THE PHILIPPINES (15 April 1967)



Agriculture and National Resources
Commerce and Industry (Civil Aeronautics Board)
Education
Finance
Foreign Affairs
Health
Justice
Labor
National Defense
Public Works and Communications (Civil Aeronautics Administration)

Source: Budget Commission; others.

EXHIBIT I - B. CIVIL AERONAUTICS ADMINISTRATION - ORGANIZATIONAL STRUCTURE*



* As of 15 June 1967.

Assistant Director of Civil Aviation, the Senior Executive Assistant, and the Technical Assistant. It is sufficient to say for our purposes here that the Director has the leadership role, and is, with his deputy, responsible for the over-all operation of the Civil Aeronautics Administration. The Senior Executive Assistant assists the Director in the development of policy, the coordination of the work of the various staff and operating elements of the organization, and countersigns disbursements of the office as directed by the Director. Essentially, he acts as a senior administration officer. The Technical Assistant provides advice on technical matters to the Director, makes studies, and performs such other duties as the Director may indicate. Essentially, he acts as a senior technical officer. The combination of a senior administrative assistant on one side and of a senior technical assistant on the other side represents, in our view, a good management feature in the directive zone for an organization such as the CAA.

In the facilitative zone--or at the staff level--the organizational components of the Civil Aeronautics Administration are, as follows: Budget Staff, ICAO Coordinating Staff, Examination Board, Internal Audit Service, Personnel Management Office, Legal Staff, and Office of Aviation Medicine... seven in number.

Succinctly, the Budget Staff is responsible for providing advice on financial matters to the Director, preparing the agency budget, controlling and reporting on disbursements, and developing procedures for better budget control. The ICAO Coordinating Staff is charged with advising the Director on ICAO matters, fulfilling the requirements (e.g., representation at ICAO conference and meetings) of membership in ICAO, and maintaining liaison with ICAO. 7/ The Examination Board conducts various examinations in connection with the granting of licenses and ratings by the CAA. The Internal Audit Service, as its name implies, conducts audits with respect to the use of money and property. The Personnel Management Office advises the Director on personnel matters, participates in the development of performance standards and evaluations with the Wage and Position Classification Office (WAPCO) of the Budget Commission, assists in staff development and training, and maintains personnel records and files. The Legal Staff handles all legal

7/ ICAO, or the International Civil Aviation Organization, is a technical agency of the United Nations, with headquarters at Montreal, Canada, and of which the Republic of the Philippines is a member.

matters relating to needs of the CAA and, in addition, makes economic recommendations to the Director in connection with his function as Vice-Chairman of the Civil Aeronautics Board. Lastly, the Office of Aviation Medicine is concerned with all medical needs and activities of the Civil Aeronautics Administration.

The organizational components in the operating zone--line elements --of the Civil Aeronautics Administration consists of the Administrative Division, Accounting Division, Safety Regulations Division, Airways Engineering Division, Airways Operating Division, Airports Division, and the Manila International Airport Division...also seven in number.

The Administrative Division oversees all administrative activities of the Civil Aeronautics Administration; executes administrative policies, regulates, and rules; and assists in the study of management problems and needs. The Accounting Division operates and maintains all the financial accounts of the CAA. The Safety Regulations Division issues flight safety regulations, prepares regulations applying to safety considerations in aircraft design and materials, and investigates aircraft accidents, determining the causes thereof and reporting the same to the Civil Aeronautics Board. The Airways Engineering Division is responsible for the development, establishment, operation, and maintenance of air navigational facilities and capabilities, and for meeting the related training requirements. The Airways Operations Division is, for its part, responsible for the development, establishment, operation, and maintenance of the airways, including aeronautical communications, air traffic services, search and rescue coordination, and training needs. The Airports Division plans, designs, constructs, maintains, and improves national airports and air navigational structures; rates airports; enforces airport hazard regulations; and acts as consultant in private airport efforts. Finally, the Manila International Airport Division "operates, controls, and manages the entire Manila International and Domestic Airport."

As presently constituted, the organizational structure of the Civil Aeronautics Administration raises no problems or questions in our mind with respect to the current organizational structure in the directive zone. The functions and activities of the Director of Civil Aviation, the Assistant Director of Civil Aviation, the Senior Executive Assistant, and the Technical Assistant are all properly classified and located in the right zone. But, insofar as the balance of the organizational structure is concerned, in the facilitative and operational zones, we do have problems and questions. Relevantly, the test that may be applied is whether the functions and activities in either one of the zones constitutes the main business or mission of the organization or simply serves to facilitate or support the achievement of the mission. In the case at hand, we assume that the mission of the Civil Aeronautics Administration is to provide, operate, and maintain a national system of airports, and airways, including in this mission the development and application of operational, safety, and technical rules and regulations.

Given the above test, we would, first, remove the Administration and Accounting Divisions from the operational zone--where they now appear on the organizational chart of the Civil Aeronautics Administration, and place them in the facilitative zone where they properly belong. The stated function, "...takes charge of the overall administrative function of the agency...", really places it in the directive zone and its stated function, "...helps in the study of management problems...", more correctly places it in the facilitative zone. The Accounting Division, as the Administration Division, is a specialized, supporting activity, and it too belongs for the same reason in the facilitative zone. The change of position for the two divisions may require nothing more than moving blocks on an organizational chart, but it also means that the leadership of the CAA has a clear understanding where the Administration and Accounting Division fit in.

Secondly, we would split up the Airports Division into an Airports Engineering Division and an Airports Operations Division, along the lines of the present division of responsibilities between the Airways Engineering Division and the Airways Operations Division. The operating and technical aspects of the airport business are two distinct functions, in particular, given a large number of airports to run and a large construction program to mount. In the suggested division, the Airport Engineering Division would pick up all technical functions and activities relating to airports, and the Airports Operations Division would pick up all operational functions and activities. Maintenance could be assigned to one or the other, or heavy maintenance to one and light maintenance to the other, or some other arrangement for maintenance adopted. The new alignment means two airport divisions on the line, but this introduces no new problems. The object is, rather, to improve the allocation and use of resources in carrying out the mission of the CAA. An operational and technical breakout of airport functions also compliments the current organizational provisions for the airways divisions.

Thirdly, we would establish a small economic and statistical staff unit, with high enough grades to make the positions attractive to highly qualified individuals. Preferably, the unit would report directly to the Director of Civil Aviation. The unit might conceivably, form part of a staff policy group, established as such. In any case, it may be appreciated that continuing statistics are essential in measuring the utilization and requirements of the national airport and airway system. The Civil Aeronautics Administration collects and develops some statistics on airport movements (aircraft, passengers, and goods), but the airport statistics in question, insofar as they are represented by the "caretaker" reports, leave much to be desired in the way of accurate, complete, and timely traffic information. We would like to see the CAA publish a quarterly report covering traffic movements at all airports under its control. The economic side of the need is for continuing development of cost data on airports and airways and vitally for studies on the development of revenues from user and service charges. We do not suggest that such studies will lead automatically to the recovery of all airport and airway costs, but they may serve to recover some costs. 8/

Finally, we would suggest without making any particular recommendation at this time that the several organizational components and elements in the facilitative zone of the Civil Aeronautics Admitration be looked at from the standpoint of possible consolidation and division where this is also indicated.

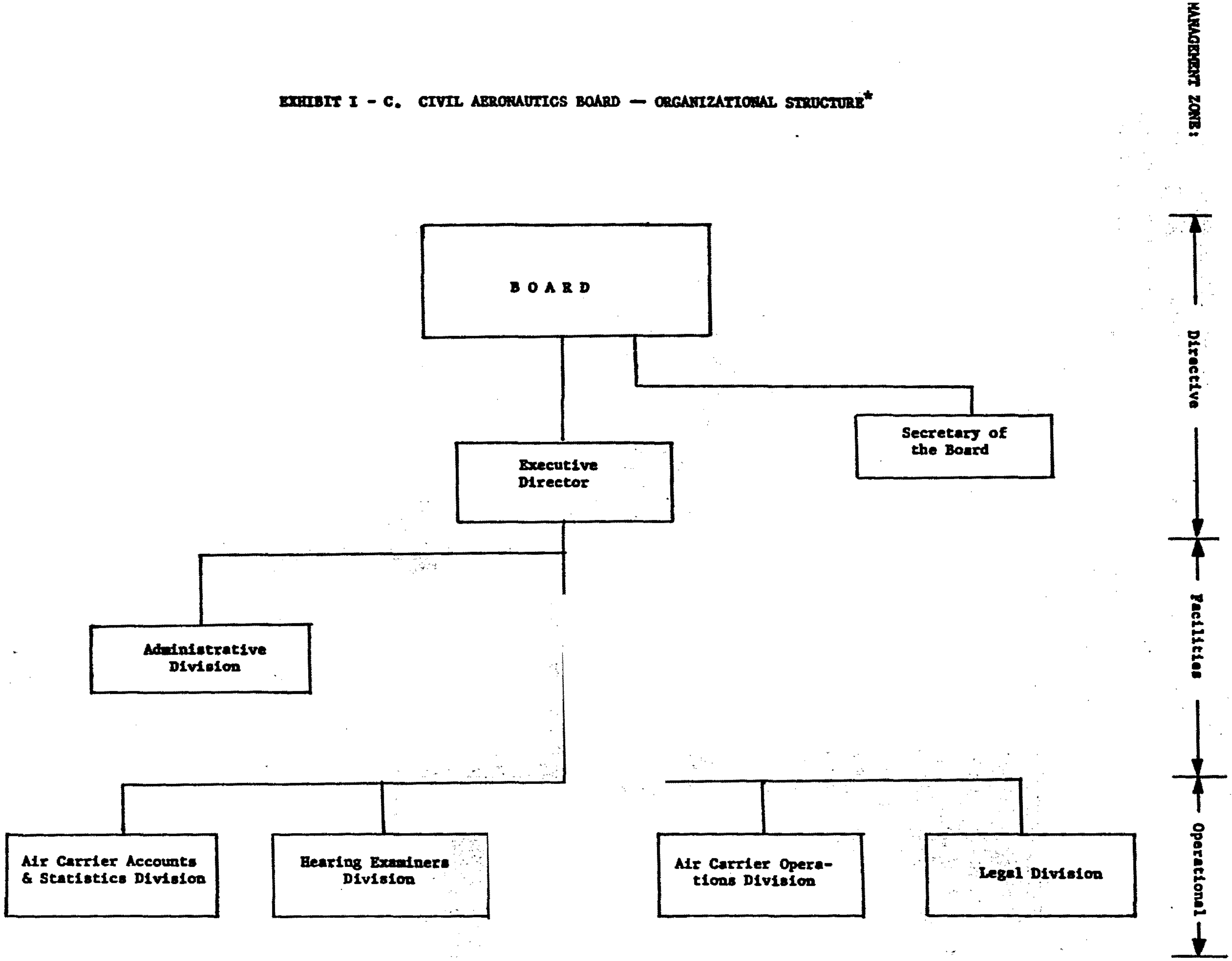
2. Civil Aeronautics Board

The Civil Aeronautics Board is a much smaller organization than the Civil Aeronautics Administration. As now constituted, the organizational structure of the CAB in the directive zone consists of the Board itself, a Secretary to the Board, and an Executive Director. (See Exhibit I-C) The membership of the Board, which is defined in Act 776, comprises the Secretary of the Department of Commerce and Industry, acting as Chairman; the Director of the Civil Aeronautics Administration, Acting as Vice-Chairman; the Commanding General of the Philippine Air Force; and two other members, appointed by the President with a term of office at his pleasure. The Chairman and two members constitute a quorum. In the absence of the Secretary of the Department of Commerce and Industry, the Director of the Civil Aeronautics

8/ The CAA should also be in a position to contract out user charge and other studies of an economic need to such firms as, say, the Economic Development Foundation (EDF) of the Philippines. Outside contracts provides a means of obtaining needed expertise without adding to the payroll. And, in the case of EDF, access is also provided to both domestic and international expertise.

X 40

EXHIBIT I - C. CIVIL AERONAUTICS BOARD — ORGANIZATIONAL STRUCTURE*



* As of 31 March 1967.

Source: Civil Aeronautics Board.

Administration takes over as Chairman. The Board, in sitting, hears petitions and appeals and hands down decisions and orders, and otherwise exercises economic control over civil aviation. The Secretary of the Board records all formal actions of the Board, prepares the agenda, and performs other duties. The Executive Director acts as chief operating and executive officer of the CAB, assisting the Chairman in the administration of the Civil Aeronautics Board. The organizational provisions of the Board at the Directive zone are clear and functional, giving us no problems.

In the facilitative zone, there is only one organizational component, entitled the Administrative Division. It functions strictly as a staff activity. In this capacity, it is responsible for the preparation of the budget of the Civil Aeronautics Board, servicing its personnel needs, providing logistical support for the organization at large, and conducting other activities of a support nature. Here, also, we have no particular problems to air or recommendations to make.

The operational zone of the Civil Aeronautics Board contains four organizational components: Air Carrier Accounts and Statistics Division, Hearing Examiners Division, Legal Division, and Air Carrier Operations Division. The first division is responsible for carrying out the Board's accounting and statistical regulations, as they apply to the regulated carriers. The second division is responsible for conducting formal hearings and proceedings involving the economic regulations of the Board and the quasi-judicial powers of the Board under Act 776. The third division is responsible for the legal enforcement of Board orders and regulations, rendering legal opinions to the Board and Board staff, and providing other support activities of a legal nature. The fourth and remaining division is responsible for the development and interpretation of economic and operations data of interest and need to the Board members and to Board staff members.

By way of comparison, the Air Transport Board of Canada consists of four branches, namely, Legal, Operations, Economics and Accounting, and Secretary's. The Legal Branch which is under the Board Counsel and Examiner, advises the Board on legal matters, conducts public or other hearings on behalf of the Board, prepares findings, and makes recommendations thereon. The Operations Branch makes tariff studies, handles applications for licenses to operate domestic and international commercial air services, prepares and issues statistical reports on air carriers, conducts field investigations relating to enforcement needs, concerns itself with international air transport policy matters, and does other things. The Economics and Accounting Branch advises the Board on economic matters and performs carrier audits and financial analyses. The Secretary's Branch operates administrative activities, including personnel, office services, and the Board library. It deals with all official correspondence to the Board, exercises general administration and supervision of the divisions comprising the Branch, and maintains liaison with public, industry, and government departments.[9]

The United States Civil Aeronautics Board comprises the Board itself and the Executive Director in the directive zone; Information, Community and Congressional Relations, Management and Programs, Personnel and Security, Comptroller, Administrative Services, and General Counsel in the facilitative zone; and the following bureaus in the operational zone: Operating Rights, Economics, Accounts and Statistics, Enforcement, and International Affairs. The Bureau of International Affairs is involved in matters having to do with international aviation policies and relations, including bilateral negotiations with other countries and multilateral activities which are represented essentially by United States relations with the International Civil Aviation Organization. Relations with ICAO cut across several fields of interest, including economic, legal, operational, and technical. The Board's purview of responsibility and nature of interest extends to the economic and legal aspects.

With respect to the Civil Aeronautics Board of the Philippines, the following possible changes are suggested: (a) rename the Hearing Examiners Division to the Operating Rights Division; (b) establish an Office of General Counsel in the facilitative zone, picking up appropriate functions from the Legal Division; (c) rename the Legal Division to the Enforcement Division, retaining therein the present compliance functions; and (d) rename the Air Carrier Operations Divisions to Air Economics Division. These changes neither add nor drop functions; they simply reorder some and apply new names. The new staff function, the Office of General Counsel, would participate in the development of positions by the Department of Foreign Affairs for negotiations and consultations with other countries on civil aviation matters, and in the negotiations and consultations themselves. The Air Economics Division would also be expected to take part in international aviation affairs, as expertise in the field of economics. It would be further expected to participate in ICAO economic activities. At such time as the size of international aviation activities of the Board warranted it, a separate operating division could be set up.

9/ Organization of the Government of Canada, Queen's Printer, Ottawa, Canada, July 1963, pp. 78-80.

43

C. Personnel

People represent singly the most important resource available to a country or to an organization. Without intelligent, industrious people --and the proper incentives--little can be hoped for in the way of achievement and accomplishment. Other resources count, but only as a function of the kind of people on the job.

1. Civil Aeronautics Administration

At the end of Fiscal Year 1966, the Civil Aeronautics Administration had 1, 320 permanent employees and 1, 674 temporary employees on its payroll. (See Exhibit I-D) The number of permanent employees constituted 44. 1 per cent of the total working force. From 1962 to 1966, the number of permanent employees increased from 851 to 1, 320 or by 469 for an average annual rate of growth of 11. 7 per cent. In the same period, the number of temporary employees increased from 1, 097 to 1, 674 or by 577 for an average annual rate of growth of 12. 0 per cent. The number of permanent employees as a percentage of the total number of workers varied from a low of 43. 1 per cent in 1963 to a high of 49. 8 per cent in 1965. The payroll of the Civil Aeronautics Board listed 45 permanent employees at the end of Fiscal Year 1966, as compared to 34 in 1962 and 1963 and to 45 in 1964 and 1965, along with a small number of temporary employees in each year.

As of 15 March 1967, the Civil Aeronautics Administration had a total of 1, 402 permanent positions. Of this total, 1, 077 were assigned to the Civil Aeronautics Administration and the remaining 325 were assigned to the Manila International Airport Division which is operated as a separate part of the CAA. The former basis accounted for 1, 019 filled jobs and the latter basis accounted for 311 filled jobs, for a total employment of 1, 330 persons and 72 vacancies (58 and 14, respectively). The permanent positions are established and funded under appropriation acts of the Congress, and are, for the most part, under Civil Service Commission regulations. In addition to the roster of permanent employees and spaces, the Civil Aeronautics Administration, including the Manila International Airport Division, had, as of 30 November 1966, a total of 1, 674 temporary workers (or dailies). These workers are without status, are hired for a period of six months or less, and are compensated for work performed (no holiday or leave time pay) out of lump-sum appropriations made by the Congress for the purpose. Currently, the Civil Aeronautics Board has 45 permanent employees and 12 temporary employees.

EXHIBIT I - D. PERSONNEL STRENGTH OF THE CIVIL AERONAUTICS ADMINISTRATION AND THE CIVIL AERONAUTICS BOARD

Line	Year a/	Civil Aeronautics Administration								Civil Aeronautics Board
		Permanent Employees b/			Temporary Employees c/			Total		Permanent Employees b/
		Strength	1962-1965 Change		Strength	1962-1965 Change		(2) + (5)	(2) as % of (8)	Strength
			Number	Per Cent		Number	Per Cent			
Col.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1	1962	851	-	-	1097	-	-	1948	43.68	34
2	1963	911	60	7.05	1205	108	9.84	2116	43.05	34
3	1964	1073	162	17.78	1157	(48)	(3.98)	2230	48.12	45
4	1965	1234	161	15.00	1246	89	7.69	2480	49.76	45
5	1966	1320	86	6.97	1674	428	34.35	2994 d/	44.09	45
6	Total:	-	469	46.80	-	577	47.90	-	-	-
7	e/	-	117	11.70 e/	-	144	11.98 e/	-	-	-

a/ Fiscal year ending 30 June.
b/ Full-time, continuing employees; individual wages and salaries specified in appropriation acts.
c/ Employees hired for a period of six months or less; paid out of a lump-sum appropriation and releases of funds.
d/ Number of authorized permanent positions and filled permanent positions as of 15 March 67: 1402 and 1330, respectively. Number of temporary employees as of 6 March 67: 1742. Total employees: 3072.
e/ Average annual rate of change. Increases unless otherwise indicated. Values derived by dividing percentage totals on above line.

Source: Civil Aeronautics Administration and Civil Aeronautics Board.

The permanent positions of the Civil Aeronautics Administration involved, separate from those assigned to the Manila International Airport Division, a total of 51 occupational groups and 38 grades, based on the classification and compensation plans of the Wage and Position Classification Office (WAPCO) of the Budget Commission.[10/] (See Exhibit I-E) The occupational group Airways Operation contained 288 positions or 26.7 per cent of the total (1,077). Airways Engineering had 153 positions or 14.2 per cent of the total. Fire-fighting followed next with 96 positions or 8.9 per cent; then Construction and Maintenance, 90 positions or 8.4 per cent; Mechanical Plant Operation, 64 positions or 5.9 per cent; General Clerical, 58 positions or 5.4 per cent; and Civil Engineering, 50 positions or 4.6 per cent. The remaining occupational groups fell below 4.6 per cent in varying numbers and percentages. There were 17 occupational groups with only one position, including that of Painter. The government at large operates on the basis of a total of 262 occupational groups.

Grades of the Civil Aeronautics Administration varied from a low of 26 to a high 65. Grades 26 through 30 accounted for 353 positions or 32.8 per cent of the total; grades 31-40 for 362 positions or 33.6 per cent; grades 41-50 for 325 positions or 30.2 per cent; grades 51-60 for 36 positions or 3.3 per cent; and grades 61-65 for one position or 0.1 per cent. The single position was that of Director of Civil Aviation. The pay scale for grade 26 is 2,160/2,544 pesos yearly, the exact pay depending upon the step in grade. Airport caretakers are in this grade. At the high end, the pay scale for grade 65 is 14,532/17,724 pesos yearly.

The positions and grades of the Civil Aeronautics Administration as separated from the Manila International Airport Division appear to be properly distributed in relation to the various occupational groups, and is not overly top-heavy. The essential occupational groups--Civil Engineering, Airport Operation, Airways Engineering, and Airways Operation--account collectively for the largest block of personnel. Notwithstanding,

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10/ Occupational Groups, Classes and Salary Ranges of the Classification and Compensation Plans, Wage and Position Classification Office, Budget Commission, Republic of the Philippines, Manila, R. P. June 1966, various pages.

X 46

EXHIBIT I - E. CIVIL AERONAUTICS ADMINISTRATION - PERSONNEL BY TYPE AND GRADE
(EXCLUDING MANILA INTERNATIONAL AIRPORT DIVISION)

OCCUPATION GROUP	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
1. Accounting		2 (2)		3			3				2		1				1			
2. Aeronautical Engineering																1				
3. Aircraft Engineering and Repair						5			2	2			1 (1)			1				
4. Airport Operations																	5			
5. Airways Operation												41 (1)		39 (1)			97			41
6. Airways Engineering	2 (1)						2					25		44		6	37		5	8
7. Architecture							3			1									1	
8. Automotive Engineering & Repair	22									2										
9. Automotive Equipment Operations	10 (1)	3 (1)																		
10. Blueprinting & Photostating	1 (1)																			
11. Budgeting			1			2		2						1			1			
12. Buying				2																
13. Cartography					1												1			
14. Cashiering													1							
15. Civil Aeronautics Regulation													8		1 (1)	3 (1)	1		8	
16. Civil Engineering							11			3						13			12	
17. Construction & Maintenance	61 (11)			1		1		6				1								
18. Duplicating Equip. Op.	1																			
19. Electrical Engineering																1				
20. Executive Assistance																				
21. Firefighting	44 (9)	29			19					2				2						
22. General Clerical	34 (7)		20		10			4												
23. General Personnel			1					2												
24. In-Service Training														1						
25. Internal Auditing & Fiscal Examination						1			1		3		4					2		
26. Laboring	16 (1)																			
27. Legal Counselling											4			6				2		
28. Library					1															
29. Machine Tool Operation			2																	
30. Materials Testing & Research	8																			
31. Mechanical & Electrical Engineering																				2
32. Mechanical Engineering										2						1				
33. Mechanical Plant Operation	7	15 (1)				18 (2)				19 (1)										
34. Mechanical Repair			1			5							11			3				
35. Medical Officers																			1	
36. Medical Technicians			1																	
37. Meteorology																				1
38. Nursing			1																	
39. Painter	1																			
40. Public Information					1 (1)								1							
41. Records Management											1									
42. Secretarial-Steno				9 (1)		2			2 (1)											
43. Security Guarding	2																			
44. Statistical		1								1										
45. Storekeeping	7 (1)							1												
46. Surveying		6					2					2								
47. Tabulating Equipment Operation								1												
48. Telecommunication Engineering and Repair	1																			
49. Welding		1																		
50. Administrative Service																				
51. Supply Management															1					
Total No. of Positions / Total No. of Vacant Positions	222 (40)	57 (4)	27	15 (1)	32 (1)	44 (2)	23	16	5 (8)	32 (1)	10	69 (1)	28 (1)	133 (1)	2 (1)	28 (1)	143	4	27	51

OCCUPATION GROUP	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	Total Positions	Vacant Positions
1. Accounting			1						1												16	(2)
2. Aeronautical Engineering		1																			2	
3. Aircraft Engineering and Repair																					11	(1)
4. Airport Operations		5																			10	
5. Airways Operation		8		12		6		6	2												268	(2)
6. Airways Engineering		5		8	5	6		6	1		1										153	(1)
7. Architecture					1																6	
8. Automotive Engineering & Repair																					24	
9. Automotive Equipment Operations																					13	(2)
10. Blueprinting & Photostating																					1	(1)
11. Budgeting			1																		8	
12. Buying																					2	
13. Cartography																					2	
14. Cashiering																					1	
15. Civil Aeronautics Regulation		7			7 (3)	1	2		7		7				1					1	43	(5)
16. Civil Engineering			2		3			2		1		1									50	
17. Construction & Maintenance																					90	(11)
18. Duplicating Equip. Op.																					1	
19. Electrical Engineering																					1	
20. Executive Assistance							1														1	
21. Firefighting																					96	(9)
22. General Clerical																					58	(9)
23. General Personnel	1																				4	
24. In-Service Training																					1	
25. Internal Auditing & Fiscal Examination				1																	12	
26. Laboring																					16	(1)
27. Legal Counselling				1			1														14	
28. Library																					1	
29. Machine Tool Operation																					2	
30. Materials Testing & Research			1																		9	
31. Mechanical & Electrical Engineering					1																3	
32. Mechanical Engineering																					3	
33. Mechanical Plant Operation																					64	(4)
34. Mechanical Repair																					20	
35. Medical Officers						1															2	
36. Medical Technicians																					1	
37. Meteorology																					1	
38. Nursing																					1	
39. Painter																					1	
40. Public Information	1																				3	(1)
41. Records Management																					1	
42. Secretarial-Steno																					13	(2)
43. Security Guarding																					2	
44. Statistical																					2	
45. Storekeeping																					8	(1)
46. Surveying																					10	
47. Tabulating Equipment Operation																					1	
48. Telecommunication Engineering and Repair																					1	
49. Welding																					1	
50. Administrative Service							1														1	
51. Supply Management	1																				2	
Total No. of Positions / Total No. of Vacant Positions	3	26	5	22	18 (3)	10	3	10	6	1	2	1			1					1	1,077	(58)

Source: Civil Aeronautics Administration (31 March 1967).

47

these four occupational groups should continue to be supported in terms of better pay.[11] The Airways Operations groups invite special attention, since it is this group which contains the position of air traffic controller. We would hope that this position be not only well compensated, but include talented individuals with a manifested esprit de corps. We need not dwell on the vital role played by a controller of aircraft traffic and the implication of any failure on his or her part. The economic value attached to the loss of a Boeing 707 or a DC-8--any aircraft--with its human lives cannot be measured, but, if a value could be established, it would run into millions of dollars.

We noted the absence of any economic positions and the inclusion of two statistical positions, both at low grades. In connection with our suggestion for a small economic and statistical staff unit, we propose that two additional positions be authorized, one for a senior economist and one for a senior statistician. With the currently authorized two statistical positions, the personnel needs of the unit in question are generally met.

Of the 325 permanent positions assigned to the Manila International Airport Division, three associated occupational groups--Security Guarding, Special Investigation, and Special Police--accounted for a total of 126 positions or 38.8 per cent. (See Exhibit I-F) Among the remaining occupational groups, Airport Operation had nine positions; Airways Operation, sixteen; and Airways Engineering, three. There was, in addition, one position at grade 41 in the occupational group, Aeronautical Engineering. Altogether 30 occupational groups were represented in the positions assigned to the Manila International Airport Division. Grades varied from

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11/ A pertinent factor is that adjustments in government salaries and wages lag behind corrections that may be indicated by studies of the Wage and Position Classification Office (WAPCO), comparing the former salaries and wages to those obtaining in industry. We were advised by a spokesman for WAPCO that the last comparative study was completed in 1963, but that the results did not show up in salary and wage adjustments until 1 April 1965. We were further advised that another study was done in 1966, with the implementation of the findings to follow at some later date, perhaps in 1967 and perhaps in 1968. From the standpoint of the worker, a long delay in salary or wage adjustment, insofar as increases are indicated, does not make for a happy situation, with the possible result that really essential people may elect to accept a position somewhere in private industry.

X 48

EXHIBIT 1 - F. CIVIL AERONAUTICS ADMINISTRATION-PERSONNEL BY TYPE AND GRADE (MANILA INTERNATIONAL AIRPORT DIVISION)

OCCUPATION GROUP	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	Total Positions	Vacant Positions
1. Accounting		6 (3)		7			6				1				1											21	(3)
2. Aeronautical Engineering																1										1	
3. Aircraft Operations																								1		1	
4. Airport Operation	3									2					2						1				1	9	
5. Airways Operation												3		2			5			5				1		16	
6. Airways Engineering												3														3	
7. Architecture														1												1	
8. Automobile Equipment Operation	5																									5	
9. Cashiering				1									1													2	
10. Credit Collection		7			2			1																		10	
11. Dentistry	1									1																2	
12. Electrical	2	3	2	5	2			1					1													16	
13. Electrical Engineering & Plant Operation														1												1	
14. Firefighting	4	7			2					1						1										15	
15. General Clerical	10 (1)		2		2																					14	(1)
16. Health and Sanitation Inspection	1																									1	
17. Internal Auditing and Fiscal Examination			1																							1	
18. Laboring	32 (1)																									32	(1)
19. Mechanical Plant Operation	2	5								1																8	
20. Medical Officers															5				2							7	
21. Nursing	5		5																							10	
22. Pipe Working	3		1						1																	5	
23. Secretarial-Steno				1		1																				2	
24. Security Guard	39 (1)	2			1										1											43	(1)
25. Special Investigation						6			1			1														8	
26. Special Police		54 (6)			10			4			5							1	1							75	(6)
27. Storekeeping					1 (1)																					1	(1)
28. Telecommunications Engineering and Repair	1			2				1 (1)																		4	(1)
29. Telecommuncation Operation	6			3		1																				10	
30. Water Service			1																							1	
Total Positions	114	84	12	19	20	8	6	7	2	5	6	7	2	4	9	2	5	1	3	5	1			2	1	325	
Total Vacant Positions	(3)	(9)			(1)			(1)																			(14)

Source: Civil Aeronautics Administration (31 March 1967).

a low of 26 to a high of 50. The highest grade was that of the position of Airport Manager, that is, grade 50, with a salary range of 6,888/8,400 pesos yearly. This salary is very small, considering the responsibilities involved, and invites augmentation. By measure,[12] Manila International Airport is a major world airport, and the operation of an installation of its size requires and demands a commensurate salary and a high order of professional ability.

In addition to its permanent working forces, the Civil Aeronautics Administration (including the Manila International Airport) had, as previously stated, a total of 1,674 temporary workers, as of 30 November 1966. Fifteen of the temporary workers were assigned to the Office of the Director of Civil Aviation, 231 to the security guard (of the Office of the DCA), 100 to the Airways Operation Division, 157 to the Airways Engineering Division, 435 to the Airports Division, 477 to the Manila International Airport Division, and the remaining number to other places in the organization. Such a large number of temporary workers--in excess of the number of permanent workers--does not, in our view, speak well for the effective, efficient management of the affairs of the Civil Aeronautics Administration. A small number of temporary workers augmenting the permanent force gives us no problem. But a large number does not promote the best interests of the CAA, given the apparent financial savings. The team feels that the CAA should establish a larger permanent working force, as justified, in the interest of better operations and higher morale.

2. Civil Aeronautics Board

In its capacity as an economic regulatory agency, the Civil Aeronautics Board is in a position to exercise great influence on the promotion and development of civil aviation. Its main expenses

12/ In 1964, Manila International Airport had a total of 35,000 commercial aircraft movements and over 1.0 million embarking and disembarking passengers, including domestic and international operations. This figure may be compared, for example, to 33,000 commercial aircraft movements and 1.2 million embarking and disembarking passengers at Geneva, Switzerland, in the same year. The Crown Colony of Hongkong had, in 1964, a total of 18,712 commercial aircraft movements and 0.8 million embarking and disembarking passengers. See: Airport Traffic 1964, Digest of Statistics No. 119, International Civil Aviation Organization (ICAO), Montreal, Quebec, Canada, pp. 18-21.

X
50

are for salaries and wages. Its end-products are the decisions that it makes and the orders that it issues. Though intangible, they have as much real impact on civil aviation as a piece of hardware or a slab of concrete, accelerating or decelerating, as the case may be, the development of civil aviation. We support, or indorse a level of salaries and wages for Board people which reflects the vital role that they play in the promotion and development of civil aviation.

On 17 March 1967, the Board had an authorized total of 45 permanent positions or spaces, of which 42 were filled. To the latter number, there may be added a small number of temporary workers. The permanent positions involved 29 different titles and 17 different occupational groups. Two positions invited our attention, in particular, that of economist, grade 41 (4,404/5,376 pesos yearly) and that of statistician, grade 35 (2,984/3,264 pesos yearly). The grade and salaries of these two positions do not seem commensurate with the fundamental importance of economics and statistics to the Board. Economics and statistics are the key ingredients in the regulatory mix. We suggest that the two positions should be better represented gradewise and, relatedly, professionally. Based on our many contacts and discussions with the Civil Aeronautics Board during the course of our aviation survey and analysis, it is our observation that the Board has competent, knowledgeable professional people on its staff. But it is weak in the area of economic principles and practices as applied to the field of air transportation.

Apart from the subject of salaries and wages, professional education and training may be recognized as vital personnel requirements of the Civil Aeronautics Board. Most of the professional employees of the Board have college degrees, with backgrounds in accounting, economics, law, and engineering, but none have had formal or practical regulatory training such as would be available from a training assignment to the United States Civil Aeronautics Board, to the Air Transport Board of Canada or a regulatory agency of another country. There is, based on our observations and findings, a firm need to obtain regulatory training for key professional people in the Philippine Civil Aeronautics Board in the areas of regulatory analysis, methods, procedures, and enforcement. It may be noted here that three employees of the Board have had technical and operational, as opposed to economic and legal training, in the United States under the sponsorship of the Agency for International Development and in cooperation with the Federal Aviation Administration. The three individuals in question are all transferees from the Civil Aeronautics Administration, moving over to the Board for reason of higher salaries.[13]

As a final note to this subsection, we wish to commend the Government of the Philippines on the administration of its personnel affairs. Its system of grades, occupational groups, and position titles is, in our view, well-thought out, and provides a working foundation for handling the management of personnel requirements for a large organization such as represented by the Government. The determination of the Government to pay a "living" wage to its people, as represented by the recent establishment of 2,160 pesos yearly as a minimum wage, deserves further praise.

D. Finances

The budgetary process of the Government of the Philippines is of concern to us, and this is first considered before taking up the subject of the finances of the Civil Aeronautics Board.

Essentially described, the budgetary process consists of four phases: preparation, authorization, implementation, and accountability. In the first phase, the various concerned departments, administrations, and agencies of the government prepare an estimate of their budgetary requirements. The estimate is submitted to the Budget Commission which reviews the estimate in the light of the anticipated revenues and other criteria. Thereupon, it submits its recommended budget estimate for the government at large, based on the various budgetary estimates received, to the President for his final review and approval. The President forwards the budget, with any changes and additions he may wish to make, to the Congress, 15 days before the opening of the regular session of the Congress. The Congress reviews the budget submitted and proposed by the President, and legislates on the proposal in accordance with its wishes.

Not less than twenty-five days before the start of the new fiscal year, Budget Form 121 is submitted by the various departments, administrations, and agencies to the Budget Commission. This form provides a plan of work and request for allotment of funds by programs. It includes data on the resources, manpower, and pesos needed to carry out the program(s) in question. This aspect of the implementation

13/ Under current and new CAA regulation, employees receiving outside training, involving expense or no expense to the CAA, are obliged to sign a contract with the CAA, agreeing to remain with the CAA for a given period of time upon their return or completion of the training assignment.

X 52

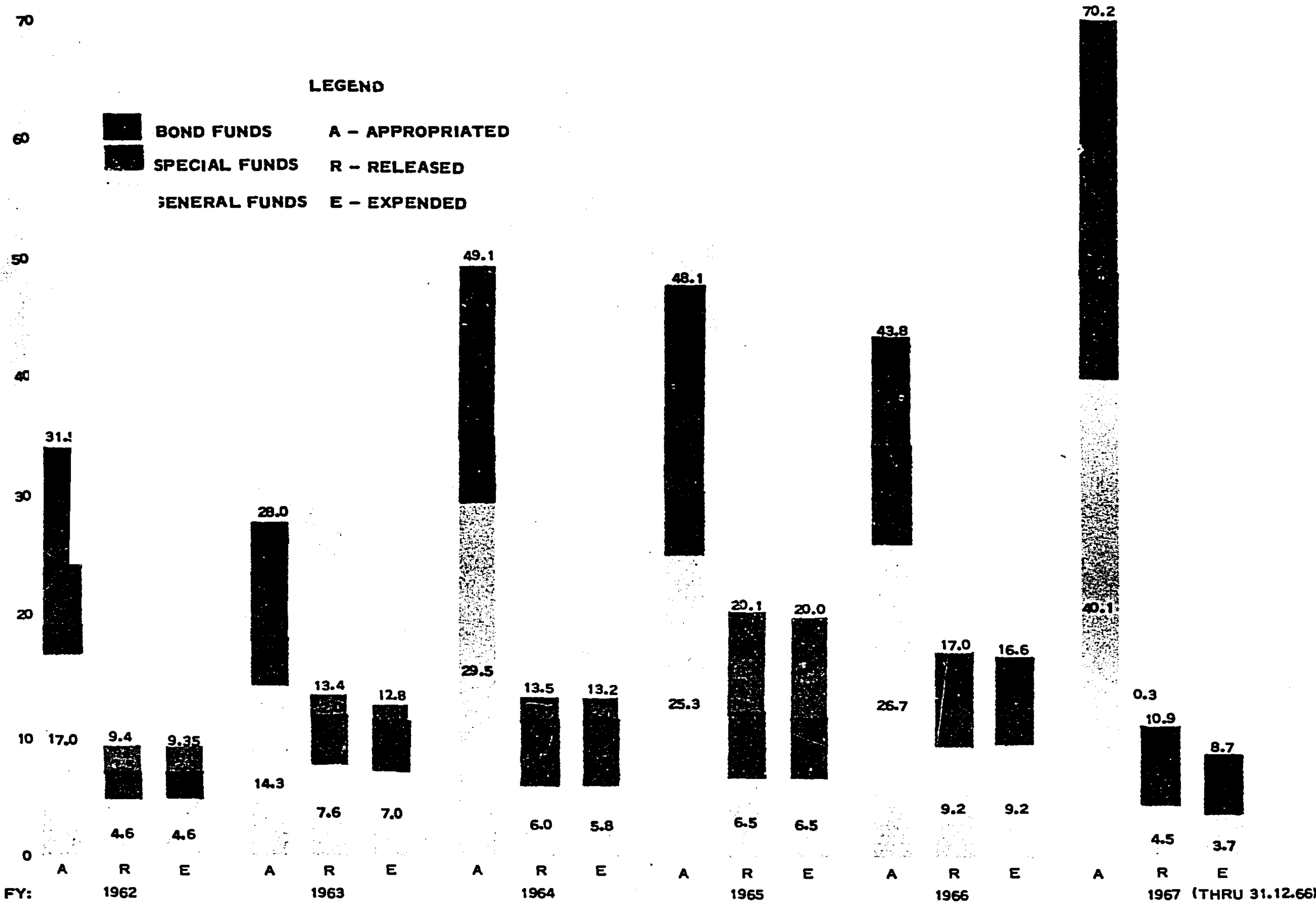
phase is repeated for every quarter in advance--but not less than five days before--the start of the concerned or next quarter. Based on the quarterly submissions of Budget Form 121, the availability of funds from the current revenues of the government, and any actions of the General Auditing Office, funds are released to the different departments, administrations, and agencies, pursuant to the approved programs.

The last phase (accountability) involves the submission of monthly reports to the Budget Commission, reporting on efforts and monies for the past month; reviews by organizational heads and staff people; and audits by organizational and governmental-wide audit groups.

In accordance with the budgetary process, 2.0 billion pesos were appropriated and 2.2 billion pesos were released in Fiscal Year 1966 for the over-all government operations. However, the accumulated appropriations for that year (comprising outstanding appropriations from the same and previous years) stood at 6.5 billion pesos, so that only one-third of the outstanding appropriations were covered by monies released by the Budget Commission in 1966. According to information supplied by a representative of the Presidential Economic Staff (PES), the level of accumulated, outstanding appropriations is increasing. It stood at 3.9 billion pesos in 1965, at 4.449 billion pesos in 1966, and at 4.472 billion pesos in 1967. The relationship, according to Staff estimates, between appropriated and released funds will be 6.953 billion pesos vs. 2.354 billion pesos in Fiscal Year 1967 and 7.210 billion pesos vs. 2.688 billion pesos in Fiscal Year 1968. As evidenced, monies appropriated are not tantamount to monies released.

The spread between appropriated and released funds characterizes the finances of the Civil Aeronautics Administration as much as it does the government finances at large. In Fiscal Year 1962, the outstanding accumulated appropriations for the CAA stood at 31.5 million pesos. (See Exhibit I-G) In the same year, the CAA received 9.4 million pesos in monies released by the Budget Commission to carry out its various programs under the different appropriations. The relationship between appropriated and released monies for that year was 3.4:1. In Fiscal Years 1963 through 1966, the relationship stood at: 2.1:1, 3.7:1, 2.6:1, respectively. Considering the general situation which obtains, these ratios do not indicate that the CAA has been slighted at the expense of other sections of the government. In Fiscal Year 1966, appropriations and releases for the

EXHIBIT I – G. CIVIL AERONAUTICS ADMINISTRATION – APPROPRIATIONS, RELEASES, EXPENDITURES *
(Millions of Pesos)



*FOR FISCAL YEARS ENDING 30 JUNE.
Source: Civil Aeronautics Administration

54

Civil Aeronautics Administration were 43.8 million pesos and 17.0 million pesos, respectively.[14/]

Taking the five Fiscal Years 1962-1966 as a whole, the accumulated, outstanding appropriations for the Civil Aeronautics Administration totalled 200.5 million pesos. Of this amount, 112.8 million pesos or 56.3 per cent was based on general funds, 25.3 million pesos or 12.6 per cent on special funds, and 62.4 million pesos or 31.1 per cent on bond funds. Released funds for the period amounted to a total of 73.3 million pesos, of which 33.9 million pesos or 45.2 per cent came from general funds, 24.4 million pesos or 33.3 per cent from special funds, and 14.9 million pesos or 20.4 per cent from bond funds. As evidenced, special fund releases were, on a percentage basis, three times as large as special fund appropriations, while general fund and bond fund releases were noticeably below the corresponding appropriation percentages. Special fund releases are, in effect, releases from the CAA and MIA Revolving Funds, and are thus from the CAA's own pocket, so to speak.

Releases from all sources to the Civil Aeronautics Administration increased from 9.4 million pesos in 1962 to 20.1 million pesos in 1965, dropping to 17.0 million pesos in 1966. (See Exhibit I-H) For the five years, releases average 14.7 million pesos on a yearly basis. In the same period, releases from the special fund expanded at an average rate of growth of 39.0 per cent, compared to 26.1 per cent for general fund releases. Bond fund releases varied around 2.0 million pesos in 1962, 1963, and 1964, jumping sharply in 1965, and disappearing entirely in 1966. Of the 17.0 million pesos released, in Fiscal Year 1966, to the CAA, 16.6 million pesos or nearly all was expended.

It may be observed generally that releases of funds to the Civil Aeronautics Administration are small, as such, run noticeably below appropriation amounts, and are being increasingly drawn from special funds.

The basic distribution of the 16.6 million pesos (specifically, 16,645,272) expended (9.2 million drawn from general funds and the remaining 7.4 million from special funds) by the Civil Aeronautics Administration, including the Manila International Airport Division, in Fiscal Year 1966 was as follows: 13.8 million pesos or 85.9 per cent for operating expenses and 2.8 million pesos or 14.1 per cent for capital expenses. (See Exhibit I-I) Of the 2.8 million capital expenditure, 1.5 million

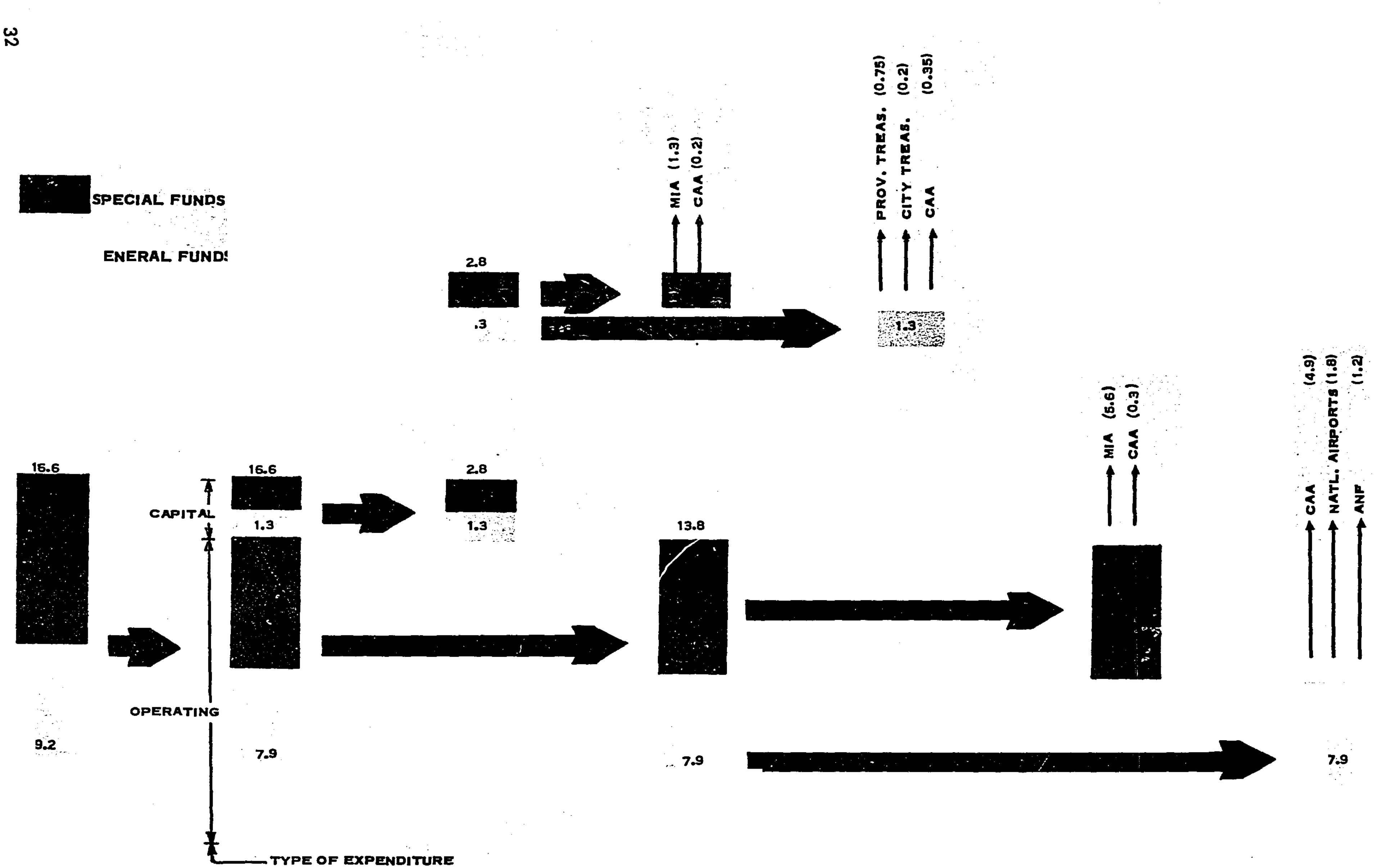
14/ Appropriations in the current Fiscal Year, 1967, stood at 70.2 million pesos for the CAA, with 10.9 million pesos released in Fiscal Year 1967 through 31 December 1966.

EXHIBIT I - 11. CIVIL AERONAUTICS ADMINISTRATION - TREND OF RELEASES BY SOURCES

F U N D	1962 Amount	1963 Amount	1964 Amount	1965 Amount	1966 Amount	1962-1966 Change Amount	1962-1966 Change %	Average Change Amount	Average Change %
General Fund	₱ 4,606,962	₱ 7,591,051	₱ 5,973,643	₱ 6,524,423	₱ 9,249,251	₱ 4,642,289	100.8	1,160,572	26.1
Special Fund	2,267,702	3,793,319	5,460,071	5,162,556	7,749,696	5,481,994	241.7	1,270,499	39.0
Bond Fund	2,530,000	1,998,803	2,028,000	8,378,000		-	-	-	-
T o t a l	₱ 9,404,664	₱13,383,173	₱13,461,714	₱20,064,979	₱16,998,947	₱10,124,283		431,071	

Source: Civil Aeronautics Administration.

EXHIBIT I – 1. CIVIL AERONAUTICS ADMINISTRATION – DISTRIBUTION OF EXPENDITURES (FY 1966)*
(Millions of Pesos)



*CAA – CIVIL AERONAUTICS ADMINISTRATION LESS MANILA INTERNATIONAL AIRPORT DIVISION.
MIA – MANILA INTERNATIONAL AIRPORT DIVISION.

Source: Civil Aeronautics Administration.

pesos (drawn from the special funds) was channelled to the Manila International Airport Division in the amount of 1.3 million pesos and to the Civil Aeronautics Administration in the amount of 249,996 pesos. The remaining 1.3 million capital expenditure (drawn from general funds) was channelled to the Provincial treasuries (740,500 pesos), the City treasuries (211,000 pesos), and the Civil Aeronautics Administration (348,368 pesos).

The 348,368 pesos taken by the Civil Aeronautics Administration, along with the amounts given to the City and Provincial treasuries, were for capital expenditures at 15 different airports under four different appropriation acts. None of the airport payments exceeded 200,000 pesos. In actual size, they ranged from 2,000 pesos each for Bancasi Airport, Calapan Airport, and Siquijor Airport to 190,000 pesos for Tuguegarao Airport.

Turning to the operating expenditures, a total of 5.9 million pesos from the CAA and MIA Revolving Funds--or special fund monies--was distributed to the Civil Aeronautics Administration in the amount of 259,462 pesos and to the Manila International Airport Division in the amount of 5.6 million pesos. Salaries and wages took 1.8 million or 32.2 per cent of the MIA allocation. Another 2.2 million pesos (39.4 per cent) was paid to the Export-Import Bank of Washington in part repayment of a loan with interest. The remaining 1.3 million pesos (28.4 per cent) of the MIA allocation was spread among various expenditures objects. The largest of these was Supplies and Material (Object 07) which consumed 645,000 pesos and the smallest of these was Uniform of Policemen and Firefighters (Object 01) which received 35,000 pesos. Sundry Expenses (Object 06) accounted for 391,134 pesos or 7.0 per cent of the MIA allocation. An additional "01" or salary/wage expenditure was 212,067 pesos for Janitorial and Sanitation Services.

The Export-Import loan runs through 31 December 1977, when the last installment is due. The contract, dated 31 July 1961, calls for 30 semi-annual repayments of the principal with interest at the rate of 5.75 per cent. The first repayment installment was due on 30 June 1963. The loan period is for 15 years. The amount of the loan is 5.0 million dollars (U.S. Funds) plus another 2.2 million dollars (U.S. Funds) for interest. At the time of this writing, the loan installments plus interest had been paid through 31 December 1967. The anticipation is attributable to the particular budgetary requirements of the government and its desire to avoid late interest charges which it had incurred in the past to the extent of several thousands of pesos. According to the terms of the contract, the proceeds of the loan are for use in assisting the Philippines in financing the purchase in the United States,

X
58

and paying transportation charges to the Philippines, of equipment and services required in connection with the enlargement and improvement of the Manila International Airport and its associated communications, navigational and traffic control facilties.

The 0.3 million pesos allocation to the Civil Aeronautics Administration in operating funds, as derived from its revolving fund, was broken out, as follows: 6,126 pesos (2.4 per cent) for Salaries; 31,961 (12.3) for Traveling Expenses; 71,375 (27.5) for Repair and Maintenance; and 150,000 pesos (57.8 per cent) for the repair and maintenance of PI-34 Aircraft.

The remaining operating expenditures--in the amount of 7.9 million pesos--drawn from general funds, were distributed as follows: 4.9 million pesos for the Civil Aeronautics Administration, 1.8 million pesos for the National Airports, and 1.2 million pesos for the Air Navigational Facilities (ANF). Of the 4.9 million pesos for the CAA, 4.1 million pesos or 83.7 per cent went for Salaries and Wages, and the balance of 0.8 million pesos or 16.3 per cent went to other objects. Of the 1.8 million pesos for the National Airports, 827,605 pesos or 45.5 per cent was used for Salaries and Wages; 661,578 pesos or 36.3 per cent for Repairs and Maintenance; 165,287 pesos or 9.1 per cent for Supplies and Materials; and the remaining 165,530 pesos or 9.1 per cent for other objects. Of the 1.2 million pesos for the ANF, 469,641 pesos or 39.1 per cent went to Salaries and Wages; 30,577 pesos or 2.6 per cent for Repairs and Maintenance; 549,431 pesos or 45.8 per cent to Supplies and Materials; and the remaining 150,351 pesos or 12.5 per cent to other objects.

The 1.8 million pesos expended for maintenance and operation of the National Airports in Fiscal Year 1966 was spread over 76 different airports. The amounts spent at the individual airports ranged in size from 6,250 pesos for the airport at Ubay to 402,500 pesos for the airport at Manila. Fifty-two airports received less than 25,000; 19 airports received between 25,000 and 50,000 pesos; two received between 50,000 and 75,000 pesos; no airports received amounts between 75,000 and 100,000 pesos; and two airports--and Manila--received more than 100,000 pesos. The 1.2 million pesos spent for the operation and maintenance of Air Navigational Facilities was divided among 23 different activities. Three Manila Airport activities--air traffic control, communications receiving, and communications transmitting--received a total of 322,100 pesos. Cebu Airport followed next, receiving 107,000 pesos. A total of 67,000 pesos went to the Airways Engineering Shop, and 13,000 pesos to the Training School. The remaining 17 activities, involving three VOR's, four NDB's, and 10 communication stations, received amounts varying from 1,300 pesos (Tacloban Airport) to 83,800 pesos (Laoag Airport).

It may be further observed, based on Fiscal Year 1966 operations, that monies of the Civil Aeronautics Administration are thinly spread over activities and locations, that Salaries and Wages account for a substantial portion of total expenditures,15/ and that capital outlays are negligible considering the nature and extent of the physical plant and the indicated requirements.

Turning lastly to CAA self-generated monies, revenues accruing to the MIA Revolving Fund from landing and take-off charges, passenger service charges,16/ and other charges, increased from 2.4 million pesos in Fiscal Year 1962 to 8.4 million pesos in Fiscal Year 1966. (See Exhibit I-J) Landing and take-off charge revenues alone increased from 0.5 million pesos to 2.3 million pesos for an average annual rate of growth of 47.0 per cent. Terminal parking charge revenues went up from 0.6 million pesos to 2.5 million pesos for an average annual rate of growth of 46.1 per cent. Passenger service charge revenues expanded from 0.4 million pesos in 1963 (in which year passenger service charges were introduced at MIA Domestic and MIA International) to 1.0 million pesos in 1966 for an average annual rate of growth of 37.9 per cent. Revenues from the remaining charge sources rose from 1.3 million pesos in 1962 to 2.6 million pesos in 1966 for an

15/ It may be noted here that, according to advisement provided by the budget section of the CAA, all salaries and wages are paid directly by the CAA, either in cash or cheque depending upon the location of the concerned employee.

16/ The CAA imposes a passenger service charge of one peso on outgoing domestic passengers and five pesos on outgoing international passengers at MIA. In our view, the passenger service charge is not the best way to develop airport revenues. Such charges are costly to administer, considered on both a money and time basis, since each passenger movement involves generally a separate collection and transaction for each passenger. In international air travel, passenger service charges constitute for many passengers--especially tourists--an unexpected charge, which they learn about just as they are about to leave the country, resulting sometimes in bad feelings against a particular country. Under circumstances where a potential international visitor by air is made aware of applicable passenger service charges in advance of his or her trip, the result can also be to discourage making a trip or to exclude certain countries in favor of others. At some airports, passenger service charges are collected from carriers on the basis of a head count of passengers getting on or off a plane. This seems a better arrangement in our mind than levying a service charge directly on the passenger.

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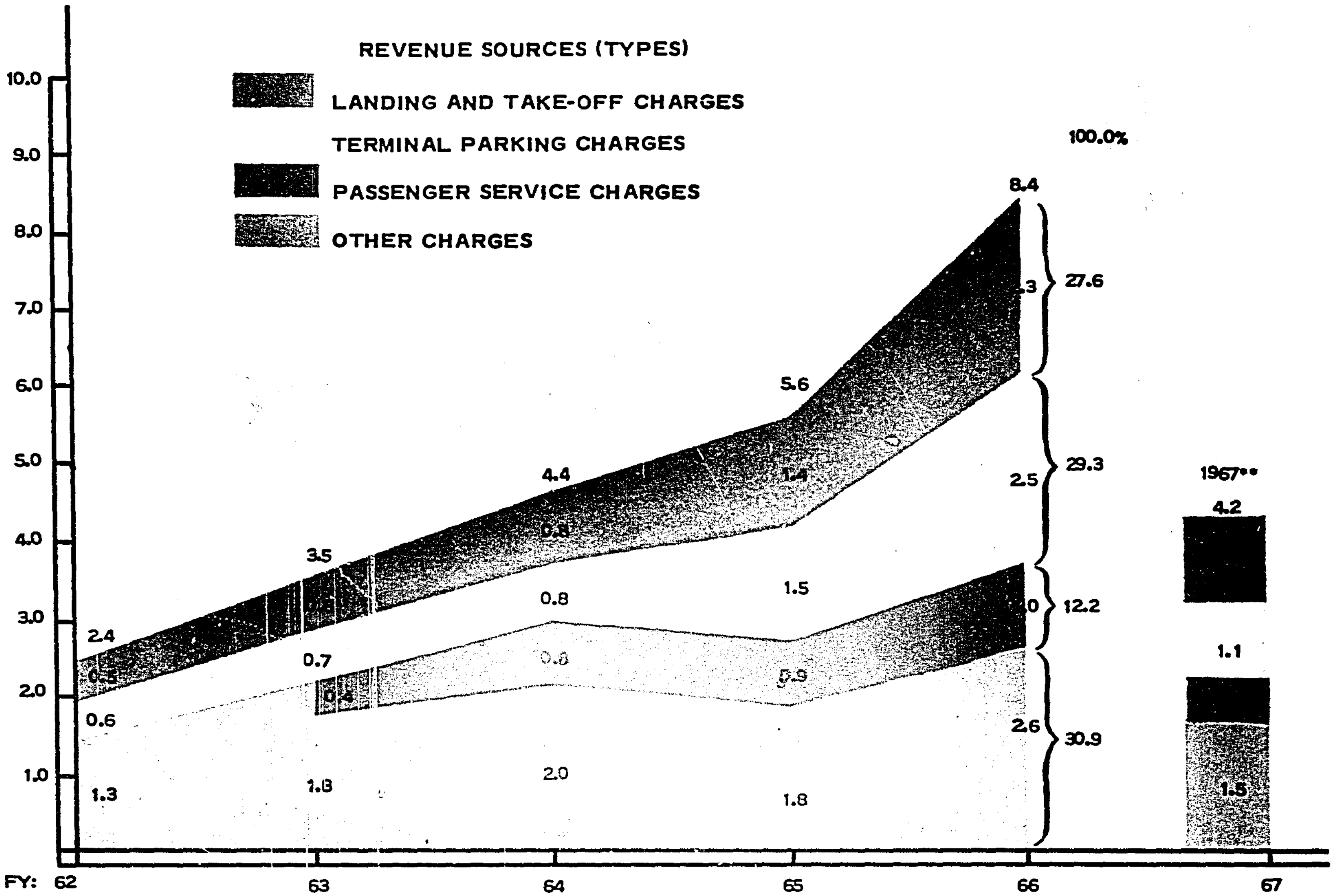
60

EXHIBIT I – J. CIVIL AERONAUTICS ADMINISTRATION – MANILA INTERNATIONAL AIRPORT REVENUES*
(Millions of Pesos)



*FOR FISCAL YEARS ENDING 30 JUNE.

**FIRST HALF OF FY 1967 (YEAR ENDING 30 JUNE 67).

Source: Civil Aeronautics Administration.

average annual rate of growth of 25.1 per cent. The over-all growth rate for the five-year period was 37.9 per cent. These various rates and amounts of growth, which are substantial, may be attributed to increases in charges and to increases in traffic.[17]

In Fiscal Year 1966, landing and take-off charges contributed 27.6 per cent of all revenues accruing to the MIA Revolving Fund in that year; terminal parking charges, 29.3 per cent; passenger service charges, 12.2 per cent; and other charges and fees, the remaining 30.9 per cent. The last category included revenues generated at MIA Domestic and MIA International by aircraft transient parking charges; charges for the use of the public address system; rental of passenger terminal building spaces; rental of airport areas (developed, undeveloped, and other areas); concession privilege fees; royalties on fuel, oil, and lubricants; indoor and outdoor advertising charges; and still other charges and fees. Of the 1.0 million pesos realized, in 1966, from passenger service charges, MIA Domestic contributed 53.5 per cent, while MIA International produced the remaining 46.5 per cent. The percentage breakout for the preceding year ran about the same.

During the first half of the current fiscal year, 1 July 1966 through 31 December 1966, a total of 4.2 million pesos accrued to the MIA Revolving Fund from the various airport user and service charges. Landing and take-off charges accounted for 1.0 million pesos, terminal parking charges for 1.1 million pesos, passenger service charges for 0.6 million pesos, and other charges and fees for 1.5 million pesos. As of 31 December 1966, based on a trial balance, the MIA Revolving Fund had assets of 7.3 million pesos, including 6.0 million pesos in accounts receivable and liabilities (mostly in unliquidated obligations) of 5.2 million pesos. Equity or surplus was 2,057,829 pesos.

In comparison to the MIA Revolving Fund, the CAA Revolving Fund is small. Its income (as represented by revenues from user and service charges) was, in Fiscal Year 1966, only 335,520 pesos (down from 379,226 in 1965). In Fiscal Year 1967 through 31 December 1966, the income was 193,278 pesos. In the five-year period, 1962-1966, revenues accruing to the Fund grew at a noticeable rate, namely, 25.1 per cent annually on an average yearly basis. Revenues are derived from various types of charges, which include licenses and rating charges, communication charges (Class B Messages), rental charges, fines and penalties, and others. As noted in Paragraph 11, the Civil Aeronautics Administration proposes, under Administrative Order No.

17/ See Exhibit II-L and II-Q.

X 62

5 which has been signed by the Director of Civil Aviation but not yet published in the Official Gazette, to collect user and service charges, including landing and take-off charges, terminal parking charges, and passenger service charges at airports other than MIA. As matters stand at the moment, however, there is no actual experience basis upon which to predicate a judgment as to the earning power of the proposed user and service charges.

The Civil Aeronautics Administration is, it is clear, not in a financial position to conduct a major capital investment program at the present time or in the near future without outside financial help, obtained either from within the nation or from without the nation, or both.

This realization is not unexpected. In Australia, for example, the civil aviation authorities spent $60.9 million (Australian dollars) in fiscal year 1966 ending 30 June, but took in only $12.9 million in revenues earned. Few airport and airway systems in the world exist entirely from revenue generated by user (and service) charges, although user charges are carrying an increasingly larger financial load, as systems mature and traffic increases. The Los Angeles International Airport is one of the few exceptions. In 1965, it realized a net income (after taxes) of $4,276,494 (U.S. Funds). LA International is also an extremely busy airport.

Manila International cannot, of course, be expected--nor can it by law--to support economically the entire system of airports and airways in the Philippines.18/ 19/

18/ Strict comparison between user and service charges at MIA International and international airports elsewhere is difficult and involved. In a compilation of charges published in the British publication Aeroplane dated 22 September 1966, the landing charge for a Boeing 707 or DC-8 in international operations at London was given as $570 (U.S. Funds). On the other hand there is no parking charge for the first six hours. There is no passenger service charge. And the London airports provide a very high state of traffic control capability. Under the currently applicable schedule of user and service charges at MIA International, a Boeing 707-320B with a normal gross weight of 328,000 lbs. would incur a landing charge of 328 pesos and take-off charge of 328 pesos for a total of 656 pesos. Apron parking for the minimum charge time of one hour adds another 492 pesos. If 7,000 gallons of aviation fuel are loaded aboard (not an unusual requirement at MIA for international long-distance flights), another 210 pesos are added in fuel royalty fees. Finally assuming that 25 passengers (and

With respect to the finances of the Civil Aeronautics Board, its appropriations, as of the latest full fiscal year (1966), called for 382,490 pesos, of which it received 273,901 pesos in released funds. Of the latter amount, 204,647 pesos were spent for personnel services, i.e., salaries, wages, per diem, and flying pay. The balance--69,254 pesos--was accounted for by equipment, operating and maintenance expenses. As evidenced, the CAB operates on a very low budget, with most of its money going for Salaries and Wages.

E. Summary

By way of summary this section has concerned itself with the basic legislation governing civil aviation affairs of the nation, the governmental agencies charged with implementing and carrying out the national responsibilities established under law for civil aviation, and the personnel and financial resources of the responsible agencies of the government. The inquiry was conducted on the basis of discussions held with appropriate individuals in and out of government and on the basis of various solicitations from these individuals for information,

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conceivably more) are boarded, 125 pesos are added in passenger service charges. The total revenue accruing to the MIA Revolving Fund in the example at hand is $406 (U.S. Funds). Not counted are revenues generated in other ways by the movement of an aircraft in and out MIA.

19/ MIA revenues from user and service charges are affected by frequency limitations. As a concrete example, the four United States frequencies serving the Philippines currently pay, on a yearly basis, a total of ₱519,792 to MIA in airport charges and fees (landing, take-off, parking, fuel royalty, and misc.). Another ₱245,024 is paid out elsewhere for servicing aircraft. Two frequencies operate through MIA, producing revenues for the airports westbound and again eastbound, while the two remaining frequencies turn around at MIA. Assuming the two carriers each doubled their frequencies, the revenues accruing directly to MIA from landing and other charges would increase to ₱1,039,584 yearly or double. The operation of a daily frequency by each carrier would increase the revenues accruing to MIA to ₱2,819,272 yearly. In five years, the daily frequencies would produce ₱14,096,360 in airport revenues, not counting revenues accruing for aircraft servicing and other possible revenues. A sum of ₱14 million in five years represents a considerable amount of revenue or cost in terms of revenues denied to MIA. The Team assumes there are other Flag Carriers with increased frequency aspirations at MIA and feels that in the search for additional revenue this source should be carefully explored.

X 64

opinions, and ideas. Our findings were generally thaf the nation would benefit from the passage of the proposed "National Aviatibn Commission Act," that the effectiveness and the efficiency of the Civil Aeronautics Administration and the Civil Aeronautics Board would increase from certain organizational and personnel changes we have proposed, and that the Civil Aeronautics Administration is not in a financial position to conduct a major capital investment program without outside national or international help.

SECTION II
MOVEMENT FUNCTION

This section examines the nature and extent of air traffic activity--essentially, air vehicle movement and air passenger movement--in the Philippines. It considers first the national inventory of airports and aircraft, and it considers next the number and types of aircraft operators (business/executive flyers, air carriers, and others) on the national scene. Thereupon, it measures the volume and distribution of traffic, establishing traffic magnitudes and trends insofar as this is possible. (Due to the limited nature of the available traffic statistics, for the reasons pointed out in our preface, no attempt was made to forecast, other than for MIA International.) Such an examination is fundamental and necessary, it goes without saying, to any airport and airway design effort.

A. Airports

The Philippines has a total of 144 existing airports. (See Exhibit II-A) The number comprises 86 public airports, 54 private airports, and 5--Philippine and United States--military airports. There are, in addition, 56 proposed airports.

The public airport category includes 76 national airports which are operated by, and under the jurisdiction of the Civil Aeronautics Administration. The national airports are, in turn, divided into three groups as follows: (a) trunkline airports, (b) secondary airports, and (c) feeder airports based on a CAA system of classification.[21] The first group consists of eight airports, namely, Manila International Airport (MIA), Mactan, Davao, Iloilo, Bacolod, Zamboanga, Laoag, and Cagayan de Oro. Of the total number, one is International (MIA) and three (Mactan, Laoag, and Zamboanga) are designated as International Alternate Airports. According to the classification of geographic regions of the Philippine Bureau of the Census and Statistics,[22] MIA is located in Region I (see Exhibit II-B). Davao and Zamboanga are in Region IX. Mactan, Region VIII. Cagayan de Oro, Region X. Bacolod and Iloilo, Region VII, and Laoag, Region II. With the exception

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21/ It does not appear that the airport classification incorporates any specific traffic criteria.

22/ The geographic classification comprises 10 regions (see Exhibit II-A for a detailed description).

X 66

EXHIBIT II - A. AIRPORTS BY OWNERSHIP, TYPE, STATUS, AND REGION (1 MARCH 1967)

Col.	Geographic Region b/	PUBLIC AIRPORTS a/								PRIVATE AIRPORTS		MILITARY AIRPORTS		GRAND TOTAL	
		Trunkline		Secondary		Feeder		Total							
		Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
1	Region I	1	-	-	-	-	-	1	-	1	-	-	-	2	-
2	Region II	1	-	2	-	1	3	4	3	-	-	-	-	4	3
3	Region III	-	-	2 (1)	-	4	3	6 (1)	3	4	-	-	-	10 (1)	3
4	Region IV	-	-	-	-	5	3	5	3	9	-	3	-	17	3
5	Region V	-	-	2 (1)	4	10	10	12 (1)	14	5	-	2	-	19 (1)	14
6	Region VI	-	-	3	-	4 (1)	2 (1)	7 (1)	2	-	-	-	-	7 (1)	2
77	Region VII	2	-	3	-	3 (1)	5	8 (1)	5	7	-	-	-	15 (1)	5
8	Region VIII	1	-	3	2	6	6	10	8	4	-	-	-	14	8
9	Region IX	2	-	4	1	5 (5)	8	11 (5)	9	17	-	-	-	28 (5)	9
10	Region X	1	-	4	2	7 (1)	7	12 (1)	9	7	-	-	-	19 (1)	9
11	TOTAL	8 c/	-	23 d/ (2)	9 e/	45 f/ (8)	47 g/	76 (10)	56	54	-	5 h/	-	135 (10)	56

a/ As defined in report, Philippine Airports and Airways Development Program 1966-1970 (See source below):

"A regular international airport is one that is used for the operation of aircraft engaged in international air navigation.
"An alternate international airport is one that is intended to be used for the operation of aircraft engaged in international air navigation in lieu of the regular international airport.
"A trunkline airport is one that serves the principal commercial centers of the Philippines. It is intended for use by medium range jets the greater capacity and speed of which will best serve the transportation needs between principal centers of commerce, trade and population.
"Secondary airports are those which serve principal towns and cities with regular traffic densities that warrant (or also their considerable distances from but close affinities with each other also warrants) operation of jet-prop aircraft.
"A feeder airport is one that serves towns with limited passenger traffic and are intended for use by piston aircraft such as the DC-3, the range and capacity of which are highly suitable for this kind of service.
"A rural airport is one that serves rural communities with very limited passenger traffic. It is intended for use by aircraft with maximum weight of 12,500 lbs."

Note: Underscoring at airports in footnotes c, d, e, g, and i below denotes airports (75 in total) currently owned and operated by the Philippine Civil Aeronautics Administration (CAA).

b/ As defined by the Philippine Bureau of the Census and Statistics:

Region I - Metropolitan Manila: Manila and suburbs - the cities of Caloocan, Quezon, Pasay, Makati, Mandaluyong, San Juan del Monte, Parañaque, all municipalities of Rizal.

Region II - Ilocos and Mountain Province: Abra, Ilocos Norte, Ilocos Sur, La Union, Mountain Province.

Region III - Cagayan Valley and Batanes: Batanes, Cagayan, Isabela, Nueva Viscaya.

Region IV - Central Luzon: Bataan, Bulacan, Nueva Ecija, Pampanga, Pangasinan, Tarlac, Zambales.

Region V - Southern Tagalog: Batangas, Cavite, Laguna, Mindoro Occidental, Mindoro Oriental, Marinduque, Palawan, Quezon, Rizal.

Region VI - Bicol Region: Albay, Camarines Norte, Camarines Sur, Catanduanes, Masbate, Sorsogon.

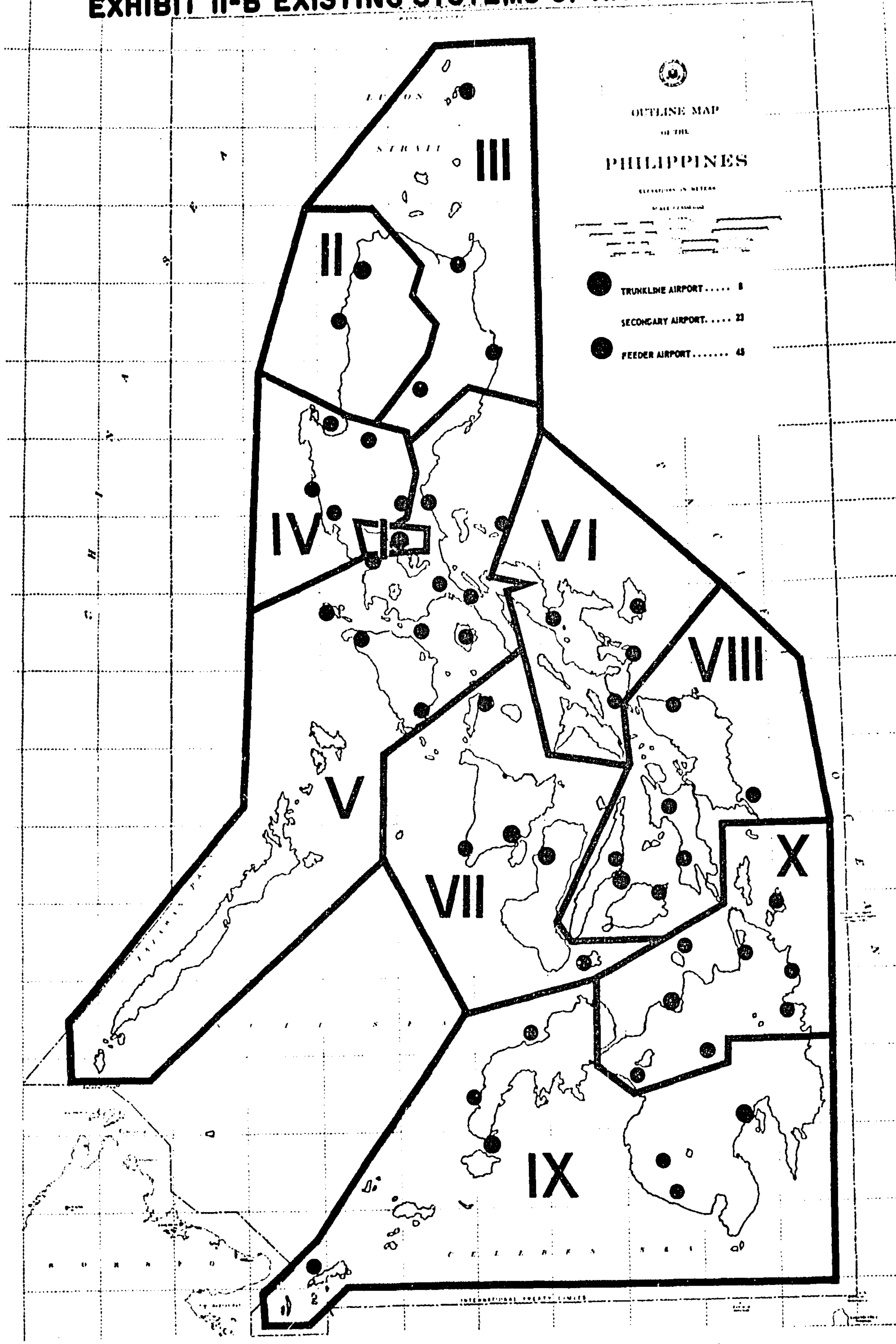
Region VII - Western Visayas: Aklan, Antique, Capiz, Iloilo, Negros Occidental, Negros Oriental, Romblon.

Region VIII - Eastern Visayas: Bohol, Cebu, Northern Leyte, Southern Leyte, Samar.

Region IX - Southern and Western Mindanao: Cotabato, Davao, Sulu, Zamboanga del Norte, Zamboanga del Sur.

Region X - Northern and Eastern Mindanao: Agusan, Bukidnon, Lanao del Norte, Lanao del Sur, Misamis Occidental, Misamis Oriental, Surigao del Norte, Surigao del Sur.

EXHIBIT II-B EXISTING SYSTEMS OF NATIONAL AIRPORTS



of Laoag and Manila all of the trunkline airports are located in the southern portion of the Philippines. As defined by the CAA system of airport classification, the trunkline airports serve the principal commercial centers of the Philippines, and are intended for use by medium range jet aircraft.

The secondary airports presently number 23 in total. Four are located in the upper third of the Philippines (Regions I through IV), 11 in the middle third (Regions V through VIII), and 8 in the lower third (Regions IX and X). Eight airports are on Luzon and eight on Mindanao. By definition, secondary airports are "...those which serve principal towns and cities with regular traffic densities that warrant ...(the)... operation of jet-prop aircraft." There are 45 feeder airports. Region V with ten airports has the largest number. Among the other regions, Region X has seven, Region VIII has six, Regions IV and IX have five each, Regions III and VI have four each. Region VII has three and Region II has one. Twenty-three feeder airports are on Luzon, twelve in Mindanao and the remaining ten on as many islands.

By definition, feeder airports "...serve towns with limited passenger traffic and are intended for use by piston aircraft such as the DC-3..."

Fifty-seven national airports involve, in relation to Manila (and Manila International), inter-island movement. The remaining 19 airports, with MIA International, are located on Luzon, and can be reached in either direction by land transport means, available now or potentially so. Of the first 30 largest cities and towns, including municipalities (which range in population from 35,282 for Dumaguete to 1,138,611 for Manila), 25 have national airports. The exceptions are Cabanatuan, Cavite, Lipa, San Pablo, and Basilan. The first four are located close to Manila, and land transport capability is available. Basilan is on Basilan Island across the Basilan Strait from Zamboanga City which is served by a national airport.

Based on the <u>1960 Census</u>, 75 (now 76) National airports accounted, in nearby cities and towns, for a population of 4.9 million or 18.1 per cent of the national total (27.1 million). A total of 8.1 million people or 29.9 per cent of the national population total were urban residents. On the economic front, the 75 national airports then accounted collectively for 29 major trade centers and areas (out of a national total of 33), for 13 secondary trade centers and areas (out of 34), and for 33 minor trade centers and areas (out of 131).[23/] Finally, 50 out of 58 provincial capitals have national airports.

23/ The Philippine Economic Atlas, Republic of the Philippines, Manila, R.P., 1965, pp. 150-151.

The public airport category comprises, in addition to the 76 national airports, ten other airports with different status. One is Itbayat, a new national airport, which is under construction and which is about 80 per cent finished. A second is Sablayan, to which scheduled air service was inaugurated by PAL on 21 December 1966.24/ This airport is operated by, and under the jurisdiction of, the Philippine Bureau of Prisons. The remaining eight airports are: Caticlan, Gingoog, Ipil, Labason, and Lebak, which are classified as feeder airports, and Dinagat, Malangas, and San Pascual, which are classified as rural airports. The Gingoog and Lebak airports are owned and operated by the municipal governments of the same name, respectively.

There are 54 private airports in the nation. Seventeen are located in Region IX on Mindanao. Another nine are located in Region IV on Luzon. Seven are in Region VII, and another seven are in Region X. The remaining private airports are located in Region I (one airport), Region III (four), Region V (five), and Region VIII (four private airports). As can be seen, the southern third of the Philippines accounts for a substantial number of private airports, along with a noticeable number in the central part of Luzon.

The Philippines has five military airports, two operated by the Philippine Government and three by the United States Government. The Philippine military airports are located at Basa Air Base at Floridablanca and the Fernando Air Base at Lipa, both operated by the Philippine Air Force. Nichols Air Base, headquarters of the Philippine Air Force, uses the airport facilities of Manila International. The United States military airports are located at Clark Air Base of the United States Air Force and at the Cubi Point and Sangley Point Naval Bases of the United States Navy.

The proposed airports, numbering 56 altogether, are referenced and set out in Philippine Airports and Airways Development Program 1966 to 1970 (Including Later Years), a document prepared (and issued under date of 12 September 1966) by a committee formed for the purpose of presenting an airport and airway development program. We have for reasons of time mostly confined our major attention to the existing system of national airports. It may be noted, however, that the subject document contained no economic or traffic data in support of proposed airports developments and improvements.

The national system of airports in the Philippines provides, as it is

24/ The PALiner (PAL house paper), Vol. X, No. 3, 18 January 1967, p. 2.

X 70

A secluded beach area — one of the many which could be improved for tourist and local residents alike.

now constituted, a reasonable amount of accessibility, viewed from the standpoint of the geographic, demographic, economic, political, and military needs of the nation.

B. Aircraft

From 1961 to 1966 (as of 17 November 1966), the inventory of registered aircraft in the Philippines increased from 216 to 378. (See Exhibit II-C) (As reported,[25] the Philippines had a total of 164 registered aircraft, including 41 commercial aircraft, at mid-1956.) This increase amounted to 32.4 aircraft and 12.2 per cent on the basis of the average annual rate of growth. There was a noticeable increase in the number of registered aircraft in 1966 over 1965. The 1965-1966 advance came on top of the addition of 43 registered aircraft from 1964 to 1965. A slight decline in the number of registered aircraft was recorded in the two-year period 1963-1964. Of the 378 registered aircraft on 17 November 1966, a total of 303 were based or owned at Manila.

The number of registered aircraft belonging to general aviation, as opposed to commercial aviation and government (civil) aviation applications, rose from 138 in 1961 to 258 in 1966. The commercial aviation increase was 73 to 113, and the government aviation increase was 5 to 7. This breakdown of growth is based on an inspection and interpretation of the aircraft registration data furnished by the Civil Aeronautics Administration. The relationship between the three categories of aircraft has remained about the same, being in the latest year, 1966, as follows: 68.2 per cent for general aviation, 29.9 per cent for commercial aviation, and 1.9 per cent for government aviation.

Based on the 1966 total of 378 registered aircraft, 295 could be classified as utility aircraft. (See Exhibit II-D) Such aircraft may be defined as aircraft designed and operated to serve the immediate mobility needs of the operator or the pilot with negligible or limited passenger/freight lift capability. The remaining aircraft--83 in number--are transport aircraft, designed and operated to move people and goods on a quantity basis.

Most aircraft in the 1966 inventory of registered aircraft were of the single-engine arrangement. Specifically, there were 228 single-engine aircraft. There were 142 twin-engine aircraft, which made up

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[25] An Economic Analysis of Philippine Domestic Transportation, Vol. VI, Stanford Research Institute, Menlo Park, California, undated, p. 2.

EXHIBIT II - C. INVENTORY OF GENERAL, COMMERCIAL, AND GOVERNMENT AIRCRAFT

Line	Year	Absolute a/				Percentage				Year-to-year Change	
		General Aviation	Commercial Aviation	Government Aviation (Civil) b/	Total	General Aviation	Commercial Aviation	Government Aviation (Civil) b/	Total	Absolute	Percentage
Col.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1	1961	138	73	5	216 c/	63.9	33.8	2.3	100.0	--	--
2	1962	158	70	5 d/	233	67.8	30.0	2.2	100.0	17	7.9
3	1963	197	74	6	277	71.1	26.7	2.2	100.0	44	18.9
4	1964	193	73	6	272	71.0	26.8	2.2	100.0	5 (-)	1.8 (-)
5	1965	212	96	7	315	67.3	30.5	2.2	100.0	43	15.8
6	1966	258	113	7	378	68.2	29.9	1.9	100.0	63	20.0 e/

a/ Based on an inspection and interpretation of aircraft listings furnished by the Civil Aeronautics Administration.

b/ Civil aircraft belonging or used by the civilian branch of the government.

c/ At mid-1956, a total of 164 aircraft were registered, of which 41 were in the commercial category and the balance in the general/government categories. Source: An Economic Analysis of Philippine Domestic Transportation, Volume VI: Air Transportation, Stanford Research Institute (SRI), Menlo Park, California, undated, page 2 (Prepared for the National Economic Council of the Republic of the Philippines).

d/ Assumed on the basis of 1961 and 1963 listings; no government aircraft listed in 1962 register, actually.

e/ 1961-1966 average annual rate of growth: 12.2 per cent (32.4 aircraft).

Source: As above.

EXHIBIT II - D. AIRCRAFT INVENTORY (17 NOVEMBER 1966) — TECHNICAL DISTRIBUTION

Line	Aircraft/Function	Single-engine [a/]				Twin-engine [a/]				Four-engine [a/]				Grand Total
		P	TP	J	Total	P	TP	J	Total	P	TP	J	Total	
Col:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
1	Utility Aircraft [b/]	226			226	68	1		69					295
2	Transport Aircraft	2 [c/]			2	53	18	2	73	3	3	2	8	83
3	Total:	228			228	121	19	2	142	3	3	2	8	378

a/ P = piston; TP = turboprop; J = jet.

b/ Aircraft designed essentially to serve immediate mobility needs of operator or pilot with limited passenger/freight lift capability.

c/ deHavilland Otters.

Source: Aircraft Register, Civil Aeronautics Administration, Republic of the Philippines, Manila International Airport, Pasay City, R.P., 17 November 1966, various pages.

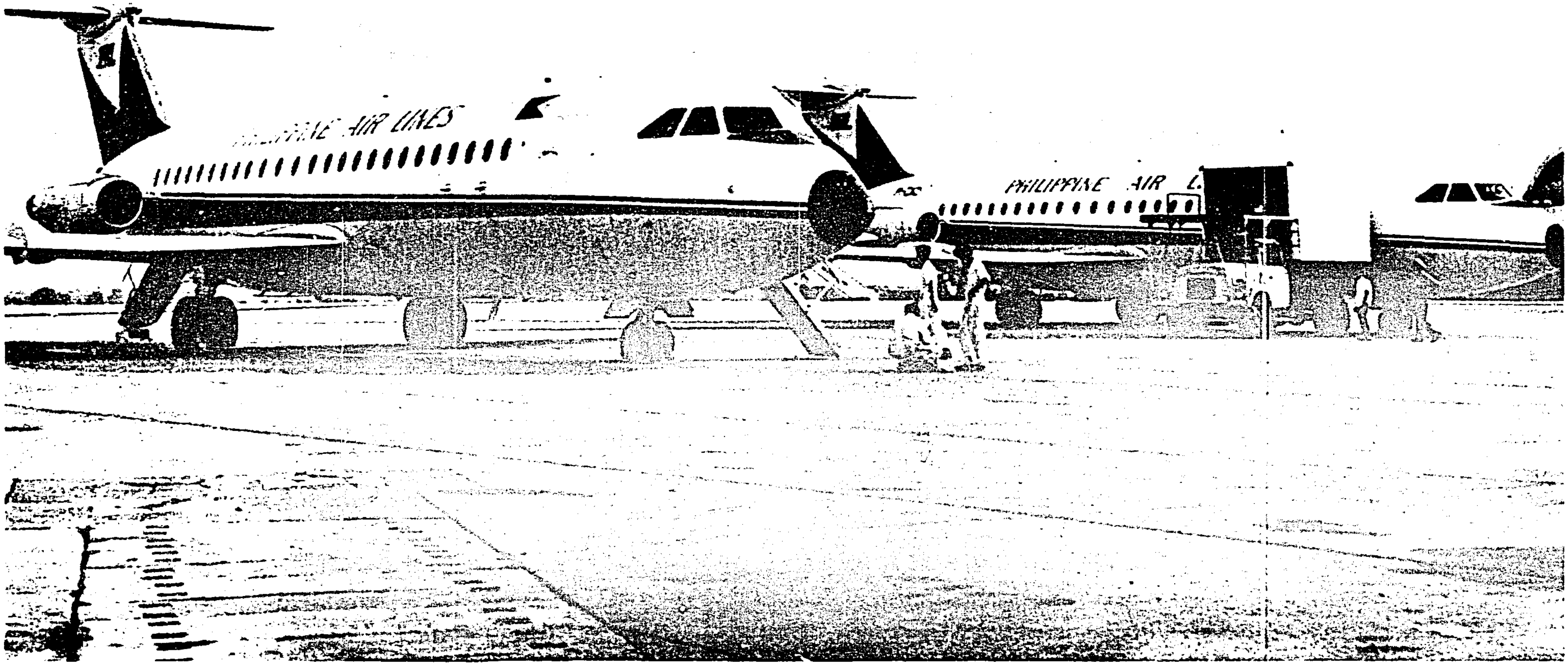
X
74

the next largest group, and there were eight four-engine aircraft. All of the single-engine aircraft were powered by piston engines. Of the 142 total of twin-engine aircraft, 121 were powered by piston engines, 19 by turbine engines driving propellers (or turboprop arrangement), and the remaining two (BAC 1-11's) were of the pure jet type. Among the four-engine aircraft, three were powered by piston engines, three by turbine engines driving propellers, and the remaining two--DC-8's--were of the pure jet type. Utility aircraft included only one turbine aircraft. The aircraft in question is a twin-engine Aero Commander with a turboprop arrangement. This aircraft is manufactured in the United States by a division of the Rockwell-Standard Corporation. Twin-engine and four-engine transport aircraft accounted for majority of the turbine-powered aircraft, either of the turboprop or pure jet type.

In general, turbine power is much more economical and efficient than piston power. The ratio between the weight of the power plant and the power produced is far greater for the turbine engine than for the piston engine. There are far less working parts in the turbine engine than in the piston engine. Turbine engines can be operated for many more hours between major overhauls than piston engines, and are subject to much less vibration and are more dependable. These and other features of the turbine aircraft, coupled with higher operating speeds and greater seating capacity made possible by turbine engines, explain in important part the revolution which has taken place in the air transport industry in the past ten years. Most, if not all or nearly all, transport aircraft now being manufactured in the world are turbine powered. Another recognizable trend is that an increasing number of transport aircraft being made are of the straight jet type. Concurrently, airlines are phasing out turboprop (and piston) aircraft in favor of straight jets.

Between 17 November 1966 and 28 February 1967, a total of 12 additional aircraft were registered with the Philippine Government. They included two F-27.1 aircraft and one Avro H.S. 748 (HS-748) operated by Philippine Air Lines and two YS-11 aircraft belonging to Filipinas Orient Airways. The YS-11's were replacements for two other YS-11's which had been registered, so that the net change in the inventory of registered aircraft from 17 November 1966 to 28 February 1967 was 10 and not 12. The inventory may be still further reduced to reflect the loss of a PAL F-27 on 28 February 1967 in an accident at Cebu.

The YS-11, F-27, and HS-748 are all twin-engine, turboprop transport aircraft. The YS-11 is manufactured by the Nihon Aeroplane Manufacturing Company, Ltd., of Tokyo. It is equipped with Rolls Royce



PAL's BAC 1-11's bring jet age to Philippine domestic aviation scene.

turbine engines. The F-27 is made by Fokker in the Netherlands. The HS-748 is made by Hawker Siddley in the United Kingdom. A remaining twin-engine, turboprop, transport aircraft type used in the Philippines is the Dart Herald, also a British-made aircraft. The four aircraft types are designed primarily for short-range transport operations. Seating capacity, in the configurations utilized in the Philippines, is as follows: YS-11 (60 seats), F-27 (44 seats), HS-748 (44 seats), and Dart Herald (50 seats). Both the F-27 and Dart Herald are high-wing aircraft. Under their franchises, the three scheduled carriers domiciled in the Philippines, namely, Air Manila, Filipinas Orient Airways, and Philippine Air Lines, are exempt from import duties, purchase taxes, and other impositions on aircraft and aircraft parts brought into the country. For others, the various applicable duties and taxes add about 22 per cent to the value of the aircraft or aircraft parts.

In essence, it may be observed that the inventory of registered aircraft in the Philippines is increasing noticeably; that the inventory contains a mixed group of aircraft, comprising differences in the number of engines, power plant types, and foreign manufacturing origin; and that the number of utility aircraft is substantially greater than the number of transport aircraft.

C. Operators

Aviation activities are based not only on airports and aircraft, but on the nature and extent of the air operator population, a third and indispensable ingredient in the aviation mix. Aviation activities may be further classified into three categories, as follows: General aviation, comprising private flying and business/executive flying; commercial aviation, comprising non-scheduled operations and scheduled operations; and government aviation, comprising civil operations and military operations. Taken together, the three categories account for a total of 239 air operators, of which 225 were domiciled in the Philippines and 14 outside the country. This figure is based on an inspection, analysis, and interpretation of aircraft registration data and other sources of information.

1. General Aviation

Of the 239 total operators in all categories, 211 operators--all domiciled in the Philippines--with 258 aircraft were classified as belonging to general aviation. Further divided, 97 of these with 109 aircraft, including one rotary-wing aircraft (or helicopter) were assigned to the sub-category of private flying. The remaining 114 operators with 149 aircraft, including four rotary-wing

77

aircraft, were assigned to the sub-category of business/executive flying. With respect to the former sub-category, the number of operators is probably inflated to the extent that it includes operators who may be engaged in business/executive flying for their own account or for the account of others without the knowledge and consent of the Civil Aeronautics Board.

General aviation activities in the world are growing rapidly, as indicated by the sale of new aircraft for private and business/executive flying. In the case at hand, specific information concerning general aviation activities in the Philippines is not readily available. We have already observed that the number of general aviation aircraft in the national inventory of registered aircraft is large, and expanding. These factors alone would suggest that general aviation should have a major impact in the total aviation picture. In reviewing registration data, we have also noted that a large number of general aviation aircraft have ownership addresses in the Manila area, and belonged to companies and firms engaged for the most part in lumbering, mining, and sugar raising.26/ We have also already noted that a large number of private aircraft are located in central Luzon and in the southern third of the nation. These factors would further suggest that a considerable amount of general aviation flying would take place between Manila, on the one hand, and the southern third and remote areas of the country, on the other hand.

Statistical data on aircraft movements at national airports for general aviation were available within defined limits, and these data are presented and considered in sub-section D, Traffic.

26/ "Among the corporations and companies who operate and own two or more aircraft are the Philamlife Insurance Co., Marinduque Mining and Industrial Corp. --which also operates a DC-3 aside from more than five small aircraft--Tarlac Development, Adecor, Canlubang Sugar Estate, Basilan Lumber Corp., Sta. Clara Lumber, Liberty Motors Inc., Bislig Bay Lumber, A. Soriano y Cia., Elizalde and Co., Theo H. Davis & Co., and Marinduque Mines Agents, Inc." Source: The Economic Monitor, Vol. 1, No. 13, Manila, R. P., 18 April 1966, p. 10. The Team is aware of several other companies operating two or more aircraft for business or executive purposes and not mentioned in the Monitor report.

2. Commercial Aviation

The subject of commercial aviation operators in the Philippines may be examined under four headings, as follows: (a) Scheduled domestic operators, (b) non-scheduled domestic operators, (c) scheduled international operators, and (d) non-scheduled international operators.

a. Domestic Scheduled Operators

There are, at present, three authorized domestic scheduled air operators in the Philippines. They are: Air Manila (AMI), Filipinas Orient Airways (FOA), and Philippine Air Lines (PAL). Each company has its head office at Makati, in Rizal, and each company has its main operating base at the Manila International Airport (MIA). All possess franchises from the Congress of the Philippines, granting to them authority to operate scheduled air service. To also hold, according to advisement from the CAB legal personnel, temporary certificates of public convenience and necessity from the Board.

The franchise for Air Manila was granted under Republic Act No. 4501, which was passed by the House of Representatives and the Senate on 20 May 1965, and signed into law by the President on 19 June 1965. The Act states in Section 1:

> "There is hereby granted to Air Manila, Incorporated, a corporation duly created and existing under Philippine laws, and a holder of a Civil Aeronautics Board permit to operate domestically on a commercial basis, hereinafter called the grantee, a franchise to establish, operate, and maintain transport services for the carriage of passengers, mail, industrial flights and cargo by air in and between, any and all points and places throughout the Philippines and other countries."

and, in Section 2:

> "Except in cases of <u>force majeure</u> and whenever weather conditions permit, the grantee, shall maintain scheduled or non-scheduled air transport services in and between, any and all points and places throughout the Philippines as well as the Philippines and other countries at such frequencies as traffic needs may require."

The grantee is obliged, under Section 12, to pay to the national government a tax of two per cent on the gross revenue or gross earnings realized from operations, in lieu of all other taxes, other than on real property, that may be levied by municipal, provincial, and national authorities.

Finally, the Act provides, under Section 17, that the franchise shall have a term of life of 50 years starting from the date of the approval of the Act.

Filipinas Orient Airways received its franchise under Republic Act 4147, which was passed by the Senate on 20 May 1964 and by the House of Representatives on 21 May 1964. It was signed by the President on 20 June 1964, on which date it became effective. Act 4147 authorizes Filipinas Orient Airways to engage in scheduled air transportation in the Philippines and between the Philippines and other countries. It is, as in the case of Air Manila, obliged to pay the National Government a two per cent tax on gross revenue or gross earnings derived from its franchised operations, in lieu of all other taxes that may be applied by the different governmental authorities. Similar to Air Manila, however, it is not exempt from taxes on real property. The term of life of the franchise is established as 50 years, to start from the date of acceptance of the franchise by the grantee. The franchise is not valid "... unless the grantee accepts the same within two years after its approval, filing such acceptance in writing with the Civil Aeronautics Board." A provision not contained in the Air Manila franchise states in Section 22: "The planes or aircraft of the grantee used for international flights shall be considered national flag carriers of the Philippine Government."

Operating authority for Philippine Air Lines is contained in Republic Act No. 4271, as amended by Commonwealth Act 643 and Republic Act 2360, approved originally under date of 14 November 1935. This Act grants PAL essentially the right to engage in domestic and foreign scheduled and non-scheduled air service and to provide the number of frequencies demanded by traffic needs. The same provision regarding frequencies is contained in the franchises of Air Manila and Filipinas Orient Airways. Under Act 4271, PAL is also obliged to pay to the National Government a tax of two per cent on its gross revenues or gross earnings, in lieu of all other taxes that may be levied by municipalities, provinces, and the National Government. It is, however, subject to real property taxes. The life of the franchise runs for 50 years from the approval date. No reference is made in the Act to national flag carrier representation.

X 80

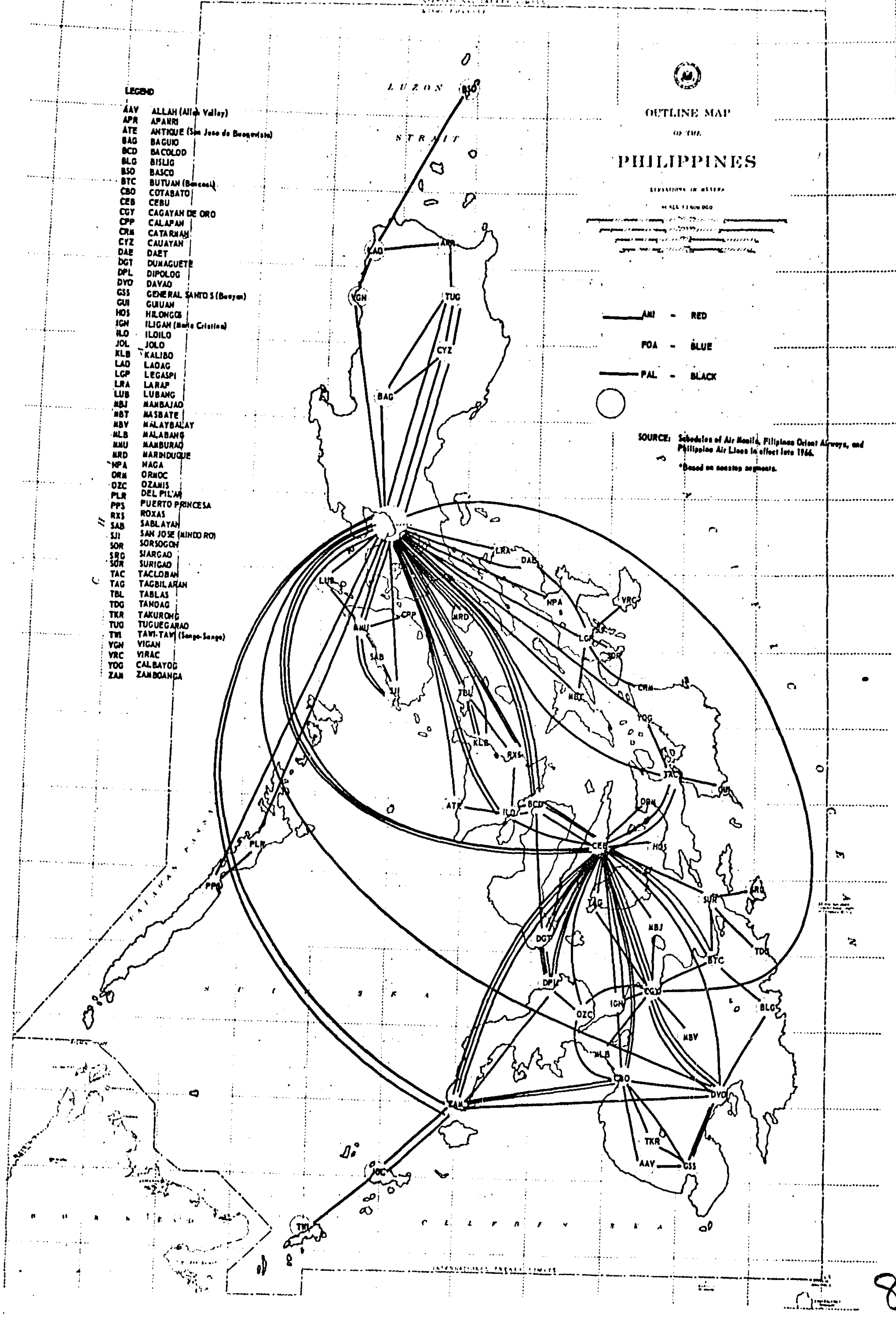
One of the many gun emplacements at Corregidor

Philippine Air Lines started domestic scheduled operations in March 1941, ceasing operations soon thereafter with the start of World War II. It resumed domestic scheduled service on 14 February 1946 with five DC-3's, and started international scheduled service on 31 July 1946 to the United States, using DC-4's. Subsequently, PAL closed down its operations to the United States for reasons of economy, and then later on it resumed service to the United States. Both AMI and FOA commenced domestic scheduled operations in 1965. The advent of these two carriers on the national air scene marked, as noted in Section I, the start of air competition for the first time in the Philippines. There was a carrier named Fleming Airways System Transport (FAST) which may have appeared to have operated a scheduled air service in the Philippines in competition with PAL. In reality, however, it was a non-scheduled air service, and so regarded itself, operating under authority of a court mandatory injunction granted on 5 June 1959. It did not hold any authority from the Civil Aeronautics Board. FAST went out of business in late 1964 or early 1965.

Based on airline schedule in effect in late 1966, Air Manila, Filipinas Orient Airways, and Philippine Air Lines operated domestic scheduled route system measuring (unduplicated mileage) 4,001 miles; 2,562 miles; and 12,647 miles in total length, respectively. (See Exhibit II-E) The shortest nonstop route segment served by AMI was 27 miles in length, and the longest segment was 534 miles. Its average nonstop segment was 143 miles. FOA's shortest route segment was 49 miles in length; longest, 350 miles; and the average, 166 miles. The shortest nonstop route segment served by PAL was 27 miles in length, and the longest segment was 602 miles. Its average nonstop segment was 130 miles. The distribution of routes of all three carriers is substantially oriented in a north-south direction, in which the main artery is formed by an axis between Manila and Cebu.

Air Manila served, in accordance with its service pattern on the date cited, a total of 22 points or national airports. These airports comprised eight trunkline airports, and 14 secondary airports. No feeder or rural airports were served. Filipinas Orient Airways served a total of 11 national airports, made up of seven trunkline airports, four secondary airports, and no feeder or rural airports. Philippine Air Lines operated to a total of 58 airports, including 53 national airports. The latter number consisted of eight trunkline airports, 23 secondary airports, and 22 feeder airports. No rural airports were served. The remaining airports served--five in number--consisted of Sablayan, owned by the national Government, but operated by the Bureau of

EXHIBIT II-E DOMESTIC SCHEDULED CARRIER ROUTE SYSTEMS*



Prisons, and four private airports (Bislig, del Pilar, Larap, and Takurong).

Based on schedules in effect in late 1966, Air Manila utilized six DC-3's and two Dart Herald's to operate its routes. AMI reported a daily utilization rate of 6 hours and 30 minutes for the former aircraft and 10 hours and 15 minutes for the latter aircraft. Filipinas Orient Airways utilized, for its part, some six aircraft to operate its routes. The lineup consisted of three DC-3's and three YS-11's. Its reported daily utilization rates were three or four hours for the DC-3's and six hours and 45 minutes for the YS-11's. Philippine Air Lines operated a total of 28 aircraft to provide service on its domestic routes. They consisted of fourteen DC-3's, twelve F-27's, and two BAC 1-11's. Its daily utilization rates were as reported to and by the Civil Aeronautics Board, as follows: 10 hours and 27 minutes for the DC-3's, 9 hours for the F-27's, and 5 hours and 55 minutes for the BAC 1-11's. In addition, PAL periodically utilizes Viscounts--of which it had three in its fleet of aircraft, as of 17 November 1966--to service some of its routes. PAL's total inventory of aircraft, including aircraft for domestic and international operations, was 57 on the given date.

The published schedules of AMI, FOA, and PAL, in effect in late 1966, called for the combined operation on a nonstop basis for a one-week period of 2,197 flights in and 2,197 flights out--a total of 4,394 flights in and out--for all 58 airports served by the three carriers. (See Exhibit II-F) Ten airports alone accounted for a total of 2,848 flights in and out or 64.8 per cent of all flights for all airports. The ten airports in question were, in the order given: Cebu, Manila, Bacolod, Davao, Cagayan de Oro, Zamboanga, Cotabato, Iloilo, Dumaguete, and Legaspi. The first 25 busiest airports, including the 10 airports just mentioned, accounted collectively for 3,842 flights in and out or 89.5 per cent of the total (4,394 flights). These figures evidence the fact that the distribution of scheduled air flights is highly concentrated in favor of a few airports. On an individual airport basis, the number of flights in and out for the different airports varied from a low of six flights weekly for Antique, del Pilar, Guiuan, Hilongos Malaybalay, Siargao, and Sorsogon, to a high of 728 flights weekly for Cebu. At 726 flights in and out weekly, Manila was just a shade below. To this number, however, there must be added the number of international flights moving in and out of MIA. Complete statistical data (flights, seats, and seat miles) for each airport are contained in Item I of Appendix A.

84

EXHIBIT II - F. ANALYSIS OF SCHEDULED AIR SERVICE BY AIRPORTS FOR ONE-WEEK PERIOD a/ b/

Line	Airports (Ranked)	Flights Total	Flights %	Flights Cumulative %	Seats Total	Seats %	Seats Cumulative %	Seat Miles Total	Seat Miles %	Seat Miles Cumulative %
Col.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1	1 - 10	2,848	64.8	64.8	124,324	68.2	68.2	25,263,184	81.7	81.7
2	11 - 20	760	17.3	82.1	27,764	15.2	83.4	2,707,960	8.8	90.5
3	21 - 30	408	9.3	91.4	15,968	8.8	92.2	1,708,152	5.5	96.0
4	31 - 40	216	4.9	96.3	8,128	4.5	96.7	826,668	2.7	98.7
5	41 - 50	112	2.6	98.9	4,144	2.3	99.0	302,932	1.0	99.7
6	51 - 58	50	1.1	100.0	1,872	1.0	100.0	101,808	.3	100.0
7	Total	4,394	100.0%		182,200	100.0%		30,910,704	100.0%	
1	1 - 25	3,842	87.5	87.5	161,128	88.4	88.4	28,949,024	93.7	93.7
2	26 - 50	502	11.4	98.9	19,200	10.6	99.0	1,859,872	6.0	99.7
3	51 - 58	50	1.1	100.0	1,872	1.0	100.0	101,808	.3	100.0
4	Total	4,394	100.0%		182,200	100.0%		30,910,704	100.0%	

a/ Based on scheduled air service in effect late 1966.

b/ See Item I in Appendix A for full statistical data.

Source: Published schedules of Air Manila, Filipinas Orient Airways, and Philippine Air Lines.

In terms of seats provided during the one week period, the carriers, utilizing equipment ranging from DC-3's to BAC 1-11's, flew 91,100 seats in and 91,100 seats out--total of 182,200--of the 58 airports. The first ten leading airports accounted for 124,324 seats in and out or 68.2 of the total. The ten airports were Cebu, Manila, Davao, Bacolod, Cagayan de Oro, Cotabato, Zamboanga, Dumaguete, Legaspi, and Butuan (Bancasi) in that order. Compared to the flight ranking, Davao changed places with Bacolod, Cotabato changed places with Zamboanga, Iloilo dropped to 12th place, and Butuan went from 13th place to 10th place. The first 25 leading airports, including the first ten mentioned by name, accounted for a total of 161,128 seats in and out or 88.4 per cent of the grand total. Again, we have evidence of substantial concentration. On an individual airport basis, Cebu was at the top of the list with 34,678 seats in and out, Manila was next in line with 32,248 seats in and out. From Manila to Davao, in third place, there is a sharp drop, to 11,000 seats in and out. Six airports had a minimum of 216 seats in and out weekly.

The number of seats flown in and out of an airport should represent the maximum number of passengers that can be boarded or off-loaded at that airport. However, the real number depends on the number of through passengers on a through flight and, of course, on the number of people who actually get on or get off. In the case of the Philippine domestic scheduled carriers, another factor is that some flights may fly through an airport with blocked space for use, or release, at another airport down the line. This practice is explained in part or in whole by the lack of adequate carrier communications capability between some points.

The three carriers--AMI, FOA, and PAL--produced a total of 30.9 million seat miles in and out of the 58 airports in the one-week period. The first ten ranking airports contributed alone 25.1 million seat miles or 81.7 per cent of the total. In the order of importance, the ten airports were: Manila, Cebu, Davao, Zamboanga, Bacolod, Cagayan de Oro, Cotabato, Iloilo, Legaspi, and Tacloban. This lineup represents several changes from the flight and seat rankings. Manila moved, for example, into first place with 9.3 million seat miles or nearly one-third of the total week's production of seat miles. The changes are explained importantly by the influence of nonstop segment lengths associated with different airports. The first 25 airports, including the ten just named, accounted for 28.9 million seat miles in and out or 93.7 per cent of the total. Sorsogon with only 6,048 seat miles in and out was at the bottom of the list.

A total of 2,197 flights was operated between the 58 airports over 100 nonstop segments in either direction in the one week period. (See Exhibit II-G) Manila had 27 nonstop segments, and easily accounted for the largest number. Cebu followed next with 18 nonstop segments to its credit. Cagayan de Oro was in third place with ten nonstop segments. And Cotabato and Davao followed with nine and seven nonstop segments, respectively. Given a possible 1,624 nonstop segments between 58 airports, the utilization of 100 segments provides a connectivity factor of 16.2 per cent, as based on nonstop operations. Connectivity is also a function of through flights and connecting flights, it should be added.

On the basis of the numbers of flights operated on all nonstop segments in the one-week period, the first ten busiest nonstop segments accounted collectively for 722 flights in both directions or 32.9 per cent of the total of 2,197 flights. (See Exhibit II-H) The first 25 busiest nonstop segments had a total of 1,258 flights in both directions or 57.2 per cent of the total of all flights. (See Exhibit II-I) These figures indicate a somewhat wider distribution of flight activity on a segment basis than on a point basis. The busiest nonstop segment was Cebu-Manila. It had 75 flights weekly in either direction or a total of 150 flights. The next busiest segment was Bacolod-Cebu with 52 flights in either direction or a total of 104 flights. The third busiest segment was Bacolod-Manila with 40 flights in either direction or a total of 80 flights. The fourth busiest segment was Bacolod-Iloilo with a total of 70 flights. The fifth busiest segment was Jolo-Zamboanga with a total of 68 flights. The five next busiest segments were, in the order given: Cagayan de Oro-Cebu, Cagayan de Oro-Davao, Cebu-Dumaguete, Cebu-Cotabato, and Cauayan-Manila. At the very bottom of the list, there were four nonstop segments with only three flights weekly (in one direction only). These were: Antique (San Jose de Buenavista)-Iloilo, Antique-Manila, del Pilar-Manila, and del Pilar-Puerto Princesa. Complete statistical data (flights, seats, and seat miles) for each nonstop segment are contained in Item II of Appendix A.

A total of 91,100 seats--45,428 seats in one direction and 45,672 seats in the opposite direction--were flown on the various nonstop segments in the one-week period by the three carriers. The first ten busiest segments had a total of 34,556 seats or 37.9 per cent of the total. The first 25 busiest segments had 55,576 seats or 61.0 per cent of the total.

The busiest segment was Cebu-Manila with 8,608 seats for the

EXHIBIT II – G. SCHEDULED FLIGHTS (NONSTOP BASIS) DURING ONE-WEEK PERIOD IN LATE 1966

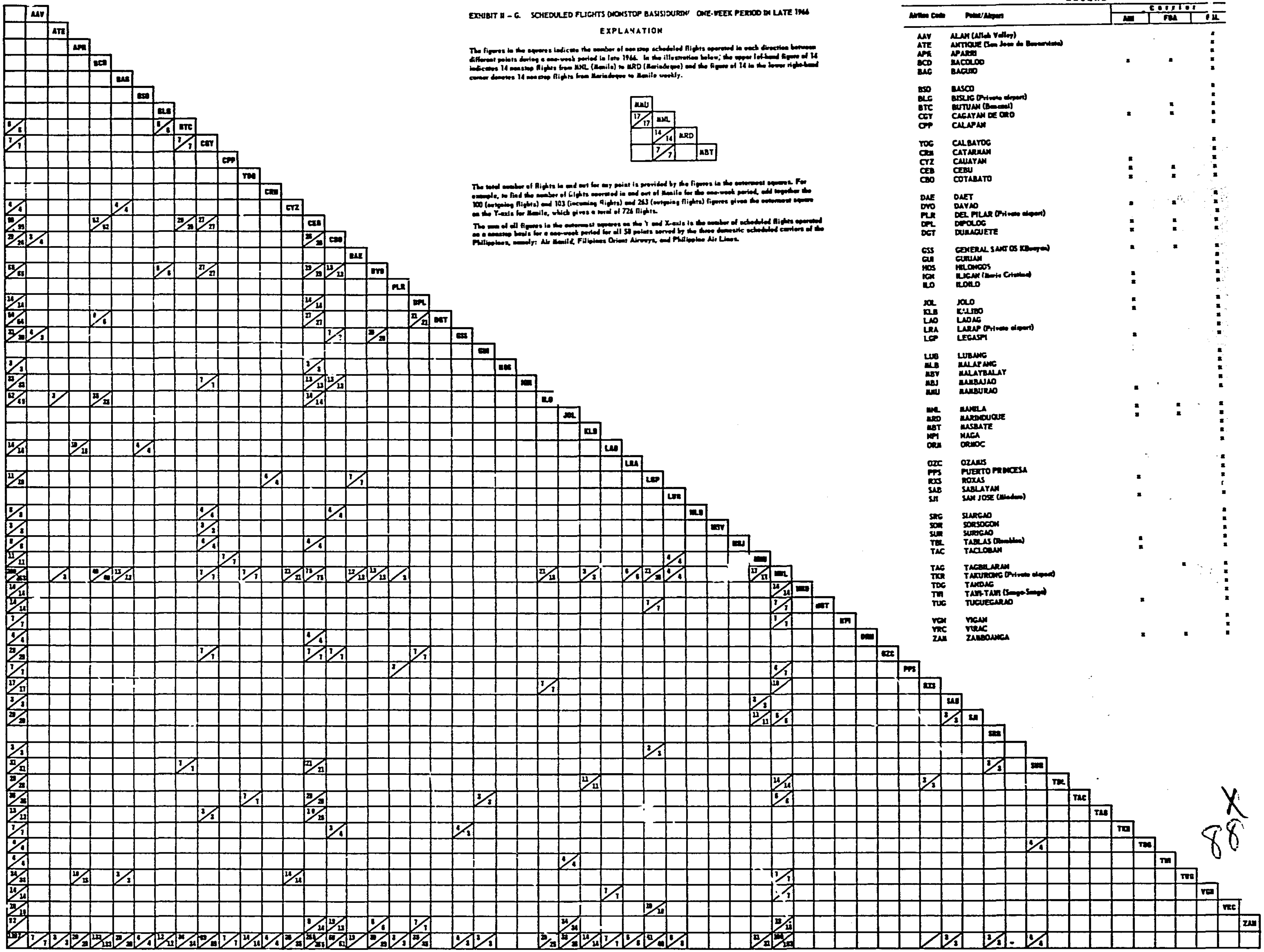
EXPLANATION

The figures in the squares indicate the number of nonstop scheduled flights operated in each direction between different points during a one-week period in late 1966. In the illustration below, the upper left-hand figure of 14 indicates 14 nonstop flights from MNL (Manila) to MRD (Marinduque) and the figure of 14 in the lower right-hand corner denotes 14 nonstop flights from Marinduque to Manila weekly.

MMU			
17/17	MNL		
	14/14	MRD	
	7/7		MBT

The total number of flights in and out for any point is provided by the figures in the outermost squares. For example, to find the number of flights operated in and out of Manila for the one-week period, add together the 100 (outgoing flights) and 103 (incoming flights) and 263 (outgoing flights) figures given the outermost square on the Y-axis for Manila, which gives a total of 726 flights.

The sum of all figures in the outermost squares on the Y and X-axis is the number of scheduled flights operated on a nonstop basis for a one-week period for all 58 points served by the three domestic scheduled carriers of the Philippines, namely: Air Manila, Filipinas Orient Airways, and Philippine Air Lines.



LEGEND

Airline Code	Point/Airport	Carrier: AM	FOA	PAL
AAV	ALAH (Allah Valley)			x
ATE	ANTIQUE (San Jose de Buenavista)			x
APR	APARRI			x
BCD	BACOLOD	x	x	x
BAG	BAGUIO			x
BSO	BASCO			x
BLG	BISLIG (Private airport)			x
BTC	BUTUAN (Bancasi)		x	x
CGY	CAGAYAN DE ORO	x	x	x
CPP	CALAPAN			x
YOG	CALBAYOG			x
CRM	CATARMAN			x
CYZ	CAUAYAN	x		x
CEB	CEBU	x	x	x
CBO	COTABATO	x	x	x
DAE	DAET			x
DVO	DAVAO	x	x	x
PLR	DEL PILAR (Private airport)			x
DPL	DIPOLOG	x	x	x
DGT	DUMAGUETE	x	x	x
GSS	GENERAL SANTOS (Dadiangas)	x	x	x
GUI	GUIUAN			x
HDS	HILONGOS			x
IGN	ILIGAN (Maria Cristina)	x		x
ILO	ILOILO	x		x
JOL	JOLO	x		x
KLB	KALIBO	x		x
LAO	LAOAG			x
LRA	LARAP (Private airport)			x
LGP	LEGASPI	x		x
LUB	LUBANG			x
MLB	MALAPANG			x
MBV	MALAYBALAY			x
MBJ	MAMBAJAO			x
MMU	MAMBURAO	x		x
MNL	MANILA	x	x	x
MRD	MARINDUQUE	x	x	x
MBT	MASBATE			x
NPI	NAGA			x
ORM	ORMOC			x
OZC	OZAMIS			x
PPS	PUERTO PRINCESA			x
RXS	ROXAS	x		x
SAB	SABLAYAN			x
SJI	SAN JOSE (Mindoro)	x		x
SRG	SIARGAO			x
SOR	SORSOGON			x
SUR	SURIGAO			x
TBL	TABLAS (Romblon)	x		x
TAC	TACLOBAN	x		x
TAG	TAGBILARAN		x	x
TKR	TAKURONG (Private airport)			x
TDG	TANDAG			x
TWI	TAWI-TAWI (Sanga-Sanga)			x
TUG	TUGUEGARAO	x		x
VGN	VIGAN			x
VRC	VIRAC			x
ZAM	ZAMBOANGA	x	x	x

EXHIBIT II - H. ANALYSIS OF SCHEDULED AIR SERVICE BY NONSTOP SEGMENTS FOR ONE-WEEK PERIOD [a/] [b/]

Line	Airports (Ranked)	Flights Total	Flights %	Flights Cumulative %	Seats Total	Seats %	Seats Cumulative %	Seat Miles Total	Seat Miles %	Seat Miles Cumulative %
Col.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1	1 - 10	722	32.9	32.9	34,556	37.9	37.9	8,631,528	55.8	55.8
2	11 - 20	392	17.8	50.7	15,396	16.9	54.8	2,397,368	15.5	71.3
3	21 - 30	276	12.6	63.3	10,736	11.8	66.6	1,496,908	9.7	81.0
4	31 - 40	217	9.9	73.2	8,240	9.0	75.6	1,042,504	6.7	87.7
5	41 - 50	140	6.4	79.6	5,548	6.1	81.7	664,104	4.3	92.0
6	51 - 60	140	6.4	86.0	5,040	5.5	87.2	444,140	2.9	94.9
7	61 - 70	116	5.3	91.3	4,516	5.0	92.2	313,048	2.0	96.9
8	71 - 80	80	3.6	94.9	2,880	3.2	95.4	225,936	1.5	98.4
9	81 - 90	66	3.0	97.9	2,460	2.7	98.1	165,728	1.1	99.5
10	91 -100	48	2.1	100.0	1,728	1.9	100.0	74,088	.5	100.0
	Total	2,197	100.0%		91,100	100.0%		15,455,352	100.0%	

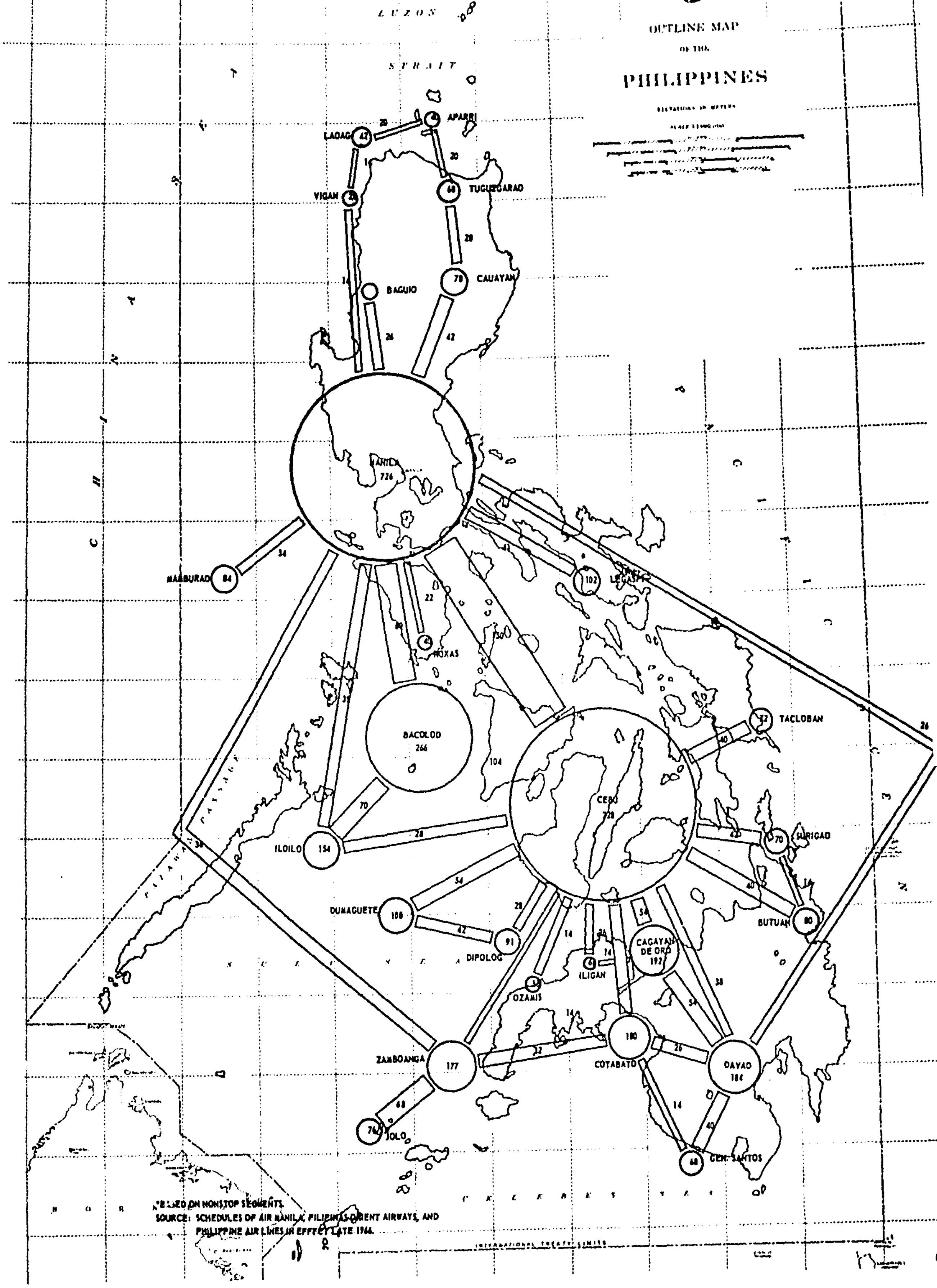
Line	Airports (Ranked)	Flights Total	Flights %	Flights Cumulative %	Seats Total	Seats %	Seats Cumulative %	Seat Miles Total	Seat Miles %	Seat Miles Cumulative %
1	1 - 25	1,258	57.3	57.3	55,576	61.0	61.0	11,841,760	76.6	76.6
2	26 - 50	489	22.3	79.6	18,900	20.7	81.7	2,390,652	15.5	92.1
3	51 - 75	296	13.4	93.0	10,996	12.1	93.8	874,908	5.7	97.8
4	76 -100	154	7.0	100.0	5,628	6.2	100.0	348,032	2.2	100.0
	Total	2,197	100.0%		91,100	100.0%		15,455,352	100.0%	

[a/] Based on scheduled air service in effect late 1966.

[b/] See Item II in Appendix A for full statistical data.

Source: Published schedules of Air Manila, Filipinas Orient Airways, and Philippine Air Lines.

EXHIBIT II-1 DOMESTIC SCHEDULED AIR SERVICE CAPACITY (WEEKLY) RANKING TWENTY-FIVE (25) FLIGHT POINTS AND SEGMENTS



*BASED ON NONSTOP SEGMENTS.
SOURCE: SCHEDULES OF AIR MANILA, FILIPINAS ORIENT AIRWAYS, AND PHILIPPINE AIR LINES IN EFFECT LATE 1966.

two directions. The least busiest segments were Antique-Iloilo, Antique-Manila, del Pilar-Manila, and del Pilar-Puerto Princesa, with 108 seats each.

Flights and seats on the various nonstop segments produced a total of 15.5 million seat miles. The first ten busiest segments accounted for 8.6 million seat miles or 55.8 per cent of the total, while the first 25 busiest segments accounted for 11.8 million seat miles or 76.6 per cent of the total. Of the three measures--flights, seats, and seat miles--seat miles represented the greatest concentration of scheduled air activity in the nation.

The three domestic scheduled carriers compete with each other to an important extent. The operations of Air Manila involved, based on schedules in effect in late 1966, service to 23 points and on 4,001 miles of routes. It had competition at all 23 points and on all but 303 miles of its routes. Filipinas Orient Airways operated, for its part, to 11 points and on 2,652 miles of routes, all in competition with Air Manila or Philippine Air Lines or both. Philippine Air Lines operated to 58 points and on 12,647 miles of routes. It had competition at 25 points and on 11,095 miles of routes. Conversely, it had no competition at 33 points and on 1,552 miles of routes. Based on a review of nine statistical measures[27] and the corresponding results for Fiscal Year 1965 (1966--not available--would be more representative of the current situation obtaining), PAL's share of the activity ran from 79.4 per cent of the total number of hours flown by the three carriers to 100.0 per cent of the total mail weight carried.

The question arises whether airline competition is good for the country. In general, the answer is yes. Competition provides a workable means to obtain improvements in service and reductions in fares. Effective competition also implies, on the other hand, the availability and observance of ground rules for fair play. In this, both the airlines and the government must play their proper roles. It also may imply, in the case at hand, a trade-off of subsidy for competition. Until the introduction of competition, PAL was in a position to subsidize its losses on short, thin traffic routes with profits from long (or longer), heavy traffic routes. In a sense, the government itself was providing subsidy for the

27/ Namely, revenue passengers carried, hours flown, miles flown, passenger miles, seat miles available, cargo (kilos) carried, mail (kilos) carried, ton-miles performed, and ton-miles available.

operation of routes which were not capable of paying their own way, but which were needed as a matter of national interest. With the introduction of competition, however, PAL's ability to subsidize routes is reduced. This is a fact which must be recognized by the government. The validity of our observation here may or may not be confirmed by a review of PAL's financial operations on particular routes. In any case, the subject of competition and subsidy invites governmental attention at this time.

Relevantly, in calendar year 1966, PAL had a net profit of 5.2 million pesos, "...in spite of unprecedented competition, a restrictive government schedules policy and a crippling pilot strike." This profit represented an increase of 6.7 per cent over that of 1965. The President of PAL, in reporting the company's financial results to a stockholders' meeting, listed several problems the company faced. As described, they were: (a) The inadequacy of the domestic fare structure in the face of increasing costs, (b) the strengthening of the competition from the imposition of limitations on PAL schedules, (c) the shortage of pilots, (d) the nine-day pilots' strike last November, (e) continuing competition at Lahug after PAL moved to Mactan, (f) competition on routes parallel to PAL's with turboprop equipment at fares lower than PAL's comparable aircraft, (g) the concentration of competing services on heavily travelled trunkline routes, and (h) the inadequacy of airports and navigational aids.

On the plus side of the ledger, the President of PAL mentioned the continuing improvement in the company's fleet of aircraft, the introduction of pure-jet service on domestic routes in 1966, and the creation of the Orient Airlines Research Bureau (OARB).

PAL filed, on 18 April 1966, for fare increases. Under its current authority from the Board, PAL charges the following passenger fares: ₱0.13/seat mile for DC-3 service, ₱0.21/seat mile for F-27 and Viscount service, ₱0.21/seat mile plus ₱20 additional (for trip, regardless of distance) for BAC 1-11 service, and ₱0.12/seat mile for F-27 night service. It filed for the following increases: F-27 service--₱0.21/seat mile plus ₱5 additional for any distance up to 200 miles and no additional after 200 miles; F-27 night service--₱0.16/seat mile plus ₱5 additional for any distance up to 200 miles and no additional after 200 miles; and DC-3 service--₱0.13/seat mile plus ₱5 additional for trip, regardless of distance. As of 15 April 1967, the Civil Aeronautics Board was still studying PAL's application for fare increases.

The increase sought by PAL appears to represent more of an adjustment of certain fares, essentially, for short distances, than an address for a blanket increase in fares. Commenting further, PAL's application for fare increases may indicate that it cannot afford to subsidize loss routes with profit routes or that it does not feel justified in doing so under a system of competition. At this time, neither Air Manila nor Filipinas Orient Airways has applications before the Board for fare increases or changes. Any decision by the Board to increase or change fares would necessitate, of course, an inquiry into carrier route costs, profits, and losses.

Viewed from the standpoint of the general public, the present level of fares are not out of line with what people can afford. On a purely economic basis, however, current fares on short route segments seem low. It might be suspected that in some route situations, it would not be possible to meet all costs even with a 100 per cent load factor and completely amortized equipment. Given the economics of transportation in general, costs are going to be higher on a unit basis for a 100-mile route than for a 1000-mile route. Terminal operations represent a major cost item which cannot be spread thinly over a short route.

In calendar year 1965, Filipinas Orient Airways reported a net loss of ₱1.1 million on its operations, after paying its franchise tax (₱80,228.68). These results were for its first year of operations. Up to the time of this writing, financial data for 1966 had not been received by the Board from Filipinas Orient Airways. Financial information from Air Manila was not available to us for both 1965 and 1966.

Air Manila reported that it has purchased eight F-27's in the United States which had formerly belonged to Piedmont. Filipinas Orient Airways has asked Boeing Company, of Seattle, to conduct feasibility studies on the use of the Boeing 727 and the 737 on its domestic routes. According to a press announcement from London, under date of 6 February 1967, Philippine Air Lines had received delivery of its third BAC 1-11, and was negotiating for the purchase of a fourth BAC 1-11 for delivery in mid-1968. It plans, according to the press release, to acquire a fleet of six BAC 1-11's. Its first BAC 1-11 was acquired in early 1966. Starting on 1 March 1967, PAL began to fly an Avro/HS 748 on some of its DC-3 routes on a trial basis. From different indications, it may be assumed that PAL wishes to dispose altogether of its Viscounts.

TABLE I

FIRE EXTINGUISHING AGENTS AND EQUIPMENT RECOMMENDATIONS

Col. 1	2	3	4	5	6	7	8	9
INDEX NO.	TOTAL QUANTITY EXTINGUISHING AGENTS			WATER/FOAM TRUCKS		WATER TANK TRUCKS		EQUIPMENT DESCRIPTION
	DRY CHEM	WATER for FOAM		CAPACITY		CAPACITY		
	Lbs.	Gals.	GPM	Gals.	GPM	Gals.	GPM	
I								Telephone or fire alarm box.
II								Portable fire extinguishers and telephone or fire alarm box.
III	500							1-Dry chemical truck.
IV	300	500	250	1-500	250			1-Combination (water/foam and dry chemical) truck.
V	300	1500	750	1-500 1-1000	250 500			1-Combination truck and 1-1000 gallon water/foam truck.
VI	500	3000	1000	2-1000	500 ea.	1-1000	500	1-Dry chemical truck, 2-1000 gallon water/foam trucks, 1-1000 gallon water tank truck.
VII	500	4500	1300	1-1000 1-1500	500 800	2-1000 or 1-2000	500 ea. or 800	1-Dry chemical truck, 1-1000 and 1-1500 gallon water/foam truck, 2-1000 or 1-2000 water tank trucks.
VIII	500	7000	1600	2-1500	800 ea.	2-2000	800 ea.	1-Dry chemical truck, 2-1500 gallon water/foam trucks, 2-2000 gallon water tank trucks.

b. Non-scheduled Domestic Operators

Eight air operators possess current authority from the Civil Aeronautics Board for domestic non-scheduled commercial air transport operations. The eight are: Charter Service Corporation, Civil Air Rural Transport (CART), Far East Aviation Service Corporation, Manila Aviation Service, Pacific Airways Corporation, Philippine Aerial Agricultural Corporation, Philippine Air Transport Service, and Security Delivery Service. Between them, they have a total of 29 aircraft, including one rotary-wing aircraft. They are engaged in charter work, taxi hauling, dusting and spraying, and in other activities of non-scheduled, transportation or utility nature. These operators are required to furnish, periodically, reports to the Board on their respective activities. The requirement does not appear, however, to be strictly enforced or observed.

A proposed statement of economic regulations for air taxi operators has been prepared in the Board. The regulations would apply to the charter movement of persons and property utilizing small aircraft. The term "small aircraft" is defined to mean "...an aircraft (including helicopter) whose maximum certificated take-off weight does not exceed 12,500 lbs." To be eligible for an air taxi operator certificate, the applicant would have to be a citizen of the Republic of the Philippines, meet certain other requirements, and satisfy the basic requirement of public convenience and necessity and the public interest. The grantee would be required to file with the Board a monthly report providing financial and traffic data on his operations. A yearly financial statement would also be furnished to the Board. The regulation would become effective upon approval of the Board and its publication in the Official Gazette, as yet unaccomplished on both counts.

c. Scheduled International Operators

Scheduled air service between the Philippines and other countries is provided by 12 foreign carriers and Philippine Air Lines. (See Exhibit II-J) Together, the 13 carriers operated, on 1 March 1967, a total of 56 frequencies weekly to (or from, in the case of PAL) Manila, with a total capacity of 6,049 seats. Nineteen foreign frequencies operated through Manila, while the remaining foreign frequencies turned around at Manila. Philippine Air Lines, with 20 international frequencies, operated the largest number of international frequencies. Cathay Pacific Airways, next in line, operated eight frequencies to Manila, followed by Qantas with

X 95

EXHIBIT II - J. INTERNATIONAL SCHEDULED AIR CARRIER OPERATIONS[a]

Line	Carrier	Carrier Code	Home Country	Basic Operating Authority	Route/Frequency Itinerary	Philippine Non-stop segments	Aircraft Type	Aircraft Seats	Weekly Frequency Allocated[b]	Weekly Frequency Utilized	Weekly Capacity (seats)[c]	Aircraft Movements[d]
Col.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1	Air France	AF	France	Air agreement (P)[e]	Paris-Tokyo	Saigon-Manila-Tokyo	B-707	144	2	2	288	8
2	Alitalia	AZ	Italy[f]	-								
3	Civil Air Transport (CAT)	CT	China, Rep. of	Air agreement (P)	Taipei-Manila	Taipei-Manila	CV-880	101	2	2	202	4
							DC-6B	64	2	2	128	4
4	Cathay Pacific Airways (CPA)	CX	Hongkong (U.K.)	Air agreement	Hongkong-Jesselton	Hongkong-Manila-Jesselton	CV-880	101	1	1	101	4
					Hongkong-Manila	Hongkong-Manila	CV-880	101	7	7	707	14
5	Garuda Indonesian Airways	GA	Indonesia	Air agreement (P)	Djakarta-Tokyo	Djakarta-Manila-Hongkong	DC-8	135[g]	1	1	135[g]	4
6	Japan Air Lines (JAL)[h]	JL	Japan[h]	-								
7	Malaysia Singapore Airlines (MSA)	ML	Singapore	[i]	Singapore-Manila	Singapore-Manila	Comet	70	2	2	140	4
8	Northwest Orient Airlines (NWA)	NW	United States	Operating permits[j]	New York-Seattle-Manila	Okinawa-Manila	B-707/320B	129	2	2	258	4
9	Pan American World Airways (PAA)	PA	United States	Operating permits[j]	San Francisco-Singapore/Djakarta	Guam-Manila-Saigon[k]	B-707	129	2	2	258	8
10	Philippine Air Lines (PAL)	PR	Philippines	-	Manila-San Francisco	Manila-Honolulu	DC-8	133	4	4	532	8
					Manila-Sydney	Manila-Sydney	DC-8	133	2	2	266	4
					Manila-Singapore	Manila-Singapore	DC-8	133	1	1	133	2
					Manila-Hongkong	Manila-Hongkong	DC-8/BAC-111	133/74	10	10	1035	20
					Manila-Taipei	Manila-Taipei	BAC-111	74	3	3	222	6
11	Qantas Empire Airways	QF	Australia	Air agreement (P)	Sydney-London	Sydney/Brisbane-Manila-Hongkong.	B-707	104	3	3	312[l]	12
					Sydney-Tokyo	Sydney/Brisbane-Manila-Hongkong	B-707	104	3	3	312[l]	12
					Sydney-Kongkong	Sydney/Brisbane-Manila-Hongkong	B-707	104	1	1	104[l]	4
12	KLM-Royal Dutch Airlines (KLM)	KL	Netherlands	Air agreement (P)	Amsterdam-Tokyo	Bangkok-Manila-Tokyo	DC-8	133	2	2	266	8
					Amsterdam-Sydney	Bangkok-Manila-Sydney	DC-8	133	1	1	133	4
13	Scandinavian Airlines System (SAS)	SK	Denmark[m]	Air agreement (P)[m]	Copenhagen-Tokyo	Bangkok-Manila-Tokyo	DC-8	137	2	2	274	8
14	Swissair	SR	Switzerland	Air agreement	Zurich-Tokyo	Bangkok-Manila-Tokyo	CV-990	99	1	1	99	4
15	Thai Airways International	TG	Thailand	Air agreement	Bangkok-Manila	Hongkong-Manila	Caravelle	72	2	2	144[n]	4
	T O T A L			o/					56	56	6049	150

a/ As of 1 March 1967.
b/ Based on frequency allocation schedule of the Civil Aeronautics Board (CAB).
c/ One way only.
d/ An aircraft movement equals one take-off and one landing.
e/ "(P)" indicates provisional or temporary, as defined by the Philippine Department of Foreign Affairs, pending negotiation of a permanent agreement or until such time as the provisional agreement is terminated.
f/ The Italian Government has communicated its desire/interest to the Philippine Government in obtaining rights for a Bangkok-Manila-Tokyo air operations.
g/ Actual seating capacity not known; given number assumed. Limited by the Philippine CAB to the sale of 20 seats between Manila and Hongkong.
h/ A JAL request for authority to operate between Taipei and Manila has been made to the Philippine CAB. Under a private agreement between JAL and PAL, the former would provide the latter with a share of the revenues derived from its (JAL) Tokyo operations. An agreement (provisional) between Japan and the Philippines was denounced by the latter, effective 90 days from 24 March 1964. No agreement exists between the two countries at this time.
i/ Covered at this time under the Philippine-United Kingdom air services agreement.
j/ No agreement. A Philippine-United States air services agreement was denounced by the former in 1959, effective the following year. Operating permission since 1960 have been provided under unilateral grants of authority.
k/ No Manila-Singapore Fifth Freedom or stop-over traffic rights.
l/ No Manila-Hongkong Fifth Freedom traffic rights.
m/ And also Norway and Sweden. SAS is a consortium owned and operated by the three countries. The Philippines has air agreements (provisional) with each of the three countries.
n/ Subject to 50 per cent CAB capacity limitation.
o/ In addition, the Philippines has air services agreements ("non-provisional") with Greece, India, Israel, Mexico, Pakistan, and Spain, and agreements (provisional) with Belgium and Burma. The Philippine Government has received proposed drafts of new agreements from Denmark, France, Netherlands, Norway, and Sweden. The Philippine Government has also a draft of a proposed agreement from the United States. The following additional countries have expressed an interest in concluding an air services agreement with the Philippines, but with no proposed drafts as yet; Australia, Iraq, Korea (Rep. of), Lebanon, and Vietnam.

Source: Civil Aeronautics Board; Department of Foreign Affairs; Official Airline Guide (For March 1967), Vol. 24, No. 3, Part one of two parts, Reuben H. Donnelley Publications, Chicago, Illinois, February 1967, various pages; others.

seven frequencies. The foreign carriers and PAL foreign frequencies produced a total of 150 aircraft movements on a weekly basis. (An aircraft movement equals one take-off or one landing.) Under Republic Act 776, domestic and foreign frequencies are subject to Board control and allocation. In the present situation, the 56 international frequencies operated to and from the Philippines represented also the number of frequencies allocated by the Board.

The Philippines has air transport agreements with three of the countries with flag-carrier operations to the Philippines. The three countries are the United Kingdom, Switzerland, and Thailand. In the case of six other countries (France, China, Republic of Indonesia, Australia, Netherlands, and the SAS consortium countries of Denmark, Norway, and Sweden), the agreements with the subject countries are of a provisional nature. As defined by the Philippine Department of Foreign Affairs, the term "provisional" is applied to air transport agreements which are in force pending negotiation of a permanent agreement or which are in force pending termination at the convenience of the government. Scheduled air operations between the Philippines and the United States are conducted under a system of unilateral grants of authority. An agreement existed between the two countries until 1959, in which year the Philippines denounced the agreement, with the results taking effect in the following year with the termination of the agreement.

At present, the United States is restricted to four frequencies weekly by the Philippines, the number which is currently operated by the two United States carriers serving the Philippines; two by Northwest and two by Pan American. Both carriers have petitions before the Philippine Civil Aeronautics Board for additional frequencies. In addition, Pan American is not permitted to carry Fifth Freedom or stopover traffic between Manila and Singapore. Garuda is restricted by the Philippine CAB to 20 seats weekly between Manila and Hong Kong. Qantas has no Fifth Freedom traffic rights between the same two points. And Thai International is restricted to the sale of 50 per cent of its seating capacity between Manila and Hong Kong. Such restrictions do not act in the best interest of the travelling public, insofar as they limit the choice in the number of frequencies available to a traveller.

The Italian Government has communicated its interest in obtaining rights for Bangkok-Manila-Tokyo air operations. Japan Air Lines has an application before the Philippine Civil Aeronautics Board for authority to operate to the Philippines. In the Trans-Pacific case, which is now being heard by the United States Civil Aeronautics Board, several United States air carriers have expressed interest in operations to the Philippines. There is an understandable interest in the Philippines. The Philippines commands a strategic position in the world lines of communications and in relation to Pacific countries such as Japan and Australia. It has plenty of tourism potential viewed in terms of its warmth and sunshine and what it can do or could do. On the economic front, it is rich in mineral deposits, forest products, and potentially so in other ways.

d. Non-scheduled International Operators

There are presently no non-scheduled international operators belonging to the Philippines. Non-scheduled carriers and off-line scheduled carriers will sometimes call on the Philippines to pick up or discharge freight or to carry in a group of visiting tourists. Their operations with respect to the Philippines is of an occasional rather than a recurring or regular nature, however.

The lack of non-scheduled international operators on the Philippine scene should not imply that there is no place for such operators. On the contrary, there is a definite place. Non-scheduled international operators provide an important service in being able to move freely with the traffic wherever it is generated and wherever it wants to go. Their development should be encouraged.

3. Government Aviation

Five operators can be defined in the category of government aviation insofar as the Philippines is concerned. They are: the Bureau of Plant Industry, the Civil Aeronautics Administration, the Philippine Air Force, the United States Air Force, and the United States Navy. The extent of civil government operations can be gauged perhaps from the fact that the list of registered civil government aircraft on 17 November 1966 comprised seven aircraft. One was assigned to the Bureau of Plant Industry, three to the Civil Aeronautics Administration, and three to the Philippine Air Force. Deduction of the three aircraft assigned to the Philippine Air Force would leave four aircraft in actual civil government work. In its current budget proposal, the Civil Aeronautics Board has requested funds for an aircraft for Board use.

We have no information on the exact nature and extent of Philippine Air Force operations. It has bases with airport facilities at Floridablanca and at Lipa. We assume that it has not more than 300 aircraft in its inventory of aircraft. The United States Air Force operates from Clark Air Base which has airport facilities. It is also a tenant

98

at Mactan Airport at Cebu. The United States Navy has airport facilities at Sangley Naval Base, in Manila Bay, and at Cubi Naval Base, on Subic Bay. Statistical data relating to aircraft movements at Clark, Sangley, and Cubi are furnished in the next subsection.

D. Traffic

We come, at this point, to the heart of our inquiry and survey, essentially, what is moving and where? Without accurate, complete knowledge regarding the volume and distribution of the movement--persons, goods, and vehicles--over a period of time, it is difficult, if not impossible, to plan effectively for aviation or for any mode of transport. Ideally, we should be able to obtain traffic statistics for the different airports and routes for, say (at least), five years. Next, we should be able to establish rates of growth (and declines) for the different airports and routes. And next, we should be able to extrapolate the identified growth rates over a reasonable period of time, conditioning the extrapolation to reflect indicated future changes in fares, frequencies, aircraft and to reflect other changes and developments. The extrapolation can be constructed to provide a lower and higher limit of future growth. The character of the movement itself over time should be the best indication of what can be expected in the future. It reflects all the factors (demographic, economic, and others) that otherwise would be introduced into the problem of assigning growth rates to different airports and routes on a more or less empirical basis.

In the case at hand, we were unable, as we disclosed in the Preface, to obtain the full measure of traffic statistics we needed.

Our efforts to produce the required traffic statistics resulted, with the exception of MIA International, in developing statistics on numbers of departing and arriving passengers at different national airports for calendar year 1965 only and on numbers of aircraft movements at different national airports for calendar years 1965 and 1966 only. The airport passenger statistics were developed on the basis of statistics furnished to us by the Civil Aeronautics Board and by carriers. The CAB had, in turn, developed the airport passenger statistics from an analysis of airport caretaker reports it had conducted in connection with its own needs. Caretaker reports are prepared on a bi-weekly basis at all but a few national airports, the others being covered under a different reporting system. The task of our going through thousands of caretaker reports for any meaningful period of time would have presented us with a long-term assignment. Apart from this fact, the reports were sometimes difficult to read, and the information, we feared, was not always complete. Under the circumstances, we approached

X
99

the three domestic air carriers, and asked them for statistics on numbers of passengers enplaned and deplaned at each of their stations. Two carriers quite readily furnished to us the required statistics, but the third carrier, citing the possible competitive effect on its operations, refused to give us any useful airport passenger statistics.

In the matter of developing statistics on aircraft movements at national airports, we turned to the Civil Aeronautics Administration. The CAA routinely prepares a monthly statistical summary of aircraft movements. Statistical data are presented for all but a few national airports, the exceptions reporting under a different system. The data are broken down into commercial aircraft movements, civil aircraft movements, and military aircraft movements. Commercial aircraft movements comprise movements by aircraft belonging to the scheduled carriers, and civil aircraft movements comprise aircraft belonging to all others (that is, essentially, general aviation operators) except military. We borrowed the available monthly summaries from the CAA, and proceeded to develop a recapitulation of aircraft movements by airports and by activity (commercial, civil, and military) on a yearly basis. Unfortunately, monthly statistical summaries of aircraft movements were complete only for the years 1965 and 1966. Due to the partial destruction of CAA records by a typhoon, monthly summary reports were available for only some months and only through 1963. The alternative of going through thousands of caretaker reports was not acceptable for the same reasons given above.

We had no problem in obtaining passenger and aircraft movements statistics for Manila International Airport. This we did do, securing traffic data separately for Manila Domestic and Manila International for the five-year period 1962-1966 (calendar years). But otherwise we were faced with the problem of a grave inadequacy of traffic statistics. We had airport passenger statistics for only one year and aircraft movement statistics for only two years. We had no passenger flow or passenger O&D (origin and destination) statistics. We had obtained some freight statistics, but they were too limited to be of any real use to us.

Given the above situation, we rationalized our position and decided on the following courses of action: (a) establish the flow characteristics of air traffic over the nation in terms of scheduled air service, which we had already done, in the preceding subsection, in analyzing air schedules of the three domestic scheduled carriers for a one-week period, based on schedules in effect in late 1966; (b) utilize the 1965 airport passenger statistics we had developed to determine the magnitudes of air traffic activity at different airports; (c) analyze airline schedules over a period of several years on the basis of representative one-week period of time to determine trends in growth (and declines) for airports served by scheduled carriers; (d) identify any major development bound to affect the growth of air traffic in the country, such as a pending fare increase; and (e) limit our forecast efforts to MIA International for which we had historical data.

This was our approach then, Our preoccupation with scheduled air transportation can be justified apart from the course of action forced upon us. Scheduled air transportation serves, or can serve, the greatest number of people at the lowest cost. It represents a mass-transport medium, insofar as civil aviation general is concerned. For this reason alone, scheduled air transportation invites particular attention. Secondly, we would say that airline management is cognizant of air transport needs and opportunities to a far greater extent than any other group in the nation. Airlines are in the business of moving people and goods by air day in and day out. Their continuing analysis of the market is reflected in the changes they make in the volume and distribution of air service. These changes should be a good basis for evaluating trends. We would not want to second guess airline management, frankly. In rationalizing the exclusion of freight and mail traffic from our analysis, apart from the fact that we were not able to obtain the subject traffic statistics, we would say that passenger traffic has a far greater influence on airport planning than either freight or mail traffic. This picture may change insofar as the Philippines is concerned, but right now we have no trouble in believing that passenger movement forms the bulk of the movement.

1. Passenger Movement

In calendar year 1965, there was a total of 4.4 million departing and arriving passengers for 50 airports in the Philippines. (See Exhibit II-K) Five airports alone contributed 2.9 million departing and arriving passengers or 65.6 per cent of the total. The five airports were Manila, Cebu, Bacolod, Davao, and Zamboanga, in that order. On an individual basis, Manila (International) had 666,027 departing passengers and 673,438 arriving passengers for a total of 1.3 million passengers. Both domestic and international passenger traffic are included in Manila figures separately. There were 1.1 million departing and arriving passengers for Manila (Domestic) and 258,162 departing and arriving passengers for Manila (International)--19.3 per cent of the combined domestic and international total--for Manila. Cebu, next after MIA, had a total of 970,000 departing and arriving passengers; Bacolod, 250,186; Davao, 199,410; and Zamboanga, 118,317. As evidenced, there is a fast dropoff in traffic volumes after Cebu. The next five airports (Iloilo, Cagayan de Oro,

X
101

EXHIBIT II - K. DOMESTIC AIR PASSENGER DEPARTURES AND ARRIVALS BY AIRPORTS FOR CY 1965

Line	Rank	Airport/Point	Passenger Movement		
			Departures	Arrivals	Total
Col.	(1)	(2)	(3)	(4)	(5)
1	1	Manila	666,027	673,438	1,339,465
2	2	Cebu	485,000	485,000	970,000
3	3	Bacolod	126,674	123,512	250,186
4	4	Davao	103,210	96,200	199,410
5	5	Zamboanga	61,759	56,558	118,317
6	6	Iloilo	60,706	56,920	117,626
7	7	Cagayan de Oro	63,781	45,622	109,403
8	8	Cotabato	48,697	49,489	98,186
9	9	Butuan	42,573	41,544	84,117
10	10	Legaspi	42,368	40,049	82,417
11	11	Tacloban	32,492	31,051	63,543
12	12	Dumaguete	29,050	27,818	56,868
13	13	Jolo	24,722	28,829	53,551
14	14	Dipolog	24,938	27,422	52,360
15	15	Daet	25,651	25,329	50,980
16	16	Cauayan	23,768	25,897	49,665
17	17	Iligan	23,710	23,279	46,989
18	18	Kalibo	22,905	23,696	46,601
19	19	Tuguegarao	22,612	23,021	45,633
20	20	Surigao	21,239	20,431	41,670
21	21	Laoag	20,225	18,293	38,518
22	22	Roxas	19,364	19,121	38,485
23	23	Buayan (General Santos)	19,017	17,494	36,511
24	24	San Jose (Mindoro)	17,556	15,840	33,396
25	25	Mamburao	16,099	16,683	32,782
26	26	Misamis (Ozamis)	13,181	14,877	28,058
27	27	Baguio	14,273	13,686	27,959
28	28	Masbate	12,877	13,284	26,161
29	29	Aparri	12,633	12,073	24,706
30	30	Marinduque	11,405	12,491	23,896
31	31	Tagbilaran	9,074	10,570	19,644
32	32	Naga	9,800	9,094	18,894
33	33	Virac (Catanduanes)	9,492	8,544	18,036
34	34	Calapan	8,914	8,958	17,872
35	35	Tablas (Romblon)	8,736	9,062	17,798
36	36	Calbayog	8,620	8,920	17,540
37	37	Puerto Princesa	7,217	6,398	13,615
38	38	Lubang	5,250	5,882	11,132
39	39	Siargao	4,724	3,684	8,408
40	40	Vigan	3,671	4,366	8,037
41	41	Sanga-Sanga (Tawi-Tawi)	3,014	3,556	6,570
42	42	Tandag	3,414	3,058	6,472
43	43	Basco	3,237	2,778	6,015
44	44	San Jose de Buenavista (Antique)	3,079	2,919	5,998
45	45	Malaybalay	2,574	3,269	5,843
46	46	Hilongos	2,588	2,983	5,571
47	47	Guiuan	2,214	2,355	4,569
48	48	Sorsogon	2,090	2,212	4,302
49	49	Allah Valley (Alah)	1,633	2,259	3,892
50	50	Ormoc	841	923	1,764
		Total	2,208,694	2,180,737	4,389,431

Source: "Caretaker" reports, carrier data, and other sources.

Cotabato, Butuan, and Legaspi, in this order) added another 491,749 departing and arriving passengers or 11.2 per cent of the total for all 50 airports. Together, the first ten ranking airports accounted for 3.4 million passenger movements, in and out, or over three-fourths of the over-all total.

Domestic passenger departures and arrivals at MIA rose from 537,324 in 1962 to 995,337 in 1966. (See Exhibit II-L) The latter figure represents a decline from 1.1 million departures and arrivals in the preceding year. Aside from 1965-1966, the remaining two-year periods evidence high growth rates. The rate of growth amounted to 25.3 per cent for 1963 over 1962, to 20.4 per cent for 1964 over 1963, and to 33.4 per cent for 1965 over 1964. For the five-year period, the average annual rate of growth was 17.8 per cent.

We cannot explain the 1965-1966 drop in passenger traffic at Manila Domestic. Airlines people with whom we spoke on the subject were unable to provide a ready explanation. A few individuals mentioned the psychological effect stemming from several air accidents in 1965. No one seemed to feel that traffic had been diverted to surface transport means. Shortage of aircraft and pilots might have been factors.[28] Personally, we would have thought that traffic would have increased with the introduction of air competition in 1965 and 1966, or at least the current rate of growth would have been maintained. On the other hand, the growth rates have been high, and predicted on large, expanding numerical bases. As a mere function of numbers, one could expect a slowdown in the growth rates. The fact remains that the 1966 drop in passenger departures and arrivals at Manila (Domestic) was marked. Relevantly, there also was a noticeable drop in the number of flights from and to Manila in 1966 over 1965, as we shall see in another exhibit.

All things considered, we are inclined to assign a future growth rate to Manila (Domestic) for the next five years, 1967-1971, of 12 per cent minimum and 18 per cent maximum. These limits should provide an adequate basis for airport planning purposes. Concurrently, we note recent improvements in railway transportation on Luzon, which could affect the upper limit, if not the lower limit. Expansion and improvements in the highway transport plant are also noted. Water transportation does not seem to

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28/ "The Pilot Shortage," The Economic Monitor, Vol. 1, No. 23, Manila, R.P., 27 June 1966, pp. 9 and 13.

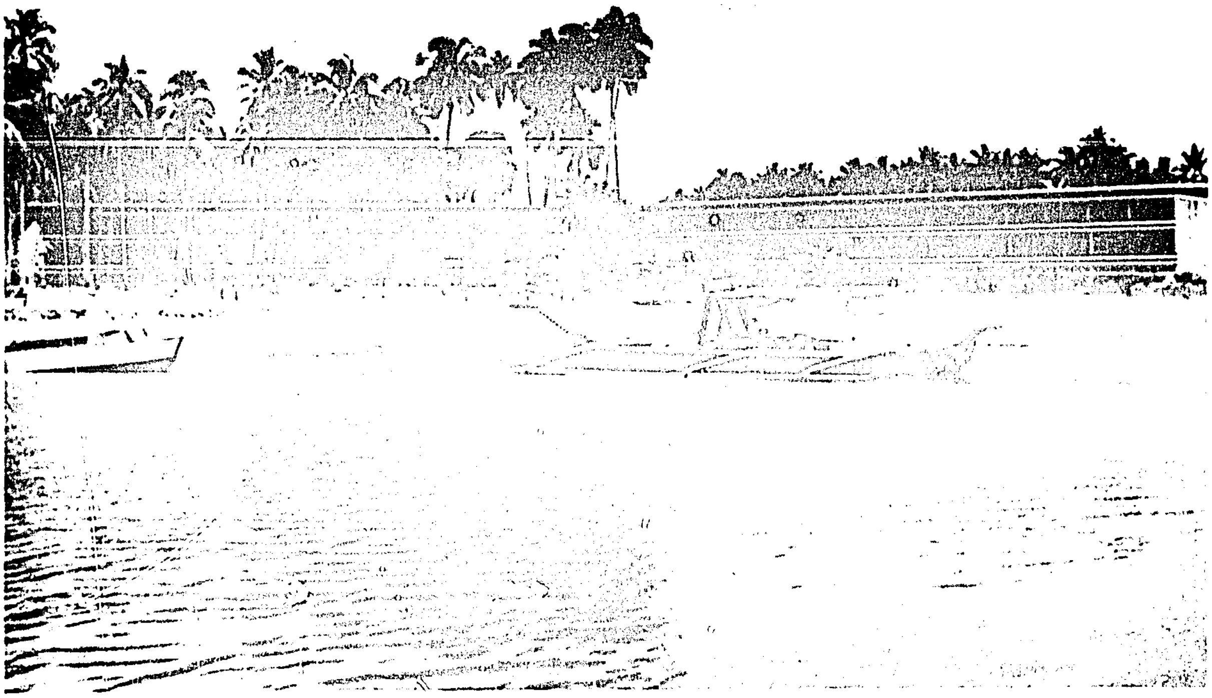
X 103

EXHIBIT II - L. PASSENGER MOVEMENT AT MANILA AIRPORT (DOMESTIC AND INTERNATIONAL)

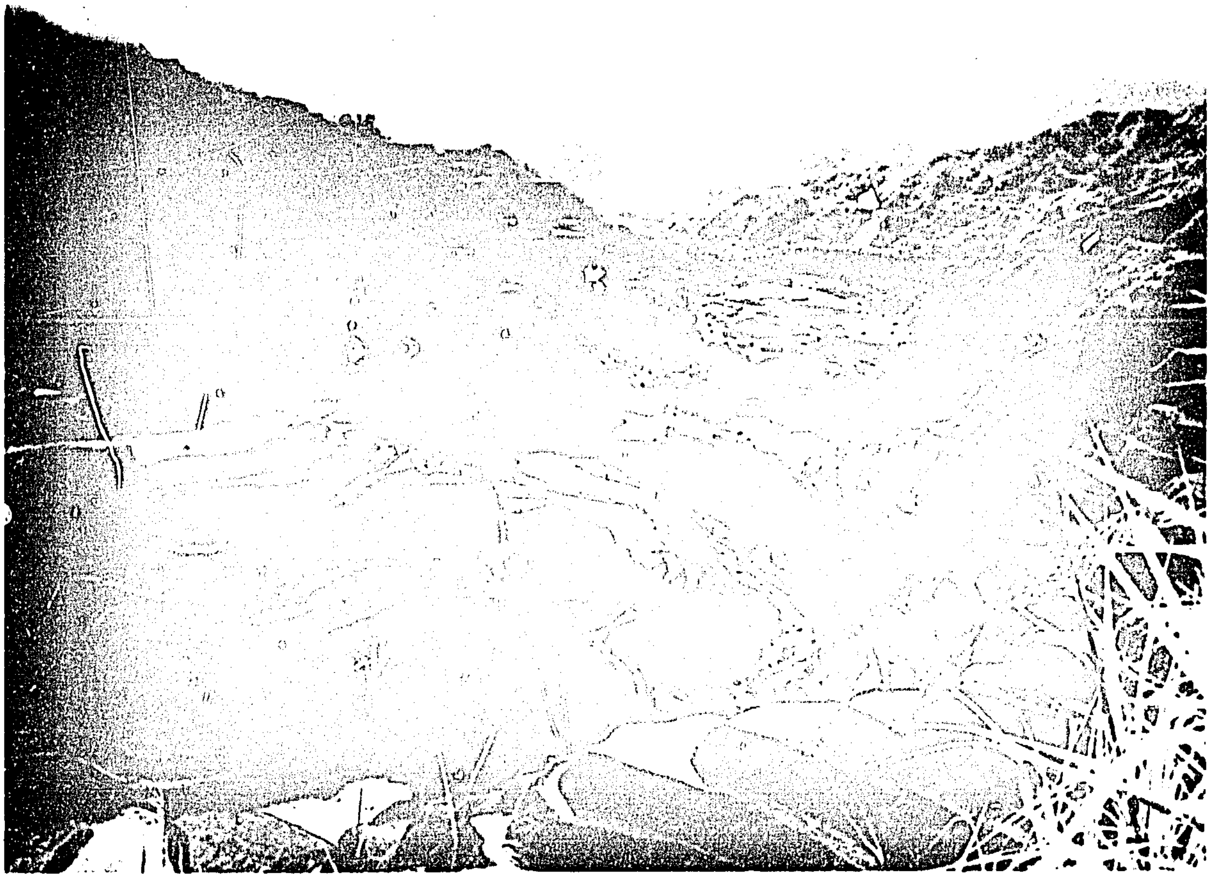
Line	YEAR	DOMESTIC					INTERNATIONAL						
		Departures	Arrivals	Total	1962-66 Change		Departures	Arrivals	Total	1962-66 Change		Transit	
					Absolute	Percentage				Absolute	Percentage	Absolute	% of (9)+(12)
Col.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1	1962	272,402	264,922	537,324	-	-	89,021	78,845	167,866	-	-	48,191	22.3
2	1963	342,019	331,347	673,366	136,042	25.3	102,180	93,095	195,275	27,409	16.3	50,577	20.6
3	1964	403,804	406,723	810,527	137,161	20.4	117,659	109,851	227,510	32,325	16.5	67,198	22.8
4	1965	530,914	550,389	1,081,303	270,766	33.4	135,113	123,049	258,162	30,652	13.5	77,486	23.1
5	1966	493,392	501,945	995,337	(85,966)	8.0 (-)	165,920	143,071	308,991	50,829	19.7	75,610	19.7
Total		2,042,531	2,055,326	4,097,857	458,003	71.1	609,893	547,911	1,157,804	141,125	66.0	319,062	
					114,523 a/	17.8 a/				35,281 a/	16.5 a/	63,812 a/	20.0 a/

a/ Average annual rate of change.
b/ Five-year average.

Source: Civil Aeronautics Administration.

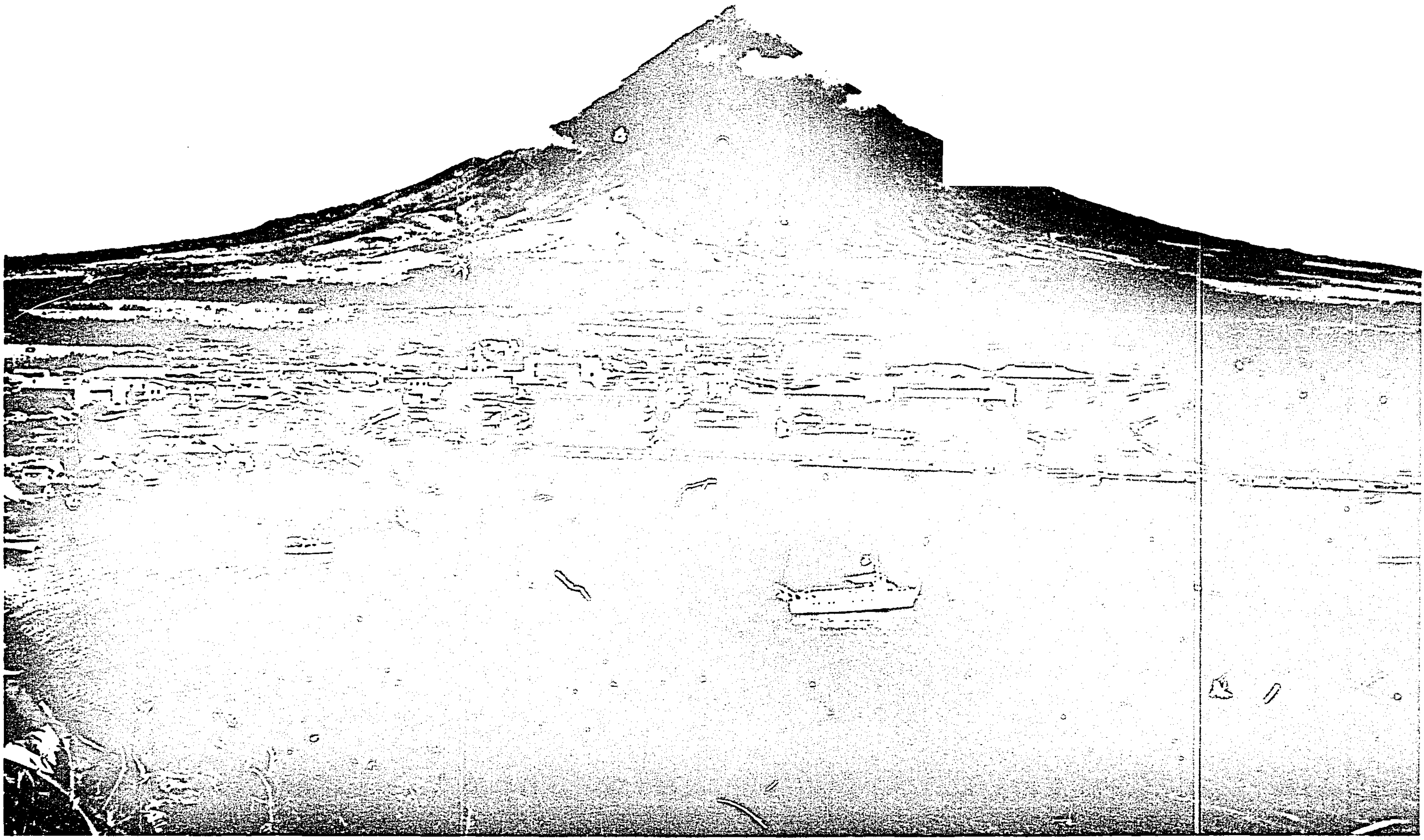


A popular resort hotel at Davao on southern Mindanao — a tropical paradise, relatively unknown to foreign tourists. Served by a number of daily direct flights from Manila.



Eighth wonder of the world — 3,000-year-old rice terraces, Mt. Province.

Thrill for the tcurist—shccting the rapids at Pagsanjan Falls.



Eight-thousand-foot Mt. Mayon—most perfectly shaped active volcanic cone in the world — Legaspi City.

us a factor about to introduce major changes in the national transportation scene.

Statistics for passenger departures and arrivals at Manila (International) demonstrate a steady growth in the five-year period, 1962-1966, from 167,866 departures and arrivals to 308,991, respectively. The rate of growth dipped slightly in 1965 from 1964, but increased noticeably from 1965 to 1966. The average annual rate of growth was 16.5 per cent for the five-year period. The growth rate in the next five-year period, 1967-1971, should be maintained at about this level. A recent forecast, of the Boeing Company in Seattle, provides an average annual rate of growth of 18.0 per cent for the years 1966 through 1970 and 14.0 per cent for the years 1971 through 1975 for air passenger traffic in the United States/Canada-Far East (including Hawaii-Far East) travel market, which is defined to include the Philippines.[29/] The Boeing forecasts anticipate equipment innovations.

International air carriers easily move the bulk of visitors to the Philippines. Visitors from abroad constitute, in turn, an important source of foreign exchange in the form of monies spent by visitors for local goods and services. Such foreign exchange can be used to purchase needed capital and consumer goods in the world market. Visitor spending also creates jobs, expands businesses and adds new ones, and augments national income and tax revenues through the process of the "multiplier effect," in which money spent by international visitors continues to produce fresh income as it changes hands in successive transactions. The Philippines has, accordingly, a vital interest in doing what it can to increase the flow of foreign visitors to its shores.

The Philippines has valuable tourism assets. They include Mayon and Corregidor and its abundance of sunshine, warmth, and tropical scenery. Australia and Japan--industrial states of growing economic power and wealth--are potential sources of large number of winter visitors seeking escape from the cold and snow. The Philippines is strategically located in relation to both nations. By jet, Sydney is some seven or eight hours to the south, and Tokyo is about four hours distance to the north. With adequate promotion and development, the Philippines should be able to exploit the two sources of visitors--with the added advantage of alternating winter locations--in coming up with its versions of

29/ International Forecasting Group, International Air Traffic Forecast, TSR 1093, The Boeing Company, Renton, Washington, January 1966, p. 27.

108

Acapulco, the Riviera, or Miami Beach. The Insular Hotel development at Davao with its lovely setting on a beach is singly a step in the right direction. This development should be able, in larger measure, to draw large numbers of winter visitors. An important stimulant and prerequisite for market development in the given case will be, we believe, the availability of nonstop or direct (single-plane) air service between Davao and overseas points, namely, Tokyo and Sydney.

2. Aircraft Movement

The analysis of airline schedules, covering a one-week period in late 1960, 1962, 1964, and 1966, made several pertinent disclosures. (See Exhibit II-M) It revealed that in the 1960-1966 period scheduled air service had been: (a) dropped at 18 points, (b) added and dropped and added again at two points, (c) added at four new points, and (d) continuous at 52 points. It further revealed, using the 58 points presently served as a reference basis, that 40 points registered increases in seat capacity, 10 points registered declines in seat capacity, and 4 points registered no change in seat capacity. In the case of remaining 4 points (of the 58 points), the points were new, and therefore no trend data were available for them.

The 40 gainers included Guiuan and Iloilo in the range up to 5 per cent; Bacolod, Cebu, and Dipolog in the 6-10 per cent range; Aparri, Baguio, Cagayan de Oro, Laoag, and Legaspi in the 11-20 per cent range; and Basco, Bislig, Cotabato, Dumaguete, General Santos (Butuan), Jolo, Manila, Marinduque, and Zamboanga, in the range above 21 per cent. The losers were Antique (San Jose de Buenavista), Calbayog, Catarman, del Pilar, Hilongos, Kalibo, Larap, Malaybalay, Siargao, and Sorsogon. The four "no change" points were Alah (Allah Valley), Naga, Ormoc, and Takurong. These figures are indicative of changes, but they are certainly not conclusive or indicative of the real changes. For all 58 airports, seat capacity increased 13.6 per cent. This figure might have suggested an over-all growth rate of 10 per cent, say, for planning purposes. However, as the growth and change figures for particular airports demonstrate, the over-all growth figure would not have been evenly distributed over the system of airports. Complete statistical data (seats, seat miles, and flights) for each point (or airport) are contained in Items III, IV, and V of Appendix A.

In calendar year 1966, 76 national airports recorded a total of 398,130 aircraft movements, an aircraft movement being one landing or take-off. (See Exhibit II-N) This figure may be com-

EXHIBIT II - M. AVERAGE ANNUAL CHANGE IN AIR CARRIER OPERATIONS (Past 6 years)*

Line	Airports/Points	Flights Number	Flights Percentage	Seats Number	Seats Percentage	Seat Miles Number	Seat Miles Percentage
Col.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1	Alah	No Change		No Change		No Change	
2	Antique	No Change		(12)	(3.2)	(1,986)	(3.1)
3	Aparri	3	11.1	96	11.2	6,096	10.7
4	Bacolod	17	9.0	632	8.9	144,976	13.9
5	Baguio	4	19.0	160	20.7	19,991	23.2
6	Basco	No Change		60	22.2	2,208	5.5
7	Bislig (Private)	No Change		195	42.2	17,836	55.0
8	Butuan	4	6.0	349	17.0	20,612	13.1
9	Cagayan de Oro	10	10.4	619	16.9	38,362	6.2
10	Calapan	1	3.1	3	18.9	(4,872)	(10.6)
11	Calbayog	(3)	(6.3)	(44)	(3.5)	9,124	7.0
12	Catarman**	(2)	(10.0)	(20)	(4.9)	24	.1
13	Cauayan	8	22.6	251	20.1	40,048	28.4
14	Cebu	71	20.4	3,986	8.0	745,326	27.9
15	Cotabato	17	19.4	999	36.0	142,308	62.8
16	Daet	1	3.4	87	6.7	20,882	27.1
17	Davao	33	344	1,315	35.4	284,242	30.7
18	Del Pilar (Private)	(1)	(11.3)	(22)	(7.0)	314	1.0
19	Dipolog	11	22.5	384	7.9	33,755	37.8
20	Dumaguete	12	27.4	495	28.3	36,841	30.5
21	General Santos	5	14.2	255	24.3	22,078	34.4
22	Guiuan	(1)	(8.3)	2	1.9	102	1.9
23	Hilongos	(3)	(16.7)	(56)	(11.9)	(3,468)	(12.4)
24	Iligan	4	8.1	221	16.0	20,936	19.7
25	Iloilo	7	6.3	112	1.7	(574)	(0.7)
26	Jolo	10	39.5	348	39.5	33,443	38.6
27	Kalibo	(2)	(5.0)	(24)	(1.9)	(8,584)	(5.6)
28	Laoag	3	10.6	156	15.1	9,501	10.8
29	Larap (Private)	(1)	(2.8)	(32)	(3.9)	1,668	9.0
30	Legaspi	7	10.7	362	14.4	39,330	12.5
31	Lubang	1	8.3	31	8.3	No Change	
32	Malabang	(4)	(9.0)	92	2.8	(1,876)	(7.0)
33	Malaybalay **	(1)	(10.0)	(24)	(5.0)	(1,392)	(2.3)
34	Mambajao ***	-	-	-	-	-	-
35	Mamburao	10	27.8	327	25.6	24,415	26.5
36	Manila	47	9.1	2,579	44.7	739,938	12.1
37	Marinduque	3	31.6	124	32.2	9,028	30.0
38	Masbate	1	2.0	24	2.8	7,164	6.6
39	Naga	No Change		No Change		No Change	
40	Ormoc	No Change		No Change		No Change	
41	Ozamis	1	2.9	80	6.5	1,632	4.3
42	Puerto Princesa	1	11.1	307	8.6	16,635	57.5
43	Roxas	4	9.4	104	53.8	33,867	69.3
44	Sablayan (Bu. of Prisons)***	-	-	-	-	-	-
45	San Jose	3	10.6	101	10.0	813	2.9
46	Siargao	No Change		(18)	(6.3)	(648)	(6.2)
47	Sorsogon	(1)	(10.0)	(36)	(14.5)	(2,458)	(15.5)
48	Surigao	5	21.4	180	12.6	6,216	19.1
49	Tablas	7	12.2	234	41.7	25,919	41.7
50	Tacloban	No Change		57	3.2	18,035	7.1
51	Tagbilaran	1	11.1	48	11.1	2,352	10.8
52	Takurong (Private)	No Change		No Change		No Change	
53	Tandag ***	-	-	-	-	-	-
54	Tawi-Tawi	1	13.9	24	13.9	2,664	13.9
55	Tuguegarao	6	14.9	197	14.2	18,023	15.9
56	Vigan***	-	-	-	-	-	-
57	Virac	1	9.3	667	12.6	2,876	12.6
58	Zamboanga	19	19.2	944	27.5	217,045	33.2
	Total	320	10.0	16,919	13.6	2,790,767	13.7

* As based on one-week period in late 1960, 1962, 1964, and 1966.
** Airport dropped and re-opened.
**** New Point.

Dropped Points

1. Baler	7. Kalaong	13. Mati
2. Basilan	8. Kiamba	14. Milbuk
3. Cabadbaran	9. Labason	15. Pagadian
4. Cubi	10. Labak	16. San Carlos
5. Gingoog	11. Lianga	17. Siocon
6. Ipil	12. Liloy	18. Toledo

Source: Carrier schedules.

EXHIBIT II - N. PHILIPPINE AIRCRAFT MOVEMENTS BY AIRPORTS AND BY RANK FOR CY 1966

Line	Rank	Airport	Aircraft Movements (Absolute)			Total
			Commercial	Private/Civil	Military	
Col.	(1)	(2)	(3)	(4)	(5)	(6)
1	1	Manila - Domestic & International	55,578	57,688	23,023	136,289
2	2	Cebu (Mactan, Lahug)	32,763	14,794	35,354	82,912
3	3	Bacolod	11,824	6,026	380	18,230
4	4	Davao	7,626	8,780	246	16,651
5	5	Zamboanga	6,180	7,735	1,147	15,062
6	6	Iloilo	4,956	4,000	442	9,398
7	7	Cagayan de Oro	7,876	856	622	9,354
8	8	Cotabato	6,986	1,370	114	8,470
9	9	Baguio	1,818	2,976	2,288	7,082
10	10	Legaspi	4,390	344	232	4,966
11	11	Cauayan	3,718	1,040	174	4,932
12	12	Bancasi	3,464	924	106	4,494
13	13	Dumaguete	4,038	332	80	4,450
14	14	Plaridel	2	4,434	12	4,448
15	15	Tacloban	3,256	344	244	3,844
16	16	Maria Cristina	3,376	342	58	3,776
17	17	Dipolog	3,518	116	60	3,694
18	18	Jolo	2,210	586	332	3,128
19	19	Misamis	2,388	674	50	3,112
20	20	Surigao	2,786	120	40	2,946
21	21	Tuguegarao	2,646	108	156	2,910
22	22	San Fernando	88	1,930	788	2,806
23	23	Roxas	2,274	198	126	2,598
24	24	Mamburao	2,374	154	34	2,562
25	25	Laoag	1,900	228	290	2,418
26	26	Buayan	1,828	368	88	2,284
27	27	San Jose (Mindoro)	1,614	138	392	2,144
28	28	Kalibo	1,896	146	84	2,126
29	29	Daet	1,748	30	42	1,820
30	30	Romblon	1,668	44	82	1,794
31	31	Masbate	1,200	466	72	1,738
32	32	Vigan	1,170	222	160	1,552
33	33	Tagbilaran	1,180	266	84	1,530
34	34	Rosales	40	1,308	90	1,438
35	35	Lubang	554	174	662	1,390
36	36	Calapan	970	222	118	1,310
37	37	Marinduque	1,066	90	148	1,304
38	38	Bagabag	164	1,036	78	1,278
39	39	Aparri	1,008	122	60	1,190
40	40	Calbayog	1,050	94	20	1,164
41	41	Naga	646	340	142	1,128
42	42	Puerto Princesa	644	232	108	984
43	43	Malabang	968	14	-	982
44	44	Tandag	254	662	4	920
45	45	Virac	736	10	154	900
46	46	Allah Valley	712	44	18	774
47	47	Hilongos	534	104	32	670
48	48	San Jose de Buenavista	596	18	36	650
49	49	Sanga-Sanga (Tawi-Tawi)	306	158	146	610
50	50	Malaybalay	312	126	136	574
51-75	51-75		2,122	2,342	880	5,344
		Total	203,021	124,875	70,234	398,130

Source: Civil Aeronautics Administration.

pared to 366,520 aircraft movements in 1965. The difference--31,610--is small. Based on the reporting system, the figures for both years are more likely to be understated than overstated. Of the 1966 total, five airports accounted for 269,144 aircraft movements or 67.6 per cent of the total. The airports in question were Manila, Cebu (Lahug and Mactan), Bacolod, Davao, and Zamboanga in that order. The next five airports, with a total of 39,270 aircraft movements, were Iloilo, Cagayan de Oro, Cotabato, Baguio, and Legaspi in that order. The ten airports accounted together for 308,414 aircraft landing and take-offs or 78.5 per cent of the total (398,130). The first 25 busiest airports accounted for 360,532 aircraft movements or 90.6 per cent of the total. Again, we are afforded evidence of a very high concentration of airport activity.

Commercial aviation (which may be defined herein as comprising scheduled carrier operators) contributed better than half of the total number of aircraft movements in 1966. The specific figure was 203,020 aircraft movements or 51.0 per cent of the total (398,130). General aviation (which may be defined herein as comprising private operators, business/executive operators, non-scheduled commercial operators, and civil government operators) contributed the next biggest slice. The specific figure was 124,875 aircraft movements or 31.4 per cent of the total. At some airports the general aviation activity easily dominates the scene. Considering both the micro- and macro-impact, any effective system of user/service charge would have to properly reflect the general aviation load. Military aircraft movements, which include United States military aircraft landings and take-offs at Cebu and Manila, contributed the remaining 70,234 aircraft movements or 17.6 per cent of the 1966 total. The breakout for 1965 ran about the same. Complete aircraft movement statistics for both 1965 and 1966 are contained in Items VI and VII in Appendix A.

The three United States military bases generated the following number of aircraft movements in calendar year 1966: Clark--168,853 itinerant and 63,308 local; Cubi--24,685 itinerant and 75,998 local; and Sangley--22,645 itinerant and 23,493 local. The total number of aircraft movements for the three bases was 378,982, a figure which must be termed substantial. No aircraft movements statistics are available for Philippine Air Force activities, apart from those included in military aircraft movements for the national airports.

From 1962 to 1966, the number of flights operated by scheduled air carriers increased, for MIA Domestic, from 23,150 to 33,267,

112

respectively. (See Exhibit II-O) The 1966 figure represents a decline of 5,287 flights or 13.7 per cent from 1965. For the five-year period 1962-1967, the average annual rate of growth was 11.2 per cent. For planning purposes, we are inclined to use at this time a growth rate of 10.0 per cent for commercial flight operations at MIA Domestic in the five-year period 1967-1971. At MIA International, scheduled or commercial air activities have steadily increased from a level of 5,398 flights in 1962 to 7,157 flights in 1966, expanding at an average annual rate of growth of 7.4 per cent. From 1965 to 1966, however, the number of international scheduled carrier flights at MIA International increased only 3.2 per cent. Making allowance for the possible entry of Alitalia and Japan Air Lines and the current frequency restrictions, we would, at this time adopt a future growth rate of 5.0 per cent in the number of flights that can be expected at MIA International in the period 1967-1971.

For trend data on numbers of scheduled air flights for the remaining airports, we invite attention anew to Exhibit II-M. As shown in this exhibit, based on the one-week sample made in each of the years from 1960 through 1966, some airports have experienced a marked increase in numbers of scheduled flights, whereas others have suffered a marked decline in numbers of scheduled flights. A few airports have had no change. For example, the number of scheduled flights for Cotabato increased by 19.4 per cent in the period 1960-1966, while the number of scheduled flights for Hilongos declined by 16.7 per cent. Alah (Allah Valley) was among the points or airports showing no change in numbers of scheduled flights in the concerned period of time. In evaluating the significance of increases or declines in numbers of scheduled flights for different airports, a pertinent factor is the size of the base we are dealing with.

E. Summary

To summarize, the Philippines has a total of 144 existing airports, including 76 national airports. The latter airports are widely distributed over the country, and comprise airports of varying descriptions and capabilities. As of 17 November 1966, there was a total of 378 registered aircraft in the Philippines. General aviation accounted, by far, for the largest number (258). In the past two years, the number of registered aircraft has increased noticeably. To complete the picture, we determined that there were 239 air operators, of which 225 were domiciled in the Philippines and 14 outside. The former includes three domestic scheduled carriers and one international scheduled carrier (one of the domestic scheduled carriers). The latter figure includes

12 international scheduled carriers. The three domestic scheduled carriers served in late 1966 a total of 58 points or airports in the nation. Based on the traffic analysis conducted, it may be observed in general that aircraft and passenger traffic is highly concentrated at certain airports and over certain airways. Manila and Cebu are easily the leading airports and the Manila-Cebu airway the leading airway from the standpoint of aircraft and passenger traffic. In conducting the traffic analyses, certain expedients were utilized to overcome the lack of fully adequate traffic statistics.

EXHIBIT II - O. AIRCRAFT FLIGHTS AT MANILA INTERNATIONAL AIRPORT (SCHEDULED OPERATIONS)

Year	Domestic			International			Aircraft Passenger Ratio	
	Flights	1962-66 Change Absolute	1962-66 Change Percentage	Flights	1962-66 Change Absolute	1962-66 Change Percentage	Domestic	International
1962	23,150	-	-	5,398	-	-	1:23.2	1:31.1
1963	23,636	486	2.1	5,645	247	4.6	1:28.5	1:34.6
1964	27,980	4,344	18.4	6,218	573	10.2	1:29.0	1:36.6
1965	38,554	10,574	37.8	6,936	718	11.5	1:28.0	1:37.2
1966	33,267	(5,287)	(13.7)	7,157	221	3.2	1:29.9	1:43.2
Total		10,117	44.6		1,759	29.5		
Average/year		2,529	11.2		440	7.4		

Source: Civil Aeronautics Administration.

PART TWO

Technical Analysis and Findings

SECTION III
AIRPORTS

There can be little doubt that the Philippine Government is being severely challenged to meet airport developments of the future. And further, that governmental responsibility in administering an airport development program and related airport guidance and assistance programs, makes it necessary that the government increase its leadership and exert greater influence in airport development on a national scale. This study attempts to describe the problem and to distinguish between what is existing and what is necessary to identify a practical planning base for future adequate system development.

The continuous growth of aviation during the past several years and its projected expansion challenges the practicality and design concepts now in common use. It is essential that aircraft performance and airport design be closely correlated to obtain proper efficiency in the aviation system. Airports must be constructed with facilities adequate to handle the type of airplanes needed to provide the kind of service required by the community. To this end airport design criteria should satisfy functional requirements while providing limits of dimensions and configuration that will attain the economical achievement of a safe and efficient airport system. It should prevent overbuilding beyond the needs of the community and should preclude obsolescence of initial development.

During the investigation preliminary to preparation of this report, virtually every site was personally visited and evaluated. In addition to the knowledge gained through those visits we have conferred with representatives of all of the airlines and many of the employees and officials of the Civil Aeronautics Administration (CAA) in a successful effort to further our knowledge and understanding of the problems involved in the airports system which exists in this country today.

It is the general concensus of this Survey Team that the Philippine airports system now in existence is less than satisfactory but that it will provide an excellent foundation for the development of the ultimate system which will serve all metropolitan and urban areas as well as much of the rural population.

The establishment of priorities and the extent of recommended improvements for any particular airport can be perhaps one of the most controversial aspects of this report. To this end we have attempted to judge each location and each recommendation for improvement (or lack of improvement) on a purely technical and objective basis.

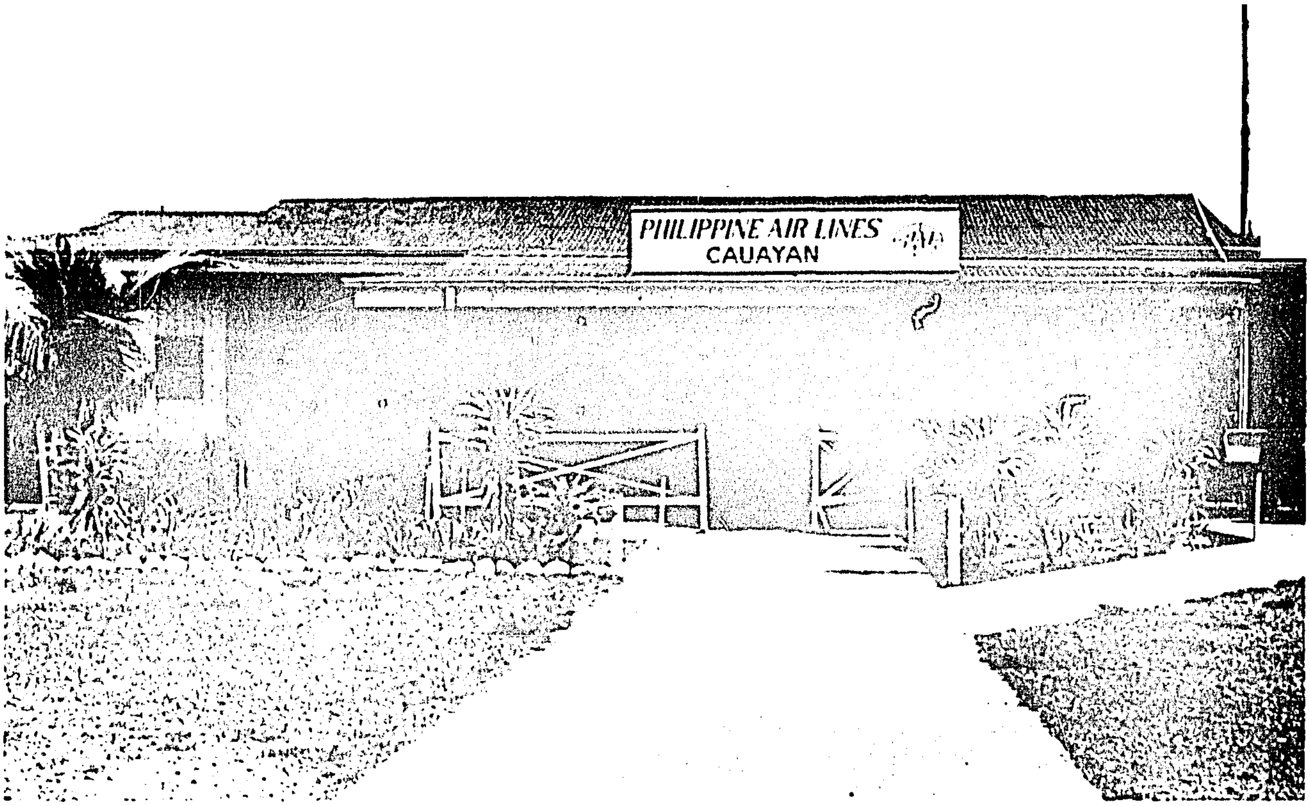
X
116

In the development of priorities it is essential that each location be considered individually, as a part of a system, and in association with the surrounding environment. As an aid to this study the Team has developed several tables of statistics concerning aeronautical activity at each airport. These tables are presented in Section IV Airways System.

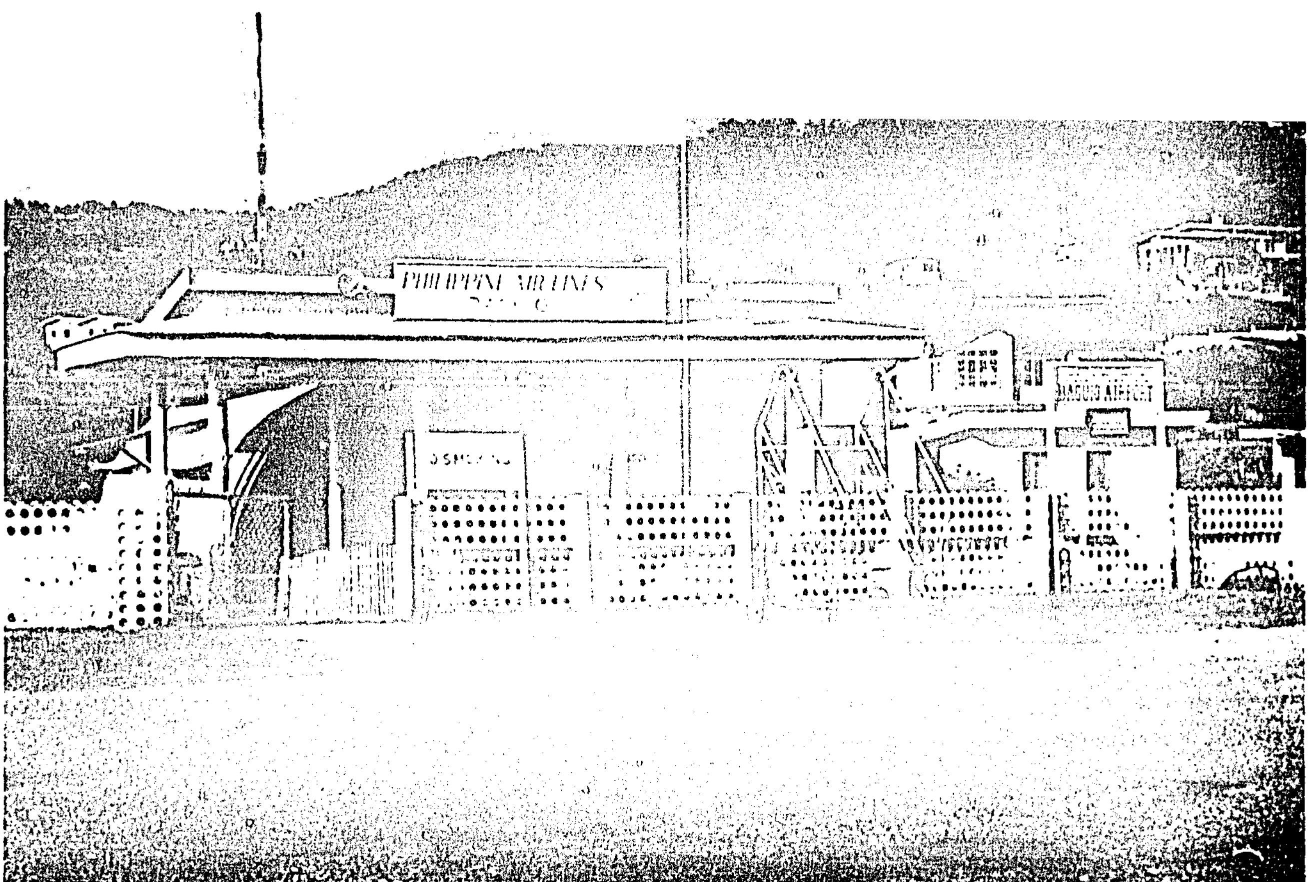
In the designation of priorities for airport development, the item of safety has been our greatest concern. In this respect we have considered the surface conditions of the runway, the clear zones and approaches, the lateral clearances associated with the airport, obstructions both on the airport and surrounding terrain, orientation of the airport with respect to wind conditions, the number of passenger movements through the airport, the number of aircraft operations, airport capacity, the types of aircraft now in use and the types of aircraft the air carriers propose for operation in the near future. The availability or non-existence of other modes of transportation such as highways and railroads, also have an influence on the priority and scheduling of airport improvements. Unfortunately, it is not possible to assign a numerical value to each of the considerations, add the values, and let the sum determine the rank of the airport. Rather, it is an exhaustive study of all the facets tempered with judgment and knowledge of aeronautical needs and necessities. For the reasons above the Team would prefer that any changes made in the sequence of recommended airport development activities be instigated by the Philippine Government if, indeed, such changes appear justified or desirable in the light of other considerations which the Team might not consider applicable.

In the preparation of the estimates of cost of the improvements we have researched current bid abstracts for similar type work and have been assisted through conversations with individuals associated with the construction industry and local practices here in the Philippines. At each location we have tried to take advantage of construction materials which will provide the greatest economy over an extended period of time. As previously noted, dimensional standards for development purposes are as contained in Annex 14 of the ICAO regulations entitled "Aerodromes" and as categorized by the Philippine CAA.

During this period of assessment it is important that we recognize the right of the using aviation public to expect that the airports of the national civil airport system are capable of lending adequate terminal support and provide a measure of comfort and convenience appropriate to the sophistication of air travel today.



Cauayan terminal building — 449,665 passengers — 16th ranking.



Baguio terminal buildinng — 27,959 passengers — 27th ranking.

The following portions of this text are divided into eight parts. Part A presents a schedule of recommended airport improvements as concern runways, taxiways, aprons, etc. and the estimated value of the improvements. The time period involved has been arbitrarily set at five years.

This time interval is in consonance with the program for the development and installation of air navigation and terminal aids covered elsewhere in this report. Part B is concerned with the installation of airport lighting equipment and other lighting aids.

Part C presents a discussion of needs for the improvement of terminal facilities. D considers aircraft fire and rescue facilities, E discusses maintenance, F is devoted to Manila International Airport, G contains a brief summary of Section III, while part H presents the proposed course of action consisting of Exhibit III-A followed by explanatory tables.

A. Runways, Taxiways, and Aprons

At the present time in the Republic of the Philippines the runway length requirements for airport development are determined by the airport service type concept. This concept divided airports in the system into categories; i.e., rural feeder, secondary, trunk, alternate international and regular international; specifying a particular runway length for each airport type based upon certain requirements. In a general manner these requirements take into account the route pattern being flown and the type of equipment normally used to fly those routes. With the advent of the short and medium range jets this method will often produce inaccuracies in establishing needed runway lengths. The suggestion is therefore advanced that consideration be given to the adoption of a method of runway length determination which incorporates the use of the performance curves of the airplane expected to use a particular runway. This method has gained wide recognition by airport engineers and planners as an effective tool in airport design and is used in a large part of the world today. We do recognize, however, that changes in methods, such as the one suggested above, are sometimes slow in adoption and implementation and for this reason we have used the system currently in effect in the preparation of our recommendations and estimates.

There is no standard design for any airport type. Each airport design will be different, reflecting the ideas of the designer, the requirement of the users, and the conditions prevailing at the selected site. However, to provide a national system of airports, there must be some common denomination to guide the design of individual airports. To determine a basis for dimensional limitations, the Republic of the Philippines has subscribed to the criteria defined in Annex 14 of the ICAO regulations entitled "Aerodromes".

With these criteria in mind a comprehensive plan of airport development has been prepared. 1/ It is important to note here however that an airport design standard suitable for use in all parts of the nation, for a variety of airplanes and under many variations in local conditions, must be based upon broad considerations. Where such a national standard is to be applied in the design of a particular airport, competent engineering personnel are required to adapt the standard to local conditions. As most airport sites are not ideal, there are cases where deviation from a standard may be required and justifiable in view of other advantages of a site. Where adherence to the recommended dimensional standards is impractical, the engineer should justify his conclusion for deviation. For example, where direct adherence to the separation between two airport components is considered impractical, it will normally be so because of the combination of physical area limitations and the cost of overcoming the limitations. The justification for deviation must be balanced against what may be the adverse effect and so noted.

It is essential that an airport have adequate capacity or its utilization and efficiency will be adversely affected. Overcapacity should be avoided to the extent possible as it adds to a waste of resources. Under capacity results in inefficient and costly operations both to the airline management and the airport management. Simultaneously, it adversely affects airport growth, utilization, and safety.

The various components of an airport system that must be analyzed to develop and satisfy demand-capacity requirements consist of the following:

1. Runways
2. Taxiways
3. Holding aprons
4. Terminal aprons and aircraft parking aprons
5. Building facilities
6. Automobile parking and access road system
7. Navigational aids

The foregoing items are in terms of analysis of facility needs. The analysis must properly account for environmental features such as airspace utilization, noise abatement procedures, proximity to other

1/ See Exhibit III-A and associated tables.

airports or modes of transportation, and obstructions before the optimum capacity of an airport can be realized.

B. Airport Lighting

In the preparation of a schedule of recommended airport lighting it was necessary that we carefully analyze the existing airline schedules and that we confer with airline officials to determine what effect the recommendations contained in this entire program would have upon airline scheduling. Again it was also necessary that we examine the airport site to insure that surrounding terrain was not of a nature that would prohibit safe night operation. After the foregoing considerations, the activity statistics, previously identified, were again examined to insure that the locations selected for field lighting do, in fact, possess a large enough actual or potential volume of night operations to warrant the expenditure of funds and to insure the continued operation and maintenance of the lighting system.

All of the recommended lighting installations are Medium Intensity Systems. Aside from the runway edge and threshold lighting, three other essential ingredients in the system are: the obstruction lighting of all obstructions in the approach and turning zones, the installation of a lighted wind cone and a rotating beacon. It is further recommended that the beacon be the standard 36-inch, 1,000-watt model with automatic lamp changer.

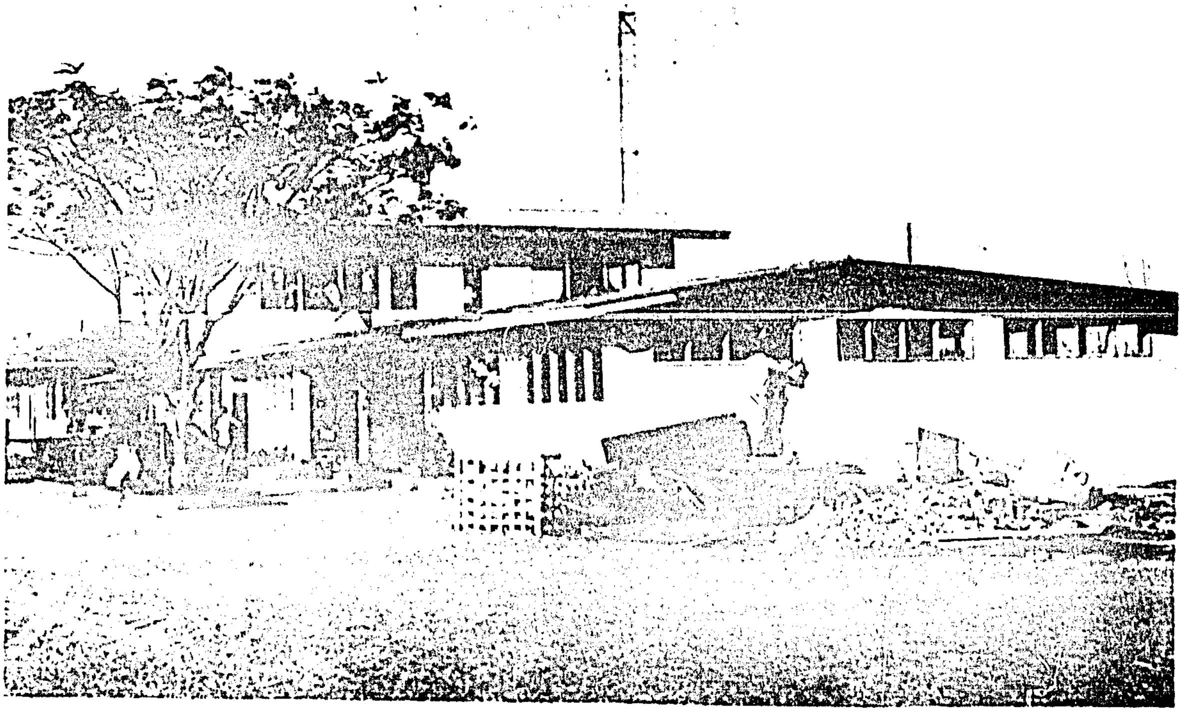
In addition to the field lighting systems there are two other types of lighting which are also recommended for inclusion in the airport improvement program. For the convenience of the passengers and the aircraft crews, apron lighting is recommended for several locations. This item is not an absolute necessity, however, it does provide an assist in passenger handling, cargo handling, and aircraft servicing. Thus it tends to reduce ground time for the aircraft, thereby increasing the efficiency of both the airport and the aircraft.

The remaining important feature which is contained in these recommendations for airport lighting is termed a Visual Approach Slope Indicator. This facility is intended to provide the pilot with visual glide slope guidance during final landing approach. There are two different configurations of this lighting aid in common use today. The larger of the two systems (VASI) is composed of 12 separate light units installed so as to appear symmetrically disposed about the runway centerline in the form of two pairs of runway wing bars. Each of the light units projects a beam of light having a white color in its upper part and a red color in its lower part. The lights are installed and leveled in such a manner that the pilot of an approaching aircraft will see all of the lights as having a red color if he is below the glide slope. When on the proper glide slope, the pilot will see the nearest lights as white and the furthest as red. When the aircraft is above the glide slope all lights have a white color. A companion installation to the one just described is known as an Abbreviated Visual Approach Slope Indicator (AVASI). The AVASI utilizes the same type of equipment as the VASI except that it contains fewer light units and is located on only one side of the runway. The information provided by this system is also the same as that provided by the VASI, however, the maintenance and installation costs of the AVASI are much lower than the VASI. These aids are primarily intended to improve safety where a visual deficiency exists at the airport. Such deficiencies may be caused by terrain which rises steeply toward the end of the runway, or lack of contrast in the approach areas which may be caused by open water, featureless terrain or dense growth within 10,000 feet of the runway threshold. It is also useful in assisting the pilot to make an approach over natural or man made obstructions. One basic requirement for the installation of either of these systems is that the runway be equipped with at least a medium intensity runway lighting system.

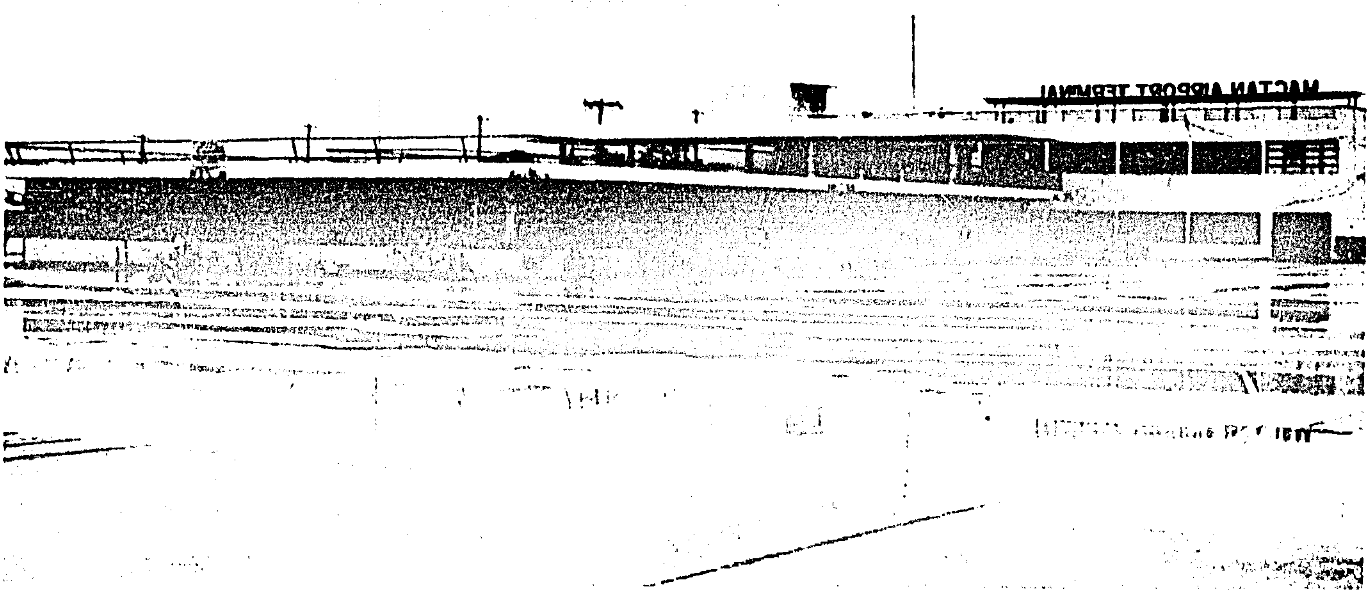
Much careful thought has been given to the preparation of recommendations concerning the selection and scheduling of these visual aids. In this case again we have discussed our recommendations with various government and airline officials and found them to be quite acceptable.

C. Terminal Buildings

The rapid growth of the aviation industry and the ever increasing public acceptance of this most modern form of transportation is forcing continual change and expansion of passenger facilities to meet the operational requirements of the airports. The air traveler today expects to find, in the airport terminal building, comfortable waiting rooms, eating facilities, concessions, restrooms, baggage handling and protection areas, and convenience to airline service counters. Simultaneously, the airlines, airport management and occasionally other government offices also create demand for space in this building which is often thought of as the nerve center of the airport. In our travels throughout the airport system we encountered varying degrees of terminal structures. In many cases no structures at all exist for the passengers. The only buildings being those in use by the airlines. A few of the airports have a scattering of huts and small sheds used for a variety of purposes. Others were extremely neat, well kept, but small structures. At the busier airports the terminal buildings are comparatively large. When examined with a critical eye, all are inadequate in one way or another. These comments are not intended

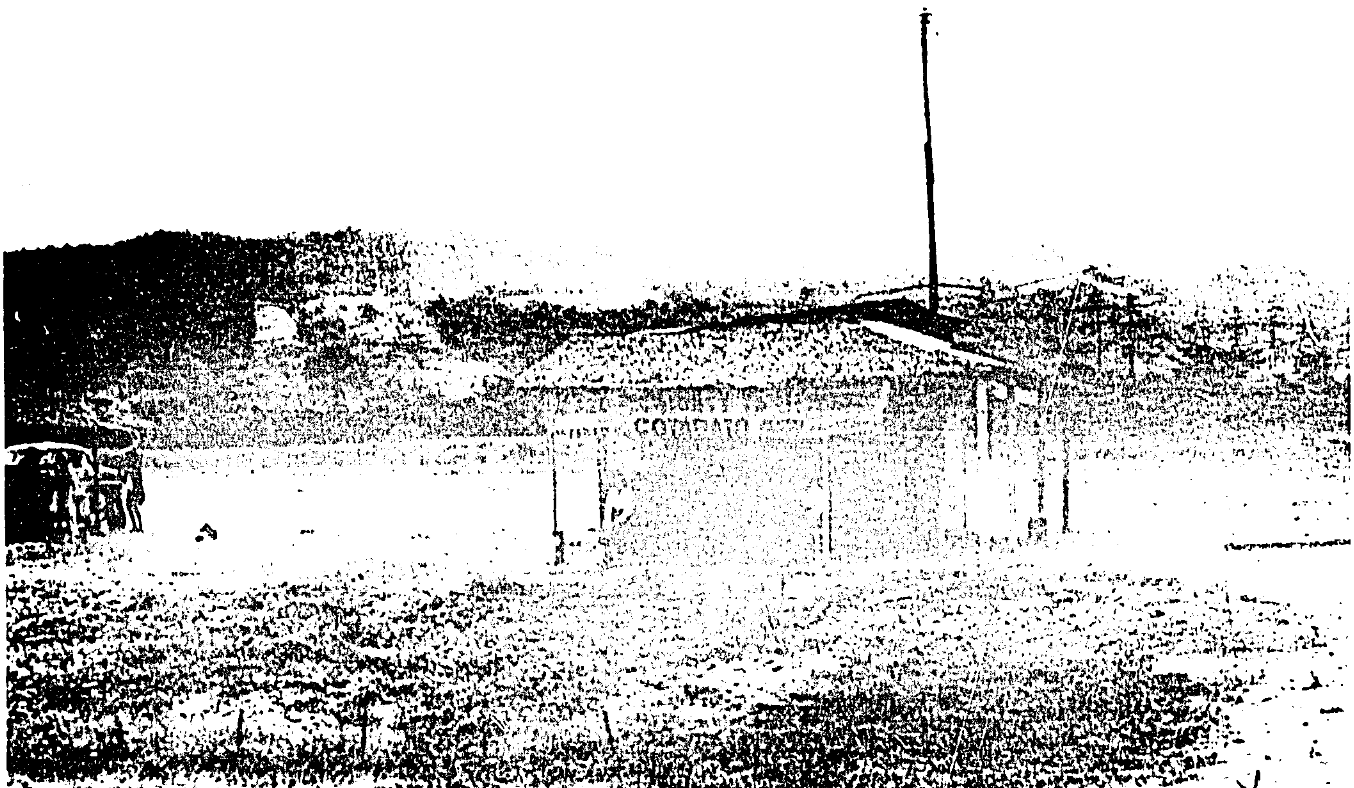


Laoag terminal building nearing completion — 38,518 passengers — 21st ranking.



Mactan Terminal Building — Philippines' second busiest airport with 970,000 passengers. The building, dedicated in 1966, is not yet complete. Mactan, located on an island near Cebu City, is the Philippines' principal International Alternate airport with a runway and approaches second to none in Southeast Asia. The passengers' principal problem is transportation to and from Cebu City which must be accomplished by a combination of bus and antique ferry boat — a trip which usually takes at least one hour

Temporary terminal structures serving Cotabato — the Philippines' 8th ranking airport through which over 98,000 passengers passed in 1966



Cotabato temporary structure

to be derogatory in any sense since we all realize that there are many other items of greater importance which are also necessary for satisfactory and safe airport development. No survey of the airports system, however, would be complete without a discussion of all major components of the airport. Several sets of architectural standards have been developed to furnish guidance to the efficient design of a terminal structure. We have used one such guide in our efforts to determine the approximate size of terminal buildings required in various locations. We realize it would be impractical to consider the construction of a terminal building at all airports in the national system within the five years this recommended program spans. For this reason we have included terminal building recommendations for only the twenty-eight busiest airports in the system. Even this we recognize as an ambitious program when all other facets of the program are considered. Consequently, you will note that the majority of the terminal buildings are scheduled during the latter part of the program. In this way, we hope to assure that the primary expenditure of funds will be used in the improvement of more critical airport needs.

D. Aircraft Fire and Rescue Facilities

Ideally, it would be desirable to provide the same degree of aircraft fire and rescue service at all airports used by like type aircraft regardless of air traffic volume or density. Studies have shown that there is a reasonably consistent ratio of aircraft ground emergencies or accidents to aircraft movements. While it is recognized that there is always a possibility of a major accident occurring on any civil airport, the probability of this occurrence is sufficiently limited at those airports with fewer movements to permit the acceptance of a lesser degree of protection.

The degree of aircraft fire and rescue service suggested is based on the risk potential. In determining the risk potential the factors of fuel load on take off, passenger capacity of the aircraft and frequency of movements must be considered. For the purpose of this discussion, these factors are expressed as aeronautical operations and indexed. Table I has been developed to readily identify the quantities of extinguishing agents, fire and rescue truck capabilities, and other facilities suggested for airports falling within the various indexes.

<u>Index I.</u> Unattended airports subjected to limited operations.

<u>Index II.</u> Airports used exclusively by single-engine aircraft with seating capacities not exceeding four.

Index III. Airports used exclusively by general aviation aircraft having 1,200 or more annual departures by aircraft grossing under 12,500 pounds that are capable of carrying four or more persons.

Index IV. Airports having 5,000 or more annual departures of general aviation aircraft grossing over 12,500 pounds or 1,400 or more annual air carrier departures scheduled for en route segments up to 200 miles.

Index V. Airports having 1,400 or more annual air carrier departures scheduled for en route segments of 200 or more but less than 400 miles.

Index VI. Airports having 1,400 or more annual air carrier departures scheduled for en route segments of 400 or more but less than 1,000 miles.

Index VII. Airports having 1,400 or more annual air carrier departures scheduled for en route segments of 1,000 or more but less than 2,600 miles.

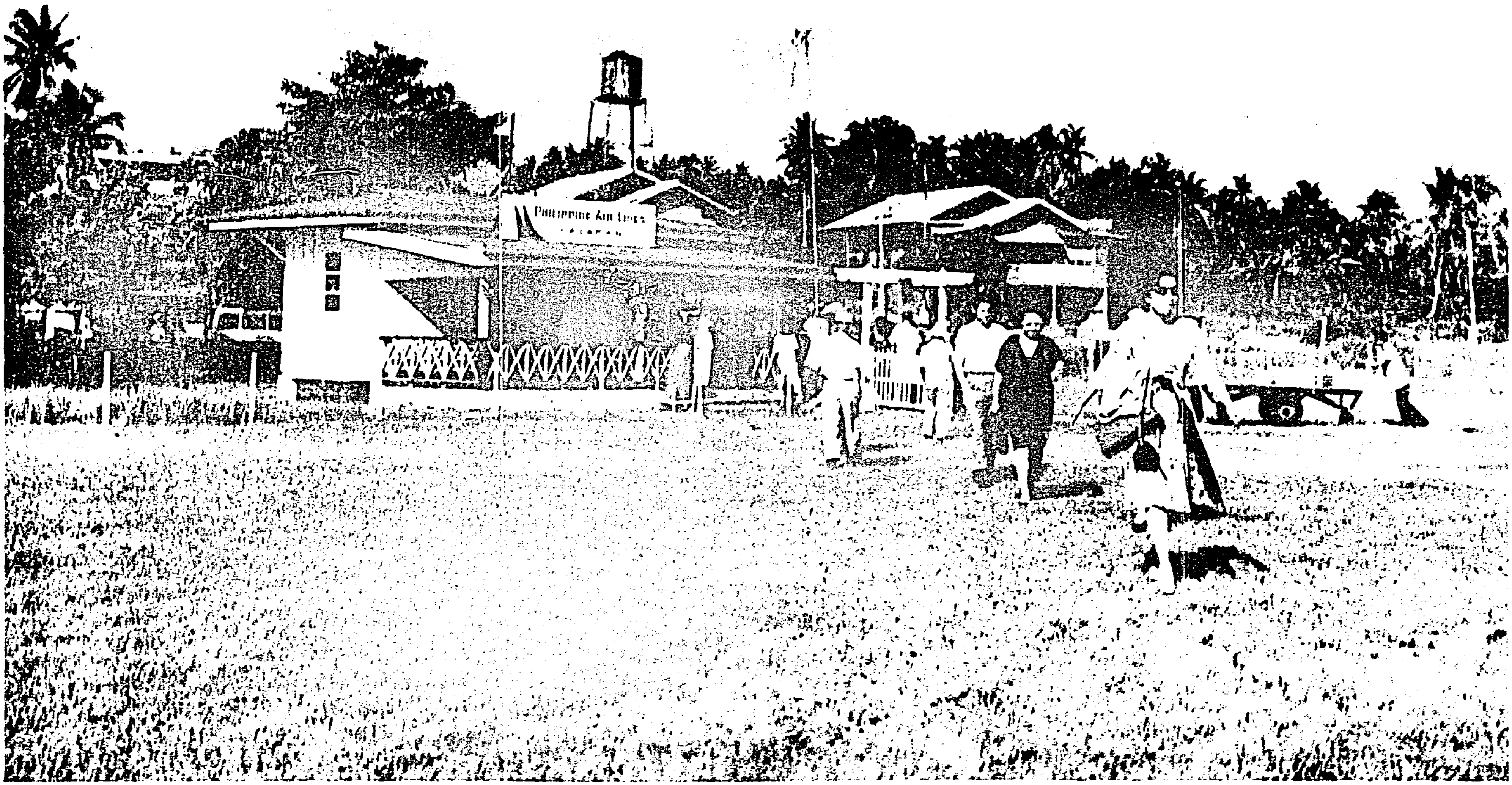
Index VIII. Airports having 1,400 or more annual air carrier departures scheduled for en route segments of 2,600 or more miles.

When an airport which falls in Indexes V through VIII qualifies for an index on the basis of scheduled miles to be flown by departing aircraft but has less than 1,400 annual departures in that mile range, the next lower Index may be used. The equipment recommendation for an Index IV airport is the minimum which should be considered for an airport serving air carrier operations or those of similar size aircraft used in charter or nonscheduled flights.

When, due to unusual or irregular flying activities, an airport cannot be readily indexed, the aeronautical operations conducted on the airport should be carefully analyzed and the fire and rescue service determination should be based on a realistic application of the philosophy reflected in this discussion. In considering Table I, it is essential to recognize the prevailing local conditions on an airport-by-airport basis in arriving at a judgment on equipment needed.

A direct-line telephone or fire alarm box provides a means at Index I airports by which the local fire department, ambulance service, or police may be readily notified of an emergency occurring on or

126



Calapan Terminal Building, 17,872 passengers 24th ranking.

adjacent to an airport.

To provide a reasonable degree of service at Index II airports, a sufficient number of portable hand fire extinguishers having a 12 B. C. Underwriters Laboratories' rating should be:

(1) Strategically located within the apron and parking areas in the ratio of one extinguisher for each 10 based aircraft. The extinguishers should be installed in weatherproof cabinets painted red and adequately labeled. The cabinets should have "break glass" fronts which would permit ready access in case of emergency and, to an extent, reduce the unauthorized use and pilferage of, or damage to, the fire extinguishers.

(2) Provided to permit the installation of two extinguishers on each of one or more vehicles normally restricted to use on the airport.

Aircraft fire and rescue trucks of the type and in the number listed will be capable of transporting the total quantity of fire extinguishing agents suggested in columns 2 and 3 for Index III through Index VIII airports.

A minimum of two trucks capable of carrying and discharging the quantity of a water/foam solution listed in columns 5 and 6 is suggested for Index V through Index VIII airports. Two trucks will provide a capability to simultaneously protect both sides of an aircraft fuselage involved in fire and reasonably assure maintaining a firefighting and rescue capability of not less than 50 percent when one truck is being serviced or repaired. Water tank trucks of the size and in the number listed will transport and discharge the water suggested in columns 7 and 8 to resupply the water/foam trucks for Index VI through Index VIII airports.

Truck assignments suggested permit an orderly progression in providing acceptable fire and rescue service, as airport activities increase, with the minimum economic burden. This is accomplished through maximum utilization of existing equipment augmented to the degree necessary to satisfy the increased protection demand.

Airports in Index VI through Index VIII which are equipped with a combination truck may consider this unit an acceptable substitute for the 500-pound dry chemical truck. The additional water/foam capability of a combination truck compensates for the dry chemical deficiency.

Fire extinguishing agent carrying and discharge capabilities of standard structural type firefighting trucks, responding from surrounding communities to on-airport aircraft emergencies, should not be applied against the suggestions in columns 3 and 4 of Table I.

Stockage. The stock level of fire extinguishing agents should provide:

(1) Double the quantity of fire extinguishing agents carried on the water/foam trucks for airport stock to readily resupply the trucks. In those instances where suppliers cannot replenish this stock within 48 hours, the quantity stocked should be proportionately increased in ratio to replenishment time.

(2) A reserve stock at airports contemplating the foaming of runways in an amount necessary to meet this condition without depleting the foam required for firefighting operations.

(3) A quantity of agents to be used for training. This quantity should be over and above that reserved for use in firefighting and the foaming of runways.

(4) Consolidation of the stocks for various uses and withdrawals made on a "first in-first out" basis.

E. Maintenance

Any structure or facility which is subjected to usage or exposure to the elements is bound to deteriorate. While such deterioration cannot be completely prevented, it can be arrested to the point where the expected life of a facility can be realized, consistent with the durability which went into its original design and construction. Timely and effective maintenance is the one sure means by which this deterioration can be reduced to its least detrimental minimum.

Lack of adequate, timely maintenance is the greatest single cause of unnecessary deterioration of airport facilities. The attitude of the airport management towards maintenance responsibilities readily reveals itself upon examination of the functional reliability of airport components and even in the airport's overall appearance. Failure of an airport element--pavement, drainage feature, building facility or utility can often be attributable to an indifferent maintenance attitude and the consequent absence of a vigorously followed maintenance program. Deteriorated condition of runways surveyed by the Team can, for the most part, be attributed to lack of timely maintenance.

Maintenance, no matter how effectively carried out, cannot overcome or compensate for a major design or construction inadequacy. It can prevent the total and possibly disastrous failure which may result from such deficiency. The maintenance inspection can reveal, at an

TABLE I

FIRE EXTINGUISHING AGENTS AND EQUIPMENT RECOMMENDATIONS

Col. 1	2	3	4	5	6	7	8	9
INDEX NO.	TOTAL QUANTITY EXTINGUISHING AGENTS			WATER/FOAM TRUCKS		WATER TANK TRUCKS		EQUIPMENT DESCRIPTION
	DRY CHEM	WATER for FOAM		CAPACITY		CAPACITY		
	Lbs.	Gals.	GPM	Gals.	GPM	Gals.	GPM	
I								Telephone or fire alarm box.
II								Portable fire extinguishers and telephone or fire alarm box.
III	500							1-Dry chemical truck.
IV	300	500	250	1-500	250			1-Combination (water/foam and dry chemical) truck.
V	300	1500	750	1-500 1-1000	250 500			1-Combination truck and 1-1000 gallon water/foam truck.
VI	500	3000	1000	2-1000	500 ea.	1-1000	500	1-Dry chemical truck; 2-1000 gallon water/foam trucks; 1-1000 gallon water tank truck.
VII	500	4500	1300	1-1000 1-1500	500 800	2-1000 or 1-2000	500 ea. or 800	1-Dry chemical truck; 1-1000 and 1-1500 gallon water/foam truck; 2-1000 or 1-2000 gallon water tank truck.
VIII	500	7000	1600	2-1500	800 ea.	2-2000	800 ea.	1-Dry chemical truck; 2-1500 gallon water/foam trucks; 2-2000 gallon water tank trucks.

X 130

early stage, where a problem exists (or may develop) and thus provide the time-warning to permit corrective action to be taken.

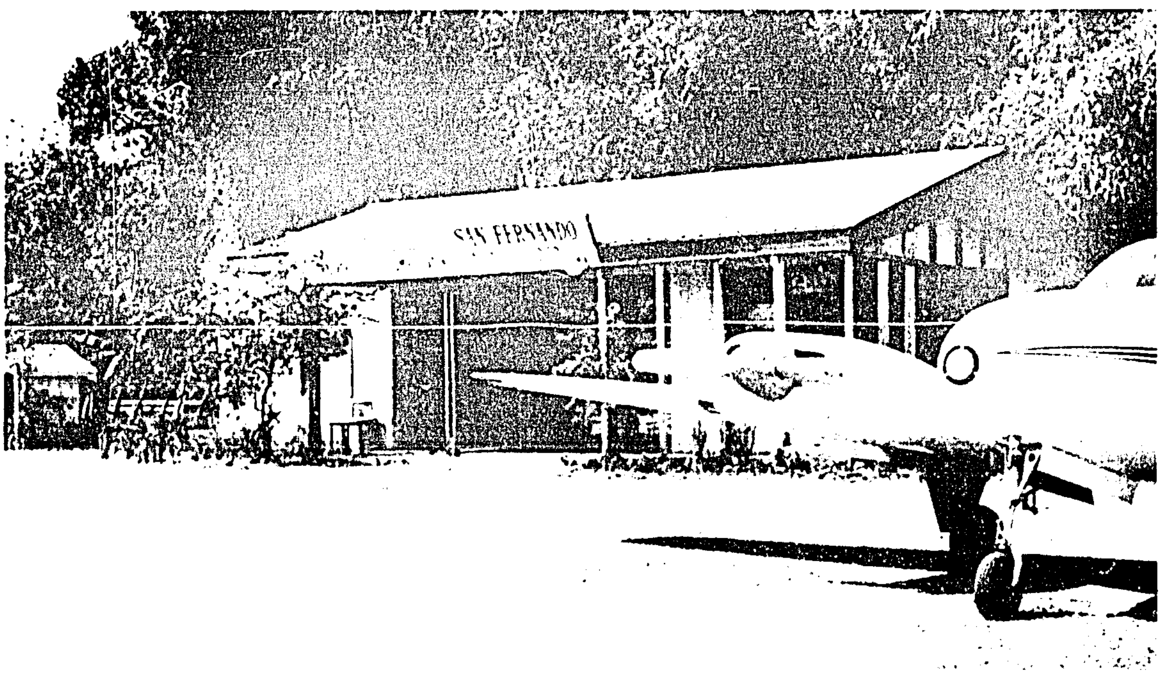
Maintenance is a continuous function and is the responsibility of every one who is employed on the airport. Nevertheless, this continuous "look-see" responsibility is only a small part of the job. A series of scheduled, periodic inspections or surveys, conducted by experienced engineers and technicians, must be carried out in a truly effective maintenance program. The program of maintenance surveys must be controlled to assure that each element or feature being inspected is thoroughly checked, that potential problem areas are identified, and that corrective measures are recommended. The maintenance program must provide for adequate "follow-up" of the inspection to see that the corrective work is expeditiously accomplished and recorded. The many and varied demands of this work make it clear that the overall maintenance program must be entrusted to a competent and responsible individual on the airport's technical staff.

Although everyone who works on the airport is in effect a "maintenance reporter," the detailed maintenance surveys must be performed by persons possessing special skills and knowledge. Aside from a thorough familiarity with the various above and below ground installations, facilities, and appurtenances, they must be well aware of the distress warning signs which normally precede trouble and how to recognize them. They must know the corrective procedures which will arrest the observed potential problems and be thoroughly schooled in operation of the various tools or items of equipment which are available for their use.

It will probably not be possible to find one person gifted in the many skills and crafts which are essential to proper maintenance and repair of an airport complex. The maintenance supervisor or person charged with overall maintenance responsibility, should possess a general working knowledge of all such skills however, and in addition to having a profound respect for maintenance functions, must be a competent organizer and talented leader. Such a person will surround himself with the needed specialists and will see also that training of his staff is carried out to insure maximum benefit is realized from those who make up his organization.

The maintenance supervisor should establish a schedule of formal inspections for the variety of facilities and services installed at the airport. This does not mean that at other than scheduled inspection times the staff is indifferent to its maintenance responsibilities. Naturally, all are expected to be aware of the continuous need for advising on and reporting of potential or actual maintenance problems.

Zamboanga terminal building and tower — 118,317 passengers — 5th ranking.



San Fernando, La Union — a rural, or feeder type airport, useful as an alternate to Baguio. Not regularly scheduled by commercial carriers, but popular with private and military fliers. Adjacent to Poro Point, the nation's third most important point of ingress and egress. The report recommends an HVOR facility to be located here.

X 132

The formal inspection should be carefully scheduled to assure that all areas, particularly those which may not come under day-to-day observation, are thoroughly checked. In making the inspection, each problem or potential problem discovered should be recorded by identity, location, type of distress, and its apparent cause, and a suggested method of correction should be recommended. Maximum advantage should be made of the use of maps and charts to provide a historical log of the maintenance work and to aid in checking performance of facilities. The inspector should submit a report of his findings and recommendations, initiate action to get the work under way, and monitor progress on the rehabilitation work to assure its early completion and acceptability. The organization for maintenance activities will vary from airport to airport, but the general types of maintenance are relatively the same regardless of airport size or extent of development.

The paving engineer should make a thorough condition and performance survey by conducting a detailed field inspection of all paved areas. These inspections should be scheduled at least twice a year. In areas of uniform temperatures, the inspection should be conducted immediately following and immediately prior to the rainy season.

Visual inspection of the airfield lighting system should be made periodically, taking into account the recommendations of component manufacturers, weather, location of the airport, numbers and nature of operations, and system complexity. In addition, regular readings should be made as recommended by manufacturers. Standby power units should be run at regular intervals to assure readiness if required. Complete visual inspections of the lighting system should be made routinely at least once a week. If severe storms occur in intervening periods, resulting in excessive rainfall or lightning strikes, additional inspections should be conducted immediately thereafter.

The nature and extent of the sewage treatment and disposal facilities have a corresponding effect on the system's maintenance requirements. Where elaborate airport sewage treatment facilities are installed, there will no doubt be personnel trained in plant operations, and they should be made responsible for plant and system maintenance. Usually such plants are found on only the largest of airports.

Where less extensive or more primitive disposal systems are employed, such as septic tanks, primarily filters only, or where raw sewage is dumped into convenient water courses, maintenance problems will be less demanding technically but will impose other responsibilities on the airport management. The more primitive the installation, the more acute are the requirements to prevent the system from becoming a hazard to health or a nuisance. It should be very evident that the disposal of untreated sewage into outfalls where there is even a remote possibility of contamination or pollution endangering human or animal life, should be discouraged vigorously.

The upkeep of sewerage (piping and ancillary facilities) will require very little maintenance effort. Occasional rodding and flushing may be required to remove blockages but this usually cannot be anticipated in a separate system. If a combined system is installed, i.e., one handling both sanitary sewage and storm water, some clogging may be anticipated after severe rains due to the introduction of foreign material (twigs and branches, silt, paper, etc.) flushed into the system by heavy surface runoff. Where kitchen waste is disposed of through the sewer system, it is sometimes the practice to install grease traps or separators. These will require frequent cleaning to perform effectively.

F. Manila International Airport

It was not the intention of the Team to devote appreciable time to a study of MIA. Because of the scope of our project to do so would have seriously reduced time available for analysis of the domestic airport system. We did, however, reach some conclusions regarding MIA, both from a passengers viewpoint as well as that of the aircraft operator. To reach these conclusions was not difficult since the deficiencies of MIA should be obvious to those who have occasion to use the terminal.

The Team is aware of the controversial nature of the MIA problem and current discussions regarding a course of action. The question uppermost seems to be whether to build a new runway parallel to 06-24 or to move the airport entirely.

Regardless of the final determination, the present runway 06-24 will be in use for an absolute minimum of two years in the event work started tomorrow on a new runway and much longer if the airport is moved. Repairs recently completed on 06-24 have only slightly improved the surface and at best can only be termed temporary since heavy jet traffic may soon undo this effort.

In view of the foregoing it is recommended that first priority should be given to applying an asphalt surface course to 06-24. The work should be done by an asphalt contractor and/or contractors capable of doing the job properly and rapidly. This work can be done without closing the airport. The runway can be closed from 10:00 p.m. to 6:00 a.m. and within this time frame it is believed that 500 tons of asphalt could be put down daily which would result in restricted operation for only thirty days. It is estimated that 84,000 yards of asphalt may be required and at 330 pounds per cubic yard, 12,600 metric tons will be required, at an estimated cost of less than one million pesos.

A three-inch overlay is considered as a minimum thickness. It should be added to the center 60 feet of the existing 200 foot wide asphalt runway and then a 40 foot (approximate) transition to existing surface. No additional work should be necessary on the outside 30 foot lanes. In placing the three inch overlay care should be taken to provide a smooth profile and a uniform transverse grade of 1-1/2 per cent. This will probably increase the present transverse grade but it is recommended in order to remove water from the runway as soon as possible and thus reduce hydroplaning action often encountered by jet aircraft on wet runways. It will also inhibit deterioration of the asphalt.

Both international and domestic terminal buildings, ramps, aprons, and other aircraft and passenger servicing areas are inadequate for today's traffic and the situation is rapidly worsening. Additionally, the domestic terminal constitutes a navigational hazard due to proximity to the runway.

After weighing all factors, the Team believes that the Philippine Government would be well advised to retain the present MIA site rather than move elsewhere. This conclusion is based primarily on accessibility and economic factors. The Team recognizes that any long range plan to expand MIA to accommodate larger aircraft now proposed should be preceded by a comprehensive feasibility study. Such a study would be devoted to examining new runway possibilities as well as construction of a new International Terminal and conversion of runway 06-24 to a taxiway.

G. Summary

Of the 76 national airports in the Philippines only 13 could be considered to have adequate runway surfacing and some of these are badly in need of attention. With the exception of Manila and Mactan none of the remainder can accept a pure jet aircraft of the BAC-1-11 class without suffering a weight penalty because of runway length or for other reasons. A number of airports must be closed during the

135

rainy season. Terminal buildings are either inadequate or non-existent, however, exceptions such as Bacolod exist and it is notable that in most cases these are owned and operated by PAL. The Team has established a priority system based on a number of factors with safety as primary consideration. A schedule of proposed action has been prepared and is presented in Exhibit III-A and Tables I through V.

X

136

TABLE I
First Year

Airport: CAGAYAN DE ORO	Location: CAGAYAN DE ORO, MISAMIS ORIENTAL	
Ultimate length: 1800 METERS	Ultimate strength: 100,000 DG	
Item	**Recommendations**	**Cost**
Runway	Repair transition between concrete and asphalt paving, extend r/w 300 m x 30 m, strengthen existing asphalt paving.	$198,000
Taxiway	Repair transition between concrete and asphalt paving on t/w. Construct parallel taxiway.	248,000
Lighting	Medium Intensity Lighting System r/w and tw, Rotating beacon, apron flood lighting, VASI.	124,000
Terminal area	Construct and pave (asphalt) auto parking lot and improve access roads.	41,000
	Develop water supply, improve sewage facilities	16,000
Land	Acquire 15 hectares	12,000
Miscellaneous	Fencing, painting	18,000
	Total	$657,000

Airport: COTABATO	Location: COTABATO CITY, COTABATO	
Ultimate length: 1800 METERS	Ultimate strength: 100,000 DG	
Runway	Extend r/w 800 m x 30 m, concrete paving	$244,000
Taxiway	Construct parallel taxiway, concrete paving	294,000
Terminal area	Construct and pave (asphalt) auto parking lot and improve access roads.	35,000
Land	Acquire 28 hectares	36,000
Miscellaneous	Fencing, painting	18,000
	Total	$627,000

Airport: DIPOLOG	Location: DIPOLOG, ZAMBOANGA DEL NORTE	
Ultimate length: 1500 METERS	Ultimate strength: 75,000 DG	
Runway	Extend r/w 500 m x 30 m, pave r/w (concrete)	$247,000
Taxiway	Construct and Pave (concrete) two stub t/w (70 m x 15 m each)	19,000
Apron	Enlarge (150 m x 65 m) and Pave Apron (concrete)	115,000
Terminal area	Construct and pave auto parking lot (asphalt) and improve access roads.	37,000
Land	Acquire 37 hectares	30,000
Miscellaneous	Fencing, painting	15,000
	Total	$463,000

Airport: MAMBURAO	Location: MAMBURAO, OCC. MINDORO
Ultimate length: 1500 METERS	Ultimate strength: 75,000 DG

Item	Recommendations	Cost
Runway	Reconstruct, extend and pave (concrete)	$288,000
Taxiway	Construct and pave (concrete) two stub t/w (70 m x 15 m each)	16,000
Apron	Construct and pave apron 100 m x 60 m (concrete)	36,000
Terminal area	Construct and improve auto parking lot and entrance road (unpaved)	7,000
Land	Acquire 26 hectares	47,000
Miscellaneous	Fencing, painting	15,000
	Total --------------------	$409,000

Airport: JOLO	Location: JOLO, SULU
Ultimate length: 1500 meters	Ultimate strength: 75,000 DG

Runway	Reconstruct, extend and pave (concrete)	$325,000
Taxiway	Construct and pave (concrete) two stub t/w (70 m x 15 m each)	14,000
Apron	Construct and pave apron 150 m x 50 m (concrete)	42,000
Terminal area	Construct and pave auto parking lot (asphalt) and improve access roads	20,000
Land	Acquire 20 hectares	36,000
Miscellaneous	Fencing, painting	15,000
	Total --------------------	$452,000

Airport: BUAYAN (GEN. SANTOS)	Location: RAJAH BUAYAN CITY, COTABATO
Ultimate length: 1800 METERS	Ultimate strength: 100,000 DG

Runway	Reconstruct, extend and pave (concrete)	$469,000
Taxiway	Construct and pave (concrete) two stub t/w (70 m x 20 m each)	17,000
Apron	Construct and pave apron 100 m x 60 m (concrete)	46,000
Terminal area	Construct and pave auto parking lot (asphalt) and improve access roads	66,000
Land	Acquire 10 hectares	13,000
Miscellaneous	Fencing, painting	18,000
	Total --------------------	$629,000

Airport: TUGUEGARAO	Location: TUGUEGARAO, CAGAYAN	
Ultimate length: 1500 METERS	Ultimate strength: 75,000 DG	

Item	Recommendations	Cost
Runway	Reconstruct, extend and pave (concrete)	$367,000
Taxiway	Construct and pave (concrete) two stub t/w (70 m x 15 m each)	25,000
Apron	Enlarge (50 m x 50 m) and pave (concrete)	45,000
Terminal area	Construct and pave auto parking lot (asphalt) and improve access roads	56,000
Land	Acquire 29 hectares	38,000
Miscellaneous	Fencing, painting	14,000
	Total	$545,000

Airport: ILIGAN	Location: ILIGAN, LANAO DEL NORTE	
Ultimate length: 1500 METERS	Ultimate strength: 75,000 DG	
Runway	Extend 500 m and pave (asphalt), overlay existing r/w 1000 m	$236,000
Taxiway & Apron	Sealcoat asphalt surfaces	6,000
Terminal area	Construct and pave auto parking lot (asphalt) and improve access roads	71,000
Land	Acquire 22 hectares	13,000
Miscellaneous	Fencing, painting	15,000
	Total	$341,000

Airport: APARRI	Location: APARRI, CAGAYAN	
Ultimate length: 1500	Ultimate strength: 75,000 DG	
Runway	Reconstruct, extend and pave (concrete)	$212,000
Taxiway	Construct and pave (concrete) two stub t/w (70 m x 15 m each)	34,000
Apron	Construct and pave apron 100 m x 50 m (concrete)	34,000
Land	Acquire 25 hectares	32,000
Miscellaneous	Fencing, painting	12,000
	Total	$324,000

Airport: DAET	Location: DAET, CAMARINES NORTE	
Ultimate length: 1500 METERS	Ultimate strength: 75,000 DG	
Runway	Reconstruct, extend and pave (concrete)	$266,000
Taxiway	Construct and pave (concrete) two stub t/w (70 m x 15 m each)	16,000
Apron	Construct and pave apron 200 m x 70 m (concrete)	92,000

DAET (cont'd)

Item	Recommendations	Cost
Terminal area	Construct and pave auto parking lot (asphalt) and improve access roads	$ 49,000
Land	Acquire 17 hectares	31,000
Miscellaneous	Fencing, painting	15,000
	Total	$469,000

Airport: KALIBO — Location: KALIBO, AKLAN
Ultimate length: 1500 meters — Ultimate strength: 75,000 DG

Item	Recommendations	Cost
Runway	Extend 400 m and pave (concrete)	$272,000
Taxiway	Construct and pave (concrete) two stub t/w (70 m x 15 m each)	22,000
Apron	Enlarge (100 m x 80 m) and pave (concrete) apron	94,000
Terminal area	Construct and pave (asphalt) auto parking lot and improve access roads	34,000
Land	Acquire 24 hectares	62,000
Miscellaneous	Fencing, painting	15,000
	Total	$499,000

Airport: MARINDUQUE — Location: GASAN, MARINDUQUE
Ultimate length: 1500 meters — Ultimate strength: 75,000 DG

Item	Recommendations	Cost
Runway	Reconstruct, extend and pave (concrete)	$272,000
Taxiway	Construct and pave (concrete) two stub t/w (70 m x 15 m each)	18,000
Apron	Enlarge (100 m x 50 m) and pave (concrete)	52,000
Land	Acquire 29 hectares	38,000
Miscellaneous	Fencing, painting	15,000
	Total	$395,000

Airport: CALAPAN — Location: CALAPAN, MINDORO ORIENTAL
Ultimate length: 1300 meters — Ultimate strength: 50,000 DG

Item	Recommendations	Cost
Runway	Construct and pave new runway (concrete)	$230,000
Taxiway	Construct and pave (concrete) two stub t/w (70 m x 15 m each)	24,000
Apron	Construct and pave apron 100 m x 50 m (concrete)	36,000
Terminal area	Construct and pave auto parking lot (asphalt) and construct entrance and access roads	51,000

CALAPAN (cont'd)

Item	Recommendations	Cost
Land	Acquire new airport site, 37 hectares	$ 67,000
Miscellaneous	Fencing, painting	13,000
	Total ---------------------	$421,000

Airport: PLARIDEL | Location: PLARIDEL, BULACAN
Ultimate length: 1200 METERS | Ultimate strength: 25,000 DG

Runway	Construct and pave (asphalt) r/w (1200 m x 15 m)	$ 86,000
Taxiway	Construct and pave parallel t/w (asphalt)	75,000
Apron	Construct and pave apron & tie down area (150 m x 300 m)	80,000
Lighting	Medium Intensity Lighting System r/w and t/w, Rotating beacon, AVASI	86,000
Terminal area	Construct and pave (asphalt) auto parking lot, (100 m x 200 m)	75,000
Land	Acquire 25 hectares	54,000
Miscellaneous	Fencing, painting	15,000
	Total ---------------------	$471,000

Airport: | Location:
Ultimate length: | Ultimate strength:

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TABLE II
Second Year

Airport: CAGAYAN DE ORO — Location: CAGAYAN DE ORO, MISAMIS ORIENTAL
Ultimate length: 1800 meters — Ultimate strength: 100,000 DG

Item	Recommendations	Cost
Terminal building	Terminal building construction 1660 sq. meters	$150,000
	Total	$150,000

Airport: COTABATO — Location: COTABATO CITY, COTABATO
Ultimate length: 1800 meters — Ultimate strength: 100,000 DG

Item	Recommendations	Cost
Lighting	Medium Intensity Lighting System r/w and t/w, Rotating beacon, Apron floodlighting, VASI	$123,000
Terminal building	Terminal building construction 1570 sq. meters	141,000
	Total	$264,000

Airport: PUERTO PRINCESA — Location: PUERTO PRINCESA, PALAWAN
Ultimate length: 1500 meters — Ultimate strength: 75,000 DG

Item	Recommendations	Cost
Runway	Extend r/w 500 m x 30 m, pave r/w (concrete)	$371,000
Taxiway	Construct and pave (concrete) two stub t/w (70 m x 15 m each)	15,000
Apron	Construct and pave apron 100 m x 50 m (concrete)	33,000
Terminal area	Construct and pave (asphalt) auto parking lot and improve access roads	42,000
Land	Acquire 28 hectares	22,000
Miscellaneous	Fencing, painting	15,000
	Total	$498,000

Airport: BACOLOD — Location: BACOLOD, OCCIDENTAL NEGROS
Ultimate length: 1800 meters — Ultimate strength: 100,000 DG

Item	Recommendations	Cost
Runway	Extend and pave ext. 300 m x 30 m (concrete)	$100,000
Taxiway	Construct and pave (concrete) parallel t/w	310,000
	Construct and pave (concrete) stub t/w	11,000
Apron	Enlarge and pave (concrete) apron 100 m x 60 m	53,000
Lighting	Extend Medium Intensity Lighting System on r/w, install lighting on t/w, Apron floodlighting, VASI	102,000
Land	Acquire 21 hectares	273,000
Miscellaneous	Fencing, painting	16,000
	Total	$865,000 X

Airport: DAVAO	Location: BANGOY, DAVAO CITY	
Ultimate length: 1800 meters	Ultimate strength: 200,000 DG	
Item	**Recommendations**	**Cost**
Runway	Extend and pave ext. 300 m x 30 m (concrete)	132,000
Taxiway	Construct and pave (concrete) parallel t/w	509,000
	Construct and pave stub and exit t/w	123,000
Apron	Enlarge and pave (concrete) apron 200 m x 40 m, 150 m x 100 m	263,000
Lighting	Extend Medium Intensity Lighting System on r/w, install lighting on t/w, Apron floodlighting, VASI	104,000
Terminal area	Construct and pave (asphalt) auto parking lot and improve access roads	299,000
Miscellaneous	Fencing, painting	21,000
	Total --------------------	$1,451,000

Airport: LEGASPI	Location: LEGASPI CITY, ALBAY	
Ultimate length: 1500 meters	Ultimate strength: 75,000 DG	
Runway	Extend r/w 300 m x 30 m, pave r/w (asphalt)	$229,000
Taxiway & Apron	Sealcoat asphalt surfaces	8,000
Lighting	Medium Intensity Lighting System r/w and t/w, Rotating beacon, Apron floodlighting, VASI	96,000
Land	Acquire 13 hectares	68,000
Miscellaneous	Fencing, painting	15,000
	Total --------------------	$416,000

Airport: BUTUAN	Location: BUTUAN CITY, AGUSAN	
Ultimate length: 1500 meters	Ultimate strength: 75,000 DG	
Runway	Reconstruct, extend and pave r/w (concrete)	$352,000
Taxiway	Construct and pave (concrete) two stub t/w (70 m x 15 m each)	14,000
Apron	Construct and pave (concrete) apron 100 m x 60 m	77,000
Lighting	Medium Intensity Lighting System on r/w and t/w, Rotating beacon, Apron floodlighting, VASI	99,000
Terminal area	Construct and pave (asphalt) auto parking lot and improve access roads	78,000
Land	Acquire 50 hectares	40,000
Miscellaneous	Fencing, painting	15,000
	Total --------------------	$675,000

Airport CAUAYAN		Location: CAUAYAN, ISABELA
Ultimate length: 1500 meters		Ultimate strength: 75,000 DG

Item	Recommendations	Cost
Runway	Extend r/w 500 m x 30 m, pave r/w (concrete)	$247,000
Taxiway	Construct and pave (concrete) two stub (70 m x 15 m each)	19,000
Apron	Enlarge (100 m x 50 m) and pave (concrete)	52,000
Terminal area	Construct and pave (asphalt) auto parking lot and improve access roads	35,000
Land	Acquire 22 hectares	24,000
Miscellaneous	Fencing, painting	15,000
	Total ------------------	$392,000

Airport: SURIGAO		Location: SURIGAO, SURIGAO DEL NORTE
Ultimate length: 1300 meters		Ultimate strength: 50,000 DG

Runway	Reconstruct, extend 300 m and pave (concrete)	$300,000
Taxiway	Construct and pave (concrete) two stub t/w (70 m x 15 m each)	18,000
Apron	Construct and pave (concrete) apron 100 m x 60 m	42,000
Terminal area	Construct and pave (asphalt) auto parking lot and improve access roads	51,000
Land	Acquire 27 hectares	49,000
Miscellaneous	Fencing, painting	13,000
	Total ------------------	$473,000

Airport: MISAMIS (OZAMIS)		Location: OZAMIS, MISAMIS OCCIDENTAL
Ultimate length: 1300 meters		Ultimate strength: 50,000 DG

Runway	Reconstruct and pave r/w (concrete)	$247,000
Taxiway	Construct and pave (concrete) two stub t/w (70 m x 15 m each)	16,000
Apron	Enlarge (100 m x 50 m) and pave apron (concrete)	51,000
Land	Acquire 29 hectares	52,000
Miscellaneous	Fencing, painting	13,000
	Total -------------------	$379,000

Airport: ROMBLON (TABLAS)		Location: ALCANTARA, ROMBLON
Ultimate length: 1300 meters		Ultimate strength: 50,000 DG

Runway	Extend 300 m and pave r/w (concrete)	$254,000
Taxiway	Construct and pave (concrete) two stub t/w (70 m x 15 m each)	18,000
Apron	Pave apron (concrete)	34,000 X

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ROMBLON (cont'd)

Item	Recommendations	Cost
Land	Acquire 25 hectares	$ 33,000
Miscellaneous	Fencing, painting	13,000
	Total -------------------	$352,000

Airport: SAN JOSE — Location: SAN JOSE, MINDORO OCCIDENTAL
Ultimate length: 1500 meters — Ultimate strength: 75,000 DG

Runway	Extend 400 m and pave (asphalt), overlay existing r/w 1100 m	$206,000
Taxiway	Construct and pave (asphalt) 2 stub t/w (70 m x 15 m each)	14,000
Apron	Enlarge and pave (asphalt) apron 100 m x 60 m overlay existing apron 100 m x 60 m	59,000
Terminal area	Construct and pave (asphalt) auto parking lot and improve access roads	45,000
Land	Acquire 11 hectares	57,000
Miscellaneous	Fencing, painting	15,000
	Total -------------------	$396,000

Airport: CALBAYOG — Location: CALBAYOG, SAMAR
Ultimate length: 1500 meters — Ultimate strength: 75,000 DG

Runway	Reconstruct, extend and pave r/w (concrete)	$247,000
Taxiway	Construct and pave (concrete) two stub t/w (70 m x 15 m each)	19,000
Apron	Enlarge (100 m x 70 m) and pave apron (concrete)	106,000
Land	Acquire 17 hectares	14,000
Miscellaneous	Fencing, painting	15,000
	Total -------------------	$401,000

Airport: MASBATE — Location: MASBATE, MASBATE
Ultimate length: 1300 meters — Ultimate strength: 50,000 DG

Runway	Reconstruct, extend and pave r/w (concrete)	$251,000
Taxiway	Pave taxiway (150 m x 15 m)	11,000
Apron	Enlarge (100 m x 80 m) and pave apron (concrete)	86,000
Terminal area	Construct and pave (asphalt) auto parking lot and improve access roads	56,000
Land	Acquire 28 hectares	50,000
Miscellaneous	Fencing, painting	13,000
	Total -------------------	$467,000

Airport: VIRAC
Location: VIRAC, CATANDUANES
Ultimate length: 1500 meters
Ultimate strength: 75,000 DG

Item	Recommendations	Cost
Runway	Reconstruct and pave r/w (concrete)	$309,000
Taxiway	Construct and pave (concrete) two stub t/w (70 m x 15 m each)	24,000
Apron	Enlarge (100 m x 50 m) and pave apron (concrete)	49,000
Land	Acquire 33 hectares	26,000
Miscellaneous	Fencing, painting	15,000
	Total	$423,000

Airport: NAGA
Location: PILO, CAMARINES SUR
Ultimate length: 1300 meters
Ultimate strength: 50,000 DG

Item	Recommendations	Cost
Runway	Reconstruct and pave r/w (concrete)	$256,000
Taxiway	Construct and pave (concrete) two stub t/w (70 m x 15 m each)	19,000
Apron	Construct and pave (concrete) apron 100 m x 60 m	37,000
Terminal area	Construct and pave (asphalt) auto parking lot and improve access roads	68,000
Land	Acquire 22 hectares	40,000
Miscellaneous	Fencing, painting	13,000
	Total	$433,000

Airport: LAHUG
Location: CEBU CITY, CEBU
Ultimate length: 1200 meters
Ultimate strength: 100,000 DG

Item	Recommendations	Cost
Runway	Sealcoat asphalt surface 1200 m x 15 m	$ 21,000
Miscellaneous	Fencing, painting	12,000
	Total	$ 33,000

Airport:
Location:
Ultimate length:
Ultimate strength:

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Airport: JOLO		Location: JOLO, SULU
Ultimate length: 1500 meters		Ultimate strength: 75,000 DG

Item	Recommendations	Cost
Terminal Building	Terminal Building construction 1,200 sq. meters	$108,000
	Total	$108,000

Airport: PUERTO PRINCESA		Location: PUERTO PRINCESA, PALAWAN
Ultimate length: 1500 meters		Ultimate strength: 75,000 DG
Lighting	Medium Intensity Lighting System r/w and t/w, Rotating beacon	$ 49,000
Terminal Building	Terminal building construction 510 sq. meters	46,000
	Total	$ 95,000

Airport: BACOLOD		Location: BACOLOD, OCCIDENTAL NEGROS
Ultimate length: 1800 meters		Ultimate strength: 100,000 DG
Terminal Building	Terminal building construction 3,350 sq. meters	$302,000
	Total	$302,000

Airport: DAVAO		Location: BANGOY, DAVAO CITY
Ultimate length: 1800 meters		Ultimate strength: 200,000 DG
Terminal Building	Terminal building construction 2,760 sq. meters	$248,000
	Total	$248,000

Airport: CAUAYAN		Location: CAUAYAN, ISABELA
Ultimate length: 1500 meters		Ultimate strength: 75,000 DG
Lighting	Medium Intensity Lighting System r/w and t/w, Rotating beacon, Apron floodlighting, AVASI	$ 70,000
	Total	$ 70,000

Airport: SURIGAO		Location: SURIGAO, SURIGAO DEL NORTE
Ultimate length: 1500 meters		Ultimate strength: 75,000 DG
Terminal Building	Terminal building construction 1020 sq. meters	$ 92,000
	Total	$ 92,000

Table III (cont'd)
Third Year

Airport: BASCO — Location: BASCO, BATANES
Ultimate length: 1300 meters — Ultimate strength: 50,000 DG

Item	Recommendations	Cost
Runway	Reconstruct, extend and pave (concrete)	$264,000
Taxiway	Construct and pave (concrete) two stub t/w (70 m x 15 m each)	23,000
Apron	Construct and pave apron 100 m x 50 m (concrete)	40,000
Terminal area	Construct and improve auto parking lot and access roads (unpaved)	12,000
Land	Acquire 37 hectares	11,000
Miscellaneous	Fencing, painting	13,000
	Total	$363,000

Airport: MACTAN — Location: LAPU-LAPU CITY, CEBU
Ultimate length: 2526 meters — Ultimate strength: 200,000 DG

Item	Recommendations	Cost
Taxiway	Construct and pave (concrete) t/w from civil apron to parallel t/w (220 m x 23 m)	$ 52,000
	Pave (concrete) t/w from military apron to r/w (270 m x 23 m)	48,000
	Construct and pave (concrete) t/w from apron extension to parallel t/w (200 m x 23 m)	52,000
Lighting[1]	Medium Intensity Lighting System on new t/w construction, VASI	61,000
Apron	Enlarge (100 m x 330 m) and pave apron (concrete)	348,000
Terminal area	Extend and pave (asphalt) auto parking lot	18,000
Miscellaneous	Painting, fencing	18,000
	Total	$597,000

Airport: ZAMBOANGA — Location: ZAMBOANGA, ZAMBOANGA DEL SUR
Ultimate length: 1836 meters — Ultimate strength: 200,000 DG

Item	Recommendations	Cost
Taxiway	Construct and pave (concrete) parallel t/w and t/w connecting apron extension	$444,000
Apron	Enlarge (200 m x 125 m) and pave apron (concrete)	233,000
Lighting	Medium Intensity Lighting System on new t/w, Rotating beacon, Apron floodlighting, VASI	95,000
Land	Acquire 51 hectares	91,000
Miscellaneous	Fencing, painting	20,000
	Total	$883,000

Airport: ILOILO	Location: ILOILO, ILOILO	
Ultimate length: 1800 meters	Ultimate strength: 100,000 DG	

Item	Recommendations	Cost
Runway	Construct and pave (concrete) r/w extension 300 m x 30 m	$ 71,000
Taxiway	Construct and pave (concrete) parallel t/w	294,000
Lighting	Medium Intensity, Lighting System r/w and t/w, Rotating beacon, Apron floodlighting, VASI	125,000
Terminal Building	Terminal building construction 1740 sq. meters	157,000
Land	Acquire 12 hectares	22,000
Miscellaneous	Fencing, painting	20,000
	Total ------------------	$689,000

Airport: LAOAG	Location: LAOAG, ILOCOS NORTE	
Ultimate length: 1460 meters	Ultimate strength: 100,000 DG	

Runway	Overlay existing asphalt paving	$218,000
Taxiway	Improve and pave (asphalt) parallel t/w	189,000
Apron	Enlarge and pave (asphalt) apron (100 m x 200 m)	62,000
Lighting	Medium Intensity Lighting System r/w and t/w, Rotating beacon, Apron floodlighting, VASI	114,000
Terminal area	Construct and pave (asphalt) auto parking lot and access roads	85,000
Land	Acquire 30 hectares	54,000
Miscellaneous	Fencing, painting	19,000
	Total ------------------	$741,000

Airport: ROXAS	Location: ROXAS, CAPIZ	
Ultimate length: 1500 meters	Ultimate strength: 75,000 DG	

Runway	Construct and pave (concrete) r/w extension 300 m x 30 m	$107,000
Lighting	Medium Intensity Lighting System r/w and t/w Rotating beacon, Apron floodlighting, AVASI	70,000
Terminal area	Construct and pave (asphalt) auto parking lot and improve access roads	21,000
Land	Acquire 21 hectares	168,000
Miscellaneous	Fencing, painting	15,000
	Total ------------------	$381,000

Airport: TAGBILARAN — Location: TAGBILARAN, BOHOL
Ultimate length: 1500 meters — Ultimate strength: 75,000 DG

Item	Recommendations	Cost
Runway	Improve and pave (concrete) r/w	$281,000
Taxiway	Construct and pave (concrete) two stub t/w (70 m x 15 m each)	14,000
Apron	Enlarge (150 m x 60 m) and pave apron (concrete)	76,000
Terminal area	Construct and pave (asphalt) auto parking lot and improve access roads	29,000
Land	Acquire 27 hectares	35,000
Miscellaneous	Fencing, painting	15,000
	Total	$450,000

Airport: LUBANG — Location: LUBANG, MINDORO OCCIDENTAL
Ultimate length: 1300 meters — Ultimate strength: 50,000 DG

Runway	Extend r/w 300 m and pave r/w (concrete)	$239,000
Taxiway	Construct and pave (concrete) stub t/w (70 m x 15 m)	12,000
Apron	Construct and pave (concrete) apron	33,000
Land	Acquire 22 hectares	7,000
Miscellaneous	Fencing, painting	13,000
	Drainage repair	15,000
	Total	$319,000

Airport: CATARMAN — Location: CATARMAN, SAMAR
Ultimate length: 1300 meters — Ultimate strength: 50,000 DG

Runway	Reconstruct, extend and pave r/w (concrete)	$215,000
Taxiway	Construct and pave stub t/w (concrete) (70 m x 15 m)	12,000
Apron	Construct and pave (concrete) apron	33,000
Land	Acquire 8 hectares	6,000
Miscellaneous	Fencing, painting	13,000
	Total	$279,000

Airport: ORMOC — Location: ORMOC, LEYTE
Ultimate length: 1300 meters — Ultimate strength: 50,000 DG

Runway	Extend 300 m, improve and pave r/w (concrete)	$240,000
Taxiway	Construct and pave (concrete) two stub t/w (70 m x 15 m each)	15,000
Apron	Construct and pave (concrete) apron	34,000

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ORMOC (cont'd)

Item	Recommendations	Cost
Land	Acquire 20 hectares	$ 26,000
Miscellaneous	Fencing, painting	13,000
	Total ------------------	$328,000

Airport: SAN JOSE DE BUENAVISTA   Location: SAN JOSE DE BUENAVISTA, ANTIQUE
Ultimate length: 1300 meters   Ultimate strength: 50,000 DG

Runway	Extend, improve and pave r/w (concrete)	$276,000
Taxiway	Construct and pave stub t/w (concrete)	9,000
Apron	Construct and pave apron	33,000
Land	Acquire 18 hectares	144,000
Miscellaneous	Fencing, painting	13,000
	Total ------------------	$475,000

Airport: SIARGAO   Location: SIARGAO, SURIGAO DEL NORTE
Ultimate length: 1300 meters   Ultimate strength: 50,000 DG

Runway	Extend 300 m and pave r/w (concrete)	$269,000
Taxiway	Construct and pave stub t/w (concrete) (70 m x 15 m)	12,000
Apron	Construct and pave apron (concrete)	37,000
Miscellaneous	Fencing, painting	13,000
	Total ------------------	$331,000

Airport: SORSOGON   Location: BACON, SORSOGON
Ultimate length: 1300 meters   Ultimate strength: 50,000 DG

Runway	Reconstruct, extend and pave r/w (concrete)	$227,000
Taxiway	Construct and pave stub t/w (ooncrete) (70 m x 15 m)	11,000
Apron	Construct and pave apron (concrete)	32,000
Miscellaneous	Fencing, painting	13,000
	Total ------------------	$283,000

TABLE IV
Fourth Year

Airport: DIPOLOG	Location: DIPOLOG, ZAMBOANGA DEL NORTE	
Ultimate length: 1500 meters	Ultimate strength: 75,000 DG	
Item	**Recommendations**	**Cost**
Terminal building	Terminal building construction 1,200 sq. meters	$108,000
	Total	$108,000

Airport: BUAYAN (GENERAL SANTOS)	Location: RAJAH BUAYAN CITY, COTABATO	
Ultimate length: 1800 meters	Ultimate strength: 100,000 DG	
Lighting	Medium Intensity Lighting System r/w and t/w, Rotating beacon, Apron floodlighting, AVASI	$ 79,000
Terminal building	Terminal building construction 940 sq. meters	85,000
	Total	$164,000

Airport: TUGUEGARAO	Location: TUGUEGARAO, CAGAYAN	
Ultimate length: 1500 meters	Ultimate strength: 75,000 DG	
Lighting	Medium Intensity Lighting System r/w and t/w, Rotating beacon, Apron floodlighting, AVASI	$ 76,000
Terminal building	Terminal building construction 1,080 sq. meters	97,000
	Total	$173,000

Airport: ILIGAN	Location: ILIGAN, LANAO DEL NORTE	
Ultimate length: 1500 meters	Ultimate strength: 75,000 DG	
Terminal building	Terminal building construction 1,090 sq. meters	$ 98,000
	Total	$ 98,000

Airport: DAET	Location: DAET, CAMARINES NORTE	
Ultimate length: 1500 meters	Ultimate strength: 75,000 DG	
Lighting	Medium Intensity Lighting System r/w and t/w, Rotating beacon, Apron floodlighting, AVASI	$ 72,000
	Total	$ 72,000

Airport: KALIBO	Location: KALIBO, AKLAN	
Ultimate length: 1500 meters	Ultimate strength: 75,000 DG	
Lighting	Medium Intensity Lighting System r/w and t/w Rotating beacon, Apron floodlighting, AVASI	$ 72,000
	Total	$ 72,000

X

Airport: LEGASPI	Location: LEGASPI CITY, ALBAY	
Ultimate length: 1500 meters	Ultimate strength: 75,000 DG	
Item	**Recommendations**	**Cost**
Terminal building	Terminal building construction 1,475 sq. meters	$133,000
	Total --------------------	$133,000

Airport: BUTUAN	Location: BUTUAN CITY, AGUSAN	
Ultimate length: 1500 meters	Ultimate strength: 75,000 DG	
Terminal building	Terminal building construction 1,475 sq. meters	$133,000
	Total --------------------	$133,000

Airport: CAUAYAN	Location: CAUAYAN, ISABELA	
Ultimate length: 1500 meters	Ultimate strength: 75,000 DG	
Terminal building	Terminal building construction 1,130 sq. meters	$102,000
	Total --------------------	$102,000

Airport: ZAMBOANGA	Location: ZAMBOANGA, ZAMBOANGA DEL SUR	
Ultimate length: 1836 meters	Ultimate strength: 200,000 DG	
Terminal building	Terminal building construction 1,745 sq. meters	$157,000
	Total --------------------	$157,000

Airport: LAOAG	Location: LAOAG, ILOCOS NORTE	
Ultimate length: 1460 meters	Ultimate strength: 100,000 DG	
Terminal building	Terminal building construction 1,020 sq. meters	$ 92,000
	Total --------------------	$ 92,000

Airport: ROXAS	Location: ROXAS, CAPIZ	
Ultimate length: 1500 meters	Ultimate strength: 75,000 DG	
Terminal building	Terminal building construction 990 sq. meters	$ 89,000
	Total --------------------	$ 89,000

Airport: DUMAGUETE	Location: DUMAGUETE, NEGROS ORIENTAL	
Ultimate length: 1500 meters	Ultimate strength: 75,000 DG	
Runway	Extend and pave r/w 220 m (concrete)	$ 43,000
Lighting	Medium Intensity Lighting System r/w and t/w, Rotating beacon, Apron floodlighting, AVASI	75,000
Terminal area	Construct and pave (asphalt) auto parking lot and improve access roads	27,000

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DUMAGUETE (cont'd)

Item	Recommendations	Cost
Land	Acquire 11 hectares	$ 29,000
Miscellaneous	Fencing, painting	15,000
	Total -------------------	$189,000

Airport: TACLOBAN Ultimate length: 1800 meters	Location: TACLOBAN, LEYTE Ultimate strength: 100,000 DG	
Runway	Extend and pave r/w 600 m (concrete)	$176,000
Taxiway	Construct and pave (concrete) two stub t/w (200 m x 20 m each	65,000
Apron	Extend and pave apron 200 m x 60 m (concrete)	96,000
Lighting	Medium Intensity Lighting System r/w and t/w, Rotating beacon, Apron floodlighting, AVASI	78,000
Miscellaneous	Fencing, painting Construct seawall for r/w protection	18,000 28,000
	Total -------------------	$461,000

Airport: VIGAN Ultimate length: 1300 meters	Location: VIGAN, Ilocos Sur Ultimate strength: 50,000 DG	
Runway	Reconstruct, extend and pave r/w (concrete)	$281,000
Taxiway	Construct and pave (concrete) two stub t/w (70 m x 15 m each)	23,000
Apron	Construct and pave apron (concrete)	33,000
Land	Acquire 20 hectares	42,000
Miscellaneous	Fencing, painting	13,000
	Total -------------------	$392,000

Airport: TACURONG Ultimate length: 1300 meters	Location: TACURONG, COTABATO Ultimate strength: 50,000 DG	
Runway	Construct and pave r/w (concrete)	$306,000
Taxiway	Construct and pave (concrete) two stub t/w (70 m x 15 m each)	27,000
Apron	Construct and pave apron 80 m x 50 m (concrete)	26,000
Land	Acquire 37 hectares for new airport site	56,000
Miscellaneous	Fencing, painting Clearing (37 hectares)	13,000 22,000
	Total -------------------	$450,000

X

Airport: ALLAH VALLEY — Location: BANGA, COTABATO
Ultimate length: 1300 meters — Ultimate strength: 50,000 DG

Item	Recommendations	Cost
Runway	Improve and pave r/w (concrete)	$187,000
Taxiway	Improve and pave stub t/w (concrete) (70 m x 15 m)	11,000
Apron	Improve and pave apron 80 m x 50 m (concrete)	33,000
Miscellaneous	Fencing, painting	13,000
	Total --------------------	$244,000

Airport: SABLAYAN — Location: SABLAYAN, MINDORO OCCIDENTAL
Ultimate length: 1300 meters — Ultimate strength: 50,000 DG

Item	Recommendations	Cost
Runway	Construct and pave r/w (concrete)	$276,000
Taxiway	Construct and pave stub t/w (concrete) (70 m x 15 m)	12,000
Apron	Construct and pave apron 80 m x 50 m (concrete)	31,000
Land	Acquire 37 hectares for new site	74,000
Miscellaneous	Fencing, painting	13,000
	Clearing (37 hectares)	18,000
	Total --------------------	$424,000

Airport: TANDAG — Location: TANDAG, SURIGAO DEL SUR
Ultimate length: 1300 meters — Ultimate strength: 50,000 DG

Item	Recommendations	Cost
Runway	Improve, extend 300 m and pave r/w (concrete)	$249,000
Taxiway	Construct and pave (concrete) two stub t/w (70 m x 15 m each)	12,000
Apron	Construct and pave apron 100 m x 50 m (concrete)	26,000
Land	Acquire 16 hectares	21,000
Miscellaneous	Fencing, painting	13,000
	Total --------------------	$321,000

Airport: TAWI-TAWI — Location: BONGAO, SULU
Ultimate length: 1300 meters — Ultimate strength: 50,000 DG

Item	Recommendations	Cost
Runway	Improve and pave r/w (concrete)	$258,000
Taxiway	Construct and pave (concrete) two stub t/w (70 m x 15 m each)	18,000
Apron	Construct and pave apron 100 m x 50 m (concrete)	49,000
Land	Acquire 6 hectares	5,000
Miscellaneous	Fencing, painting	13,000
	Total --------------------	$343,000

Table IV (cont'd)
Fourth Year

Airport: MALAYBALAY Ultimate length: 1300 meters	Location: MALAYBALAY, BUKIDNON Ultimate strength: 50,000 DG	
Item	**Recommendations**	**Cost**
Runway	Construct and pave r/w (concrete)	$275,000
Taxiway	Construct and pave stub t/w (concrete) (70 m x 15 m)	11,000
Apron	Construct and pave apron 80 m x 50 m (concrete)	19,000
Land	Acquire 37 hectares for new site	48,000
Miscellaneous	Fencing, painting	13,000
	Clearing (37 hectares)	15,000
	Total ------------------	$381,000

Airport: BROOKES POINT Ultimate length: 1300 meters	Location: BROOKES POINT, PALAWAN Ultimate strength: 50,000 DG	
Runway	Construct and pave r/w (concrete)	$294,000
Taxiway	Construct and pave (concrete) two stub t/w (70 m x 15 m each)	14,000
Apron	Construct and pave apron 100 m x 50 m (concrete)	31,000
Land	Acquire 37 hectares for new site	30,000
Miscellaneous	Fencing, painting	13,000
	Clearing (37 hectares)	12,000
	Total ------------------	$394,000

Airport: BAGUIO Ultimate length: 1600 meters	Location: BAGUIO, MOUNTAIN PROVINCE Ultimate strength: 75,000 DG	
Runway	Overlay existing asphalt surface	144,000
Taxiway & Apron	Overlay existing asphalt surface	39,000
Miscellaneous	Fencing, painting	18,000
	Total ------------------	$201,000

TABLE V
Fifth Year

Airport: MAMBURAO		Location: MAMBURAO, OCCIDENTAL MINDORO
Ultimate length: 1500 meters		Ultimate strength: 75,000 DG

Item	Recommendations	Cost
Lighting	Medium Intensity Lighting System r/w and t/w Rotating beacon, Apron floodlighting, AVASI	$ 71,000
Terminal building	Terminal building construction 890 sq. meters	80,000
	Total --------------------	$151,000

Airport: DAET		Location: DAET, CAMARINES NORTE
Ultimate length: 1500 meters		Ultimate strength: 75,000 DG
Terminal building	Terminal building construction 1,150 sq. meters	$103,000
	Total --------------------	$103,000

Airport: KALIBO		Location: KALIBO, AKLAN
Ultimate length: 1500 meters		Ultimate strength: 75,000 DG
Terminal building	Terminal building construction 1,090 sq. meters	$ 98,000
	Total --------------------	$ 98,000

Airport: SAN JOSE		Location: SAN JOSE, MINDORO OCCIDENTAL
Ultimate length: 1500 meters		Ultimate strength: 75,000 DG
Lighting	Medium Intensity Lighting System r/w and t/w, Rotating beacon, Apron floodlighting, AVASI	$ 73,000
Terminal building	Terminal building construction 890 sq. meters	80,000
	Total --------------------	$153,000

Airport: NAGA		Location: PILI, CAMARINES SUR
Ultimate length: 1300 meters		Ultimate strength: 50,000 DG
Terminal building	Terminal building construction 600 sq. meters	$ 54,000
	Total --------------------	$ 54,000

Airport: DUMAGUETE		Location: DUMAGUETE, NEGROS ORIENTAL
Ultimate length: 1500 meters		Ultimate strength: 75,000 DG
Terminal building	Terminal building construction 1,240 sq. meters	$112,000
	Total --------------------	$112,000

Airport: TACLOBAN — Location: TACLOBAN, LEYTE
Ultimate length: 1800 meters — Ultimate strength: 100,000 DG

Item	Recommendations	Cost
Terminal building	Terminal building construction 1,320 sq. meters	$119,000
	Total	$119,000

Airport: BAGUIO — Location: BAGUIO, MOUNTAIN PROVINCE
Ultimate length: 1600 meters — Ultimate strength: 75,000 DG

Item	Recommendations	Cost
Terminal building	Terminal building construction 810 sq. meters	$ 73,000
	Total	$ 73,000

Airport: MALABANG — Location: MALABANG, LANAO DEL SUR
Ultimate length: 1300 meters — Ultimate strength: 50,000 DG

Item	Recommendations	Cost
Runway	Extend r/w 300 m and pave extension (asphalt)	$ 58,000
	Patching and sealcoating	$ 38,000
Taxiway	Construct and pave (asphalt) stub t/w (70 m x 15 m)	11,000
Apron	Construct and pave apron 70 m x 50 m (asphalt)	28,000
Miscellaneous	Fencing, painting	13,000
	Total	$148,000

Airport: HILONGOS — Location: HILONGOS, LEYTE
Ultimate length: 1300 meters — Ultimate strength: 50,000 DG

Item	Recommendations	Cost
Runway	Improve, extend 300 m and pave r/w (concrete)	$297,000
Taxiway	Construct and pave (concrete) two stub t/w (70 m x 15 m)	23,000
Apron	Construct and pave apron 80 m x 50 m (concrete)	32,000
Miscellaneous	Fencing, painting	13,000
	Total	$365,000

X
158

EXHIBIT III - A

AIRPORT DEVELOPMENT SCHEDULE AND COST
(in dollars)

	FIRST YEAR				SECOND YEAR				THIRD YEAR				FOURTH YEAR				FIFTH YEAR				
	Land	Constr. & Paving	Lighting	Buildings	Land	Constr. & Paving	Lighting	Buildings	Land	Constr. & Paving	Lighting	Buildings	Land	Constr. & Paving	Lighting	Buildings	Land	Constr. & Paving	Lighting	Buildings	Totals
Cagayan de Oro	12,000	521,000	124,000					150,000													807,000
Cotabato	36,000	591,000					123,000	141,000													891,000
Dipolog	30,000	433,000														108,000					571,000
Mamburao	47,000	362,000																	71,000	80,000	560,000
Jolo	36,000	416,000										108,000									560,000
Buayan (General Santos)	13,000	616,000													79,000	85,000					793,000
Tuguegarao	38,000	507,000													76,000	97,000					718,000
Iligan	13,000	328,000														98,000					439,000
Aparri	32,000	292,000																			324,000
Daet	31,000	438,000													72,000					103,000	644,000
Kalibo	62,000	437,000													72,000					98,000	669,000
Marinduque	38,000	357,000																			395,000
Calapan	67,000	354,000																			421,000
Plaridel	54,000	331,000	86,000																		471,000
Mactan				445,000						538,000	81,000										1,042,000
Puerto Princesa					22,000	478,000					49,000	46,000									503,000
Bacolod					273,000	490,000	102,000					302,000									1,167,000
Davao						1,347,000	104,000					248,000									1,699,000
Legaspi					68,000	252,000	96,000									133,000					549,000
Butuan					40,000	536,000	99,000									133,000					808,000
Cauayan					24,000	368,000					70,000					102,000					564,000
Surigao					40,000	424,000						92,000									565,000
Misamis (Ozamis)					52,000	327,000															379,000
Romblon (Tablas)					33,000	319,000															352,000
San Jose					57,000	339,000													73,000	80,000	549,000
Calbayog					14,000	387,000															401,000
Masbate					50,000	417,000															467,000
Virac					26,000	397,000															423,000
Naga					40,000	393,000														54,000	487,000
Lahug						33,000															33,000
Basco									11,000	352,000											363,000
Zamboanga									91,000	697,000	95,000					187,000					1,040,000
Iloilo									22,000	385,000	125,000	157,000									680,000
Laoag									54,000	573,000	114,000					92,000					833,000
Roxas									168,000	143,000	70,000					89,000					470,000
Tagbilaran									35,000	415,000											450,000
Lubang									7,000	312,000											319,000
Catarman									6,000	273,000											279,000
Ormoc									26,000	302,000											328,000
San Jose de Buenavista									144,000	331,000											475,000
Siargao										331,000											331,000
Sorsogon										283,000											283,000
Dumaguete													29,000	85,000	75,000					112,000	301,000
Tacloban														383,000	78,000					119,000	580,000
Vigan													42,000	350,000							392,000
Tacurong													56,000	394,000							450,000
Allah Valley														244,000							244,000
Sablayan													74,000	350,000							424,000
Tandag													21,000	300,000							321,000
Tawi-Tawi													5,000	338,000							343,000
Malaybalay													48,000	333,000							381,000
Brookes Point													30,000	364,000							394,000
Bagnio														201,000						73,000	274,000
Malabang																		148,000			148,000
Hilongos																		365,000			365,000
Totals for each column	509,000	5,983,000	210,000	445,000	748,000	6,506,000	524,000	291,000	564,000	4,833,000	584,000	853,000	306,000	3,342,000	452,000	1,094,000	-0-	513,000	144,000	719,000	28,818,000
Totals for each Year				7,147,000				8,068,000				7,034,000				5,193,000				1,376,000	

SECTION IV
AIRWAYS SYSTEM

An airways system comprises the complex of designated controlled airspace, air traffic control services and procedures, aeronautical fixed and mobile communication services, and air navigation and communications facilities that are required for the safe and expeditious flow of air traffic under Instrument Flight Rule (IFR) and Visual Flight Rule (VFR) conditions.

This section of the report is concerned with the Philippine National Airways System and associated operational services. Included is a general examination of the existing airways structure, air traffic control and communication facilities and services, as well as navigation aids and communications equipment, and concluding with recommendations for improvement.

A. Evaluation of Existing System

1. Airway/Route Structure

A two-layer altitude stratification concept is used in the Philippine airway/route system. Domestic airway widths at flight level (FL) 240 and below are 5 nautical miles (NM) either side of centerline. Oceanic routes at FL 240 and below in the Manila Flight Information Region (FIR) commence one hundred NM from the ingress/egress navigational facilities for the domestic airway system, and include the airspace 25 NM either side of the route centerline to the FIR boundary. Airspace designated for high altitude jet routes above FL 245 includes ten NM either side of the route centerline for domestic as well as oceanic routes of the high altitude structure. A triangular section of airspace east and northeast of Jomalig VOR, extending to the FIR boundary, has been designated control area. The floor of controlled airspace in the Manila FIR has been established at 1500 feet above the terrain and 500 feet below the lowest minimum enroute altitude over water.

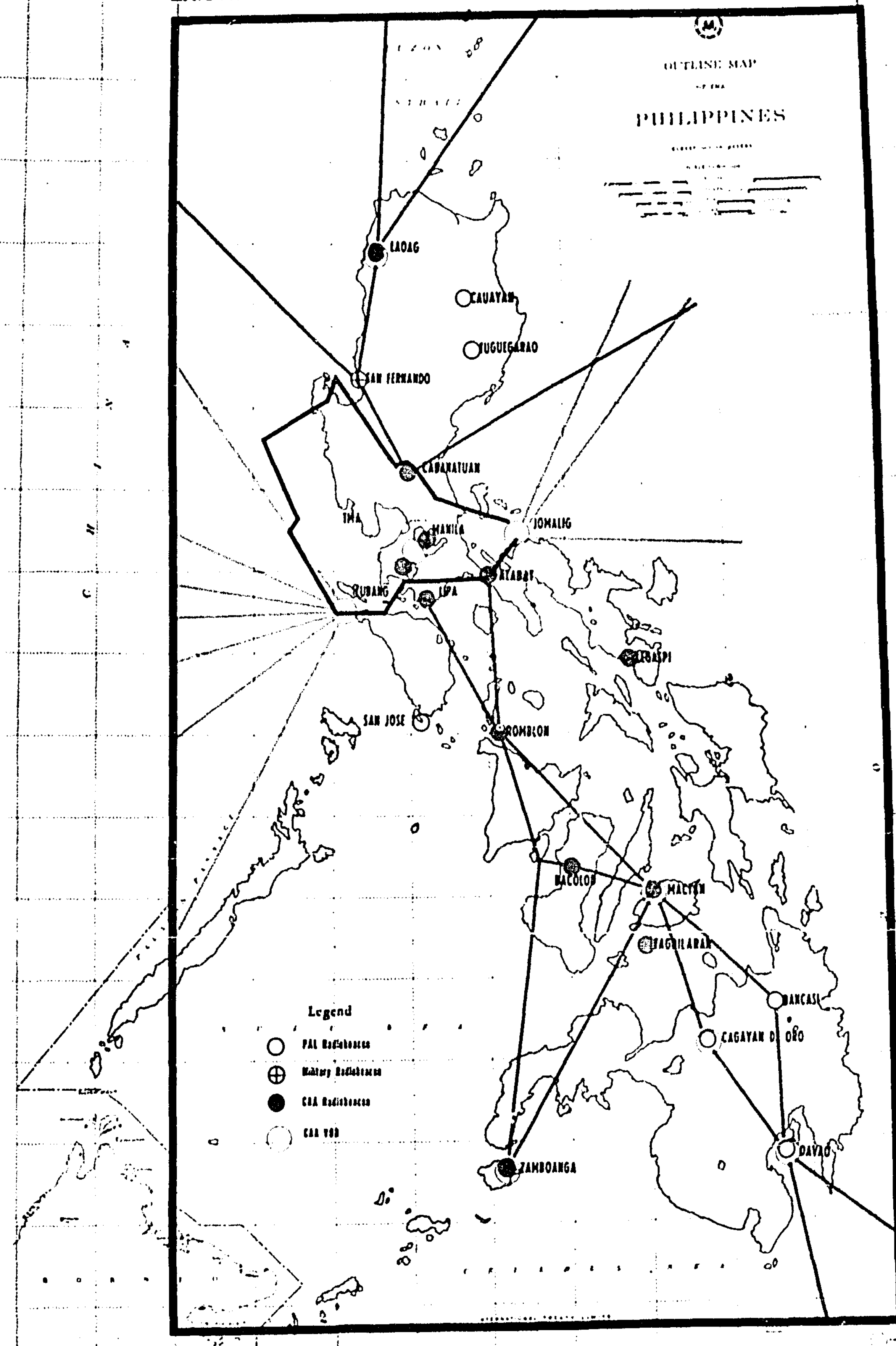
Handling of airspace actions is the responsibility of an Air Navigation Services Coordinating Committee (ANSCC) which was established several years ago by Executive Order No. 203. The Committee was created to determine and correlate user requirements of Air Navigation Service and to coordinate with other agencies in the solution of problems concerning air space matters. Included in their responsibilities is the approval of installations, operation, maintenance, alteration or decommissioning of radio aids to navigation, assignment of radio frequencies, establishment of airdrome and ground aids and the establishment of procedures to insure coordination of military activities affecting civil aviation with the CAA. The ANSCC is composed of the Civil Aeronautics Administrator or his authorized representative as Chairman, and of representatives of the following offices: (a) Weather Bureau; (b) Bureau of Telecommunications; (c) Civil Aeronautics Administration; (d) Philippine Air Force; (e) Radio Control Division, Department of Public Works and Communications; (f) Philippine Air Lines; and (g) such other representatives as the Committee may invite to the Committee Conference as advisors or observers. The Committee is authorized to solicit the regular participation as observers in the Committee of duly authorized representatives of the U. S. Air Force Headquarters, 13th Air Force; Commander U. S. Naval Forces (Philippine); Airline Pilots Association of the Philippines; U. S. FAA; and the International Air Transport Association. These representatives may also be invited to submit recommendations to the Committee on matters of joint interest.

The ANSCC has been generally inactive for approximately the past five years. It was reported to the Team that for the most part, the only meetings of the Committee during this period were held to elect officers. Airspace activity and obstruction evaluation have for sometime been handled by CAA personnel. The CAA is presently attempting to have control of all airspace matters transferred to their Airways Operations Division.

In the existing low altitude system (see Exhibit IV-A) outside of the Manila/Clark AB/Cubi Point NAS terminal areas, one airway is established in the North Luzon area. Another single airway serves the main domestic traffic artery between Manila and Mactan South of the Romblon NDB. A single airway provides controlled airspace on the route from Manila to Zamboanga and likewise for the route from Mactan to Zamboanga. Although a dual airway serves the Mactan-Davao route, the minimum enroute altitudes are 9 and 12 thousand feet, respectively, due to the terrain that must be crossed. Outside of the Manila/Clark AB/Cubi Point NAS areas, the existing Airway system and associated NAVAIDS provide enroute airspace and terminal approach guidance to seven terminals in the Philippines. Two-way traffic flow is utilized on nearly all Airway/Route segments and, in the absence of a basic dual airway system, departing aircraft are assigned crossing restrictions at or near their filed cruising altitude in many instances within or immediately adjacent to terminal areas to insure separation from inbound enroute aircraft. Departure routings within the Manila and adjacent terminal areas afford little latitude in which to efficiently establish aircraft at assigned altitudes prior to joining

161

EXHIBIT IV-A
EXISTING LOW ALTITUDE AIRWAY SYSTEM



162

the airway system without vitally affecting other departure and arrival routes within the area.

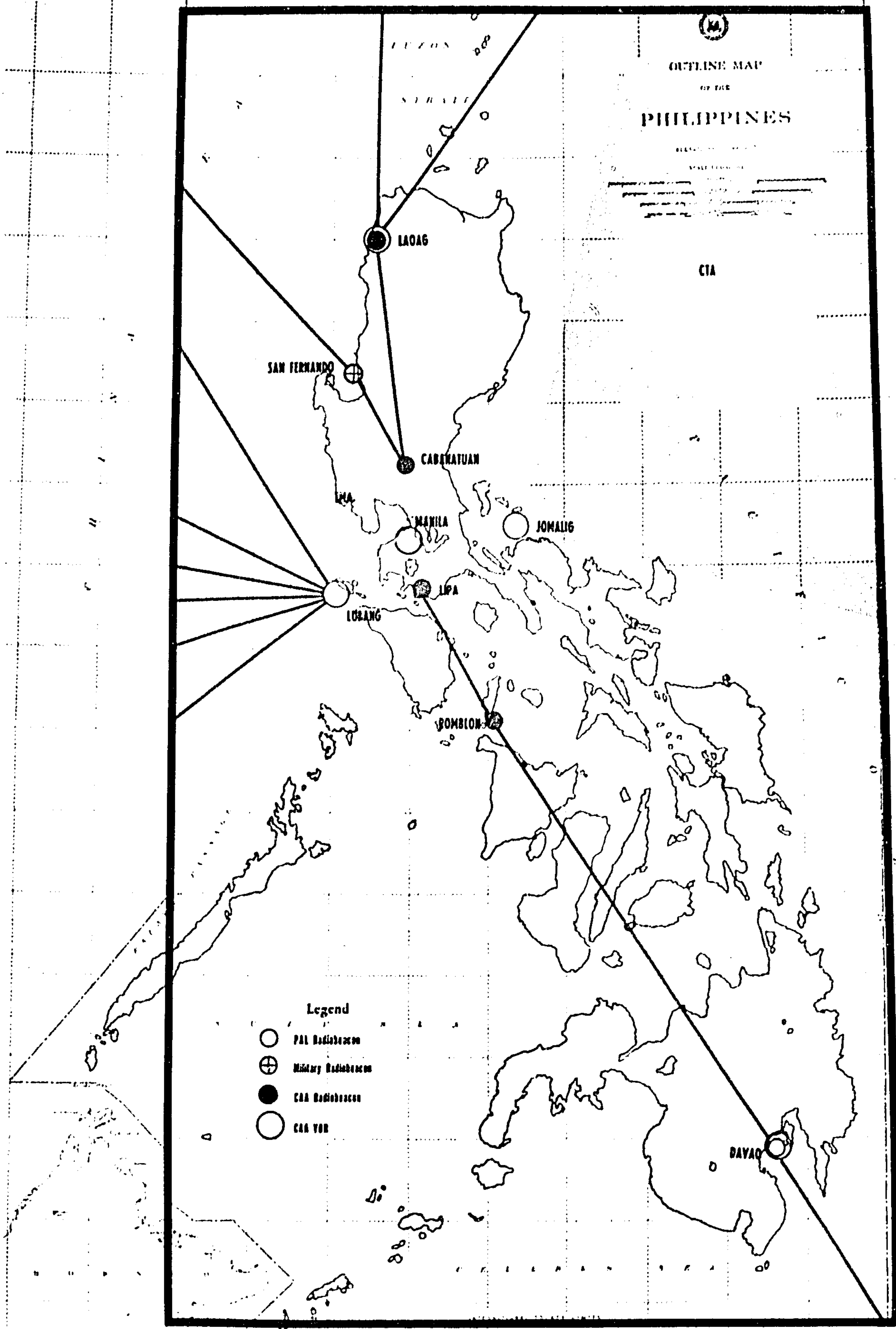
The major portion of international traffic arriving and departing Manila enters or departs the Domestic Airway System via four navigational facilities. Transition from Domestic/Oceanic separation minima for both low and high altitudes occurs 100 miles beyond those fixes. Multiple airway and route convergence at these fixes also compound the congestion of a two-way traffic flow.

The High Altitude Jet Airway/Route System provides several oceanic routes to the west of Manila extending from the Lubang VOR to the FIR boundary. The triangular control area for Oceanic Routes extending East from the Jomalig VOR to the FIR boundary includes altitudes to FL450. North routes to Hongkong (via San Fernando), Taipei, and Okinawa (via Laoag) are also adequately served in the high altitude structure. To the south of Manila, however, only one high altitude airway serves the islands and points beyond. (See Exhibit IV-B)

Few restricted areas have been established in the Manila FIR and these do not interfere with the airway configuration and the movement of air traffic. Several warning areas have been designated in the Manila FIR adjacent to the island of Luzon. Nearly all are located in the area to the west and northwest of the Manila, Cubi Point NAS, and Clark AB terminal areas. Warning areas and restricted areas are assigned for use by all the military branches and various activities, which include both air and surface units, are conducted in these areas. Several designated warning areas west of Luzon involve controlled airspace. A joint use concept of operation is employed to provide the most efficient use of airspace. Warning areas are published on aeronautical charts and in airman information publications, and activated by Notice to Airman (NOTAM) by the primary military agency concerned.

Additional controlled airspace in the form of terminal control areas and control zones has been designated to supplement the low and high altitude domestic airway system previously described. Five terminal control areas of various shapes serve the major airport terminals at Manila, Cubi Point NAS, Clark AB, Mactan and Davao, and these terminal control areas extend upward from 1500 feet above the terrain with the exception of Clark and Cubi Point control areas, which extend upwards from the surface. Control zones have been designated at Manila, Clark AB, Mactan/Lahug, Cagayan de Oro, Davao and Zamboanga. Control zones are generally circular areas of five miles

EXHIBIT IV-B
EXISTING HIGH ALTITUDE AIRWAY SYSTEM



radius, or more, centered on the airport served and extend upwards from the surface. The basic circular area has been modified in some cases by extending the zone two miles on either side of the final approach path, to a distance which includes the area within which an aircraft would normally descend below 1500 feet above the terrain on instrument approach to the airport. No specific standard has been established by the CAA for the amount of air traffic which would justify the establishment and/or designation of controlled airspace. Air traffic control service and controlled airspace have been designated to the extent permitted by the capability of available air-ground communications and the operating personnel made available to the administrator for this purpose.

The airway/route system is based primarily on the use of twelve low frequency Non-Direction Beacon (NDB) NAVAIDS operated by the CAA Six of these NDBs serve as approach aids at five of the major terminal locations. Nine Very High Frequency Omnidirectional Ranges (VORs) operated by the CAA supplement the airway system and serve as approach aids for five airports. At two of these airports (Manila and Mactan), CAA NDBs are also available for approach aids.

Philippine Air Lines operates six NDBs and all are used as terminal approach aids. Two are located at airports which are also served by a CAA NAVAID. Their NDB at Butuan operates continuously, in accordance with an agreement between PAL and the CAA, and provides navigational guidance along two segments of the airway from Mactan to Davao. The rest of PAL's NDBs are operated "upon request" and are normally only available to the company's own aircraft. Four of the PAL NDBs serve airports outside the CAA Airway System.

Various military NAVAIDs at Clark AB, Basa AB, Cubi Point NAS, Sangley Point NS, and Mactan Airport supplement the airway system and provide approach aids for these locations. Military Tactical Air Navigation (TACAN) facilities are presently operating at seven locations; namely, Paredes Air Station, Poro Point, Clark AB, Cubi Point NAS, Sangley Point NS, Lubang and Mactan. Some are temporary installations. Replacement facilities are being installed at Lubang and Mactan. Additional TACAN facilities are being installed at Roxas, Davao and Zamboanga airports. Except for facilities under construction at Mactan, Davao and Zamboanga, TACAN installations are not sufficiently close to CAA VOR.s to be considered as co-located facilities.

NAVAIDs operated by the CAA are generally in poor condition. From the cockpit of several Air Carrier and civil aircraft it was observed that few of the NDBs were operating at sufficient power to provide adequate guidance along the entire portion of airway segments between NAVAIDs. One NDB could not be received more than seven miles from the NAVAID site. Most VOR sites in the system are located too far apart to permit reception at or near minimum enroute altitudes. Satisfactory monitor capability at most VORs does not exist and flight inspection of facilities is not being conducted frequently enough to assure satisfactory operation. At the writing of this report, the Jomalig VOR, which serves as Manila's major ingress/egress point for international traffic to and from the east, has operated in a "test" status for approximately one year awaiting flight inspection.

The "users" are well aware of the unsatisfactory NAVAID situation and all complained of the serious inadequacy of existing facilities. Through personal observation and discussion with several groups, it was noted that the majority of airline and civil flying in the Philippines is accomplished through the use of commercial broadcast stations as a primary means of navigation.

The number of navigation aids operated by the CAA are critically few in number. A review of air traffic activity statistics for national airports confirms that well over half of the 76 airports operated by the CAA should be served by adequate navigation aids, communications, aviation weather service, and air traffic service to permit IFR flight to and from these terminals.

2. Air Traffic Control (ATC)

The Philippine CAA is responsible for providing air traffic facilities, services and procedures for aircraft flying within an airspace designated by the International Civil Aviation Organization (ICAO). This area, the Manila Flight Information Region (FIR), encompasses almost one million square miles of lateral airspace and must today be considered the crossroads of the majority of air movements in Southeast Asia. Although air traffic activity records were only available for the past two years, the Team was informed that air traffic in the Manila FIR has increased in excess of 250 per cent since 1960.

Two area control centers (ACCs) have the responsibility for providing ATC service to Instrument Flight Rule (IFR) and Special Visual Flight Rule (VFR) aircraft within controlled airspace in the Manila FIR. The Cebu ACC, or sub-ACC as it is called by the CAA, is located in the Lahug airport control tower at Cebu and is responsible for control of aircraft in the central Visayan island and Mindanao areas at FL 280 and below. The balance of controlled airspace in the Manila FIR is the responsibility of the Manila ACC located at the Manila International Airport. Geographical boundaries of the Manila FIR and Cebu sub-ACC area of responsibility are depicted in Exhibit IV-C.

Within the Manila FIR, responsibility for approach control (APP) service to IFR and special VFR aircraft has been delegated to five CAA and two military terminal area traffic control facilities as follows:

Facility	Airports
Manila Control Tower	Manila International Airport and Sangley NAS
Mactan Control Tower	Mactan and Lahug Airports
Cagayan de Oro Control Tower	Cagayan de Oro Airport
Davao Control Tower	Davao Airport
Zamboanga Control Tower	Zamboanga Airport
Clark Radar Approach Control[1/] (RAPCON)	Clark AB and Basa
Cubi Point Control Tower[1/]	Cubi Point NAS

Aerodrome Control (ADC) Service is provided by seven CAA and five Military control tower facilities at the following airports:

Baguio	Fernando AB[1/]
Clark AB[1/]	Lahug
Basa AB[1/]	Mactan
Cubi Point NAS	Cagayan de Oro
Sangley Point NAS[1/]	Davao
Manila	Zamboanga

For purposes of this report only the two ACC, five APP and seven ADC air traffic facilities operated and maintained by the CAA are discussed.

a. Area Control Centers

(1) Manila ACC

The facility operates in an older building on the Manila International Airport. Much of the facility's original equipment was installed by the US CAA in the late 1940's. It has since been supplemented by equipment provided under the Colombo Plan, by US AID and the US military. A surplus 102A Switching

1/ Military facilities.

167

System was installed in 1964 to provide communications.

The ACC's area of jurisdiction is divided laterally into four manual positions, i.e., two oceanic and two domestic. The east and west portions of the FIR are each served by one oceanic position and one domestic position. One flight data position serves all control sectors. 102-A communication terminations are identical at all control sectors and the flight data position except that flight data does not have transmit/receive capability on the facility's one UHF and two VHF frequencies. One additional position provides Aircraft Movement Information Service (AMIS) within the entire Manila FIR for air defense purposes. The four control sectors are individually recorded through use of four "belt type" tape recorders. The flight data and AMIS positions are not recorded.

Air traffic activity recorded by Manila ACC during the period from January 1, 1965 through December 31, 1966 follows:

IFR AIRCRAFT OPERATIONS

	Air Carrier	Military	Civil	Total
Calendar year 1965	40,329	63,905	836	105,070
Fiscal year 1966	44,082	86,700	1,104	131,886
Calendar year 1966	43,775	103,295	887	147,957

IFR AIRCRAFT FIX POSTINGS

	Air Carrier	Military	Civil	Total
Calendar year 1965	161,316	255,620	3,344	420,280
Fiscal year 1966	176,328	346,800	4,416	527,544
Calendar year 1966	175,100	413,180	3,532	591,812

During this two-year period, total aircraft operations increased 29% and total aircraft fix postings increased 41%. Significantly, military aircraft operations and fix postings increased 62% during the same period and in December 1966 accounted for 70% of the center's activity. Accelerated U. S. military operations caused much of this traffic increase.

The facility should be capable of providing area control service to

168

aircraft operating in the controlled airspace for which it is responsible, however, many deficiencies exist and actual capability of the facility falls considerably short of today's user requirements in the existing international and domestic system. Major deficiencies are in the area of communications, lack of a sufficient number of qualified journeyman personnel, and the crowded facility layout which has not permitted expansion to meet the needs of rapidly increasing air traffic volume.

Some years ago the CAA recognized the fact that increasing air traffic was fast exceeding the capabilities of their Area Control Centers and other air traffic facilities. In 1959 the Philippine Government began negotiations with Export-Import Bank for a sizeable loan to improve facilities at Manila. A new Manila ACC was part of this project. Its specifications were conceived in the early 1960's and construction of the facility started in 1962 but for a variety of reasons it is only now approaching completion. The project is being accomplished under a turn-key contract.

The new Manila ACC has several deficiencies. Except for an additional flight data position, sectoring and console arrangement provide essentially the same physical capability as the existing center, i.e., two oceanic sectors, two domestic sectors and an Aircraft Movement Information Service (AMIS) sector. There is adequate room for expansion, however.

The major deficiency of the new facility lies in its lack of a flexible communications switching system. With the present installation, air ground frequencies and distant interphone lines are on a common control panel at each sector and cannot be used simultaneously by two persons working the sector. Only one panel, with 12-channel capability, is installed at each sector to serve the two positions of operation. The panel works basically like a transmit/receive radio control panel. When a receiver is selected in the controllers headset, the transmitter for that frequency/incoming line is also selected. In order to monitor a frequency/incoming line without transmitting, the select key must be moved to the monitor position and monitoring is then via a common speaker. Push button signalling from the ACC to distant stations is possible through the use of a tone transmitter, and a distant station can signal the ACC through the same process but the tone will sound simultaneously at all consoles at which the line terminates and selective signalling is not possible. If the transmit/receive selector key is in the neutral position the transmitter is not selected and the receive signal is limited to the visual monitor of a type 47 light bulb. Select keys for standby transmitters and receivers are also on the panel thus reducing the availability of channels per sector. Direct

169

access to monitor both sides of a conversation, is not possible among sectors, and no provision exists for direct communications among sectors, except by use of the Teletalk. Additionally, no provision exists for coordinator positions.

Local interphone lines to adjacent facilities (Manila ADC and APP, international and domestic air/ground communications, Weather Bureau, tape relay center, maintenance equipment room, etc.) are not included in the common control panel described above. These are accommodated in a separate voice call intercom system. One common master control unit, including speaker, is installed at each console in the ACC. The system does not tie in to the controllers transmit/receive headset and is not recorded.

The nature of the air traffic control system is such that the expeditious and orderly control of air traffic depends upon an effective communications system. To safely separate IFR aircraft and furnish essential services, controllers must have the capability to rapidly and accurately coordinate and exchange aircraft movement data and related information. Many of the important basic requirements for efficient ACC sector operation are not satisfied by these two communications systems. The following is a summarization of the deficiencies described in the foregoing paragraphs:

1. Lack of selective signalling to individual sectors for incoming calls on either system.

2. The receiver and transmitter for each radio frequency are on the same panel key and cannot be controlled separately.

3. Interphone lines on individual 12-channel transmit/receive panels may not be used simultaneously by one controller while radio frequencies are being used by another.

4. Local coordination circuits on the voice call intercom system are not recorded.

5. Sector transmit/receive monitor capability is limited and not adequate for training of controller personnel.

6. Coordination between sectors cannot be accomplished by use of the 12-channel transmit/receive equipment.

7. During periods of high activity an abnormally high noise level and associated interference will occur through use of the voice call and speaker monitor system and will most certainly result in missed calls, repeats, etc.

As indicated before, specifications for the new Manila ACC were submitted several years ago prior to the marked increase in traffic in recent years. The CAA is aware of the many deficiencies in the new facility and that its electronic capability is considerably below that of the existing ACC. They plan to accept the new ACC when it is completed and attempt reengineering and modification to correct the deficiencies prior to moving operations to the new facility.

(2) Cebu Sub-ACC

This facility is located in the control tower at Lahug Airport. It is composed of a single sector, with seven strip bays, installed on top of the console desk at the left side of the tower cab.

Air traffic activity recorded by the Cebu Sub-ACC during the period from January 1, 1965, through December 31, 1966, follows:

IFR AIRCRAFT OPERATIONS

	Air Carrier	Military	Civil	Total
Calendar year 1965	24,514	5,157	525	30,196
Fiscal year 1966	21,073	8,841	449	30,363
Calendar year 1966	19,929	10,362	425	30,716

IFR AIRCRAFT FIX POSTINGS

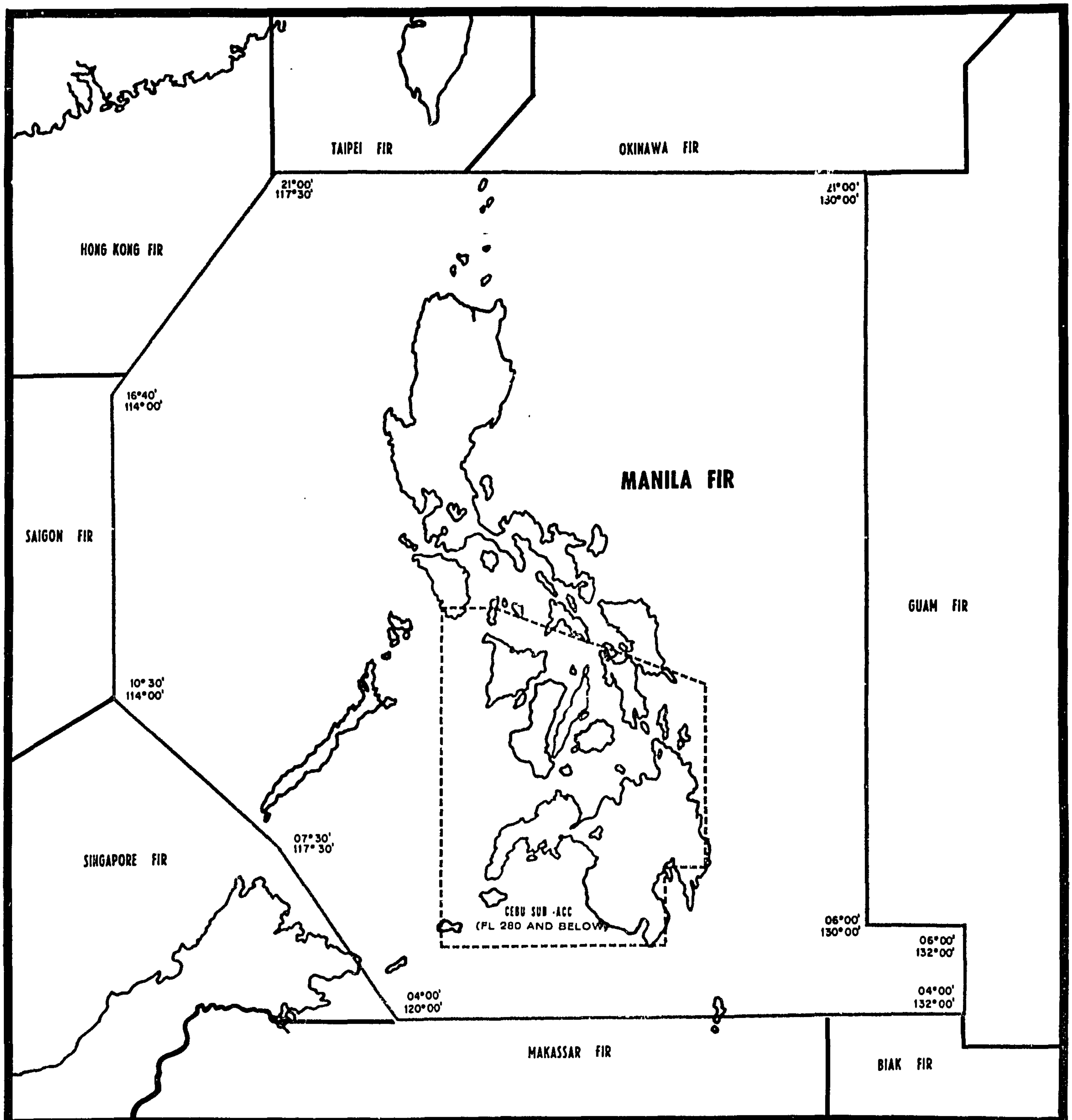
	Air Carrier	Military	Civil	Total
Calendar year 1965	53,087	11,103	1,154	65,344
Fiscal year 1966	49,085	19,083	1,205	69,373
Calendar year 1966	48,042	25,070	1,512	74,624

During this period the number of air carrier IFR operations and IFR fix postings declined. Actually, total air carrier activity significantly increased at most terminals in the facility's area of responsibility. Thus these figures indicate that progressively fewer air carrier aircraft utilized the Cebu Sub-ACC's IFR services during the reporting periods. Civil IFR traffic shows a steady increase. Military activity more than doubled and represents the increase in U. S. military traffic through Mactan airport in support of the war in Vietnam.

Due to an extreme lack of adequate mobile and fixed communications capability, the facility cannot satisfactorily provide area control

171

EXHIBIT IV-C
MANILA ACC AND CEBU SUB-ACC AREAS OF RESPONSIBILITY



service to aircraft operating in the controlled airspace for which it is responsible. For example controllers have not been able to communicate with aircraft on one civil VHF frequency for several months and must use the Lahug ADC frequency for this purpose. Physical and electronic equipment have deteriorated to the point that virtually nothing is economically salvageable.

The CAA has planned, and money has been appropriated and released, to move the Cebu Sub-ACC from Lahug to Mactan Airport. However, for various reasons, this project has not yet passed the planning stage.

b. Aerodrome Control and Approach Control Facilities

A new control tower structure was provided for Manila International Airport during construction of the present airport terminal building and the CAA commenced operations in the new facility November 24, 1966. Local, ground and approach control services are provided from separate control positions. Equipment in the tower cab was installed under the same contract as the new Manila ACC and the facility is in good condition. A separate room for approach control including new console and associated equipment is located on the fourth floor of the terminal building, but has not yet been commissioned.

The same type transmitter/receiver control panel as installed in the new Manila ACC is used by each control position in the tower cab and constitutes the major deficiency of the facility. Receivers and transmitters for each frequency are on the same key and cannot be controlled separately, thus restricting controller flexibility in the manipulation required in the normal use of ADC and APP frequencies.

Through monitoring on several occasions, it was also noted that transmissions from the Manila tower and approach control positions were difficult to understand. They appeared to be over modulated and signal quality was poor. Several users contacted also complained about this deficiency. Incoming signals received in the facility are also noisy and distorted. During periods of heavy traffic considerable interference results from the large number of missed calls and repeats required by both controllers and pilots.

Mactan Control Tower was built in 1961 as a Philippine Air Force (PAF) installation. When the U. S. Air Force came to Mactan in May 1965, an agreement was reached with the PAF which authorized the USAF to augment the PAF tower complement. On April 23, 1966, the CAA assumed operational responsibility for Mactan control tower and USAF controller's duties have been restricted since that time. The

Mactan AB has become a joint-use airport and is now designated as an alternate international civil airport. Each of the three domestic air carriers serving the Cebu area now operate from the Mactan airport, the last two having transferred operations from the Lahug airport in Cebu in early 1967. In December 1965, the USAF reached an agreement with PAF which authorized the USAF to maintain the electronic equipment associated with Mactan tower and this arrangement still exists. The USAF recently installed a new console in the tower cab. They have augmented other equipments and indicate they plan to continue to assist in this manner in the future. CAA controllers provide local control and approach control service from the tower cab. USAF provides airport surveillance radar (ASR) and ground controlled approach (GCA) radar service "on request" from mobile equipment.

Mactan tower does not have a discrete frequency for approach control. Local control, ground control and approach control functions are all handled on one civil and one military VHF frequency. The situation is further complicated by the fact that Lahug tower and the Cebu sub-ACC, some six miles distant, also operate on the same civil frequency. Although air carriers can and do use the military frequency at Mactan, other civil aircraft do not have this capability. Occasionally, aircraft receive instructions intended for another aircraft and clearances are often not received by pilots due to one facility interfering with the other. This situation has apparently even resulted in an occasional incident where aircraft have landed at the wrong airport. In an attempt to alleviate the problem, maintenance people at Mactan have reduced the power on their civil VHF transmitter. The interference problem still exists, however, and the dangerous aspects of this problem are obvious. Discrete civil frequencies for the Mactan and Lahug towers and Mactan approach control are sorely needed.

Compared with other CAA facilities outside the Manila area, working quarters in the Mactan tower, although crowded, are otherwise quite satisfactory and working conditions have apparently improved considerably in recent months.

ADC for Lahug airport, Cebu, is provided by the CAA from an old steel structured tower on the airport. The facility is generally in a poor state of repair and much is needed to put it in shape. As indicated previously, the Cebu Sub-ACC is also located in this tower cab although plans are to move it to Mactan airport in the near future.

The other ADC facilities operated by the CAA are at Baguio, Cagayan de Oro, Davao, and Zamboanga airports. Approach control services are also provided at the latter three locations. Condition of these facilities varies from poor to fair. Major deficiencies are again lack

174

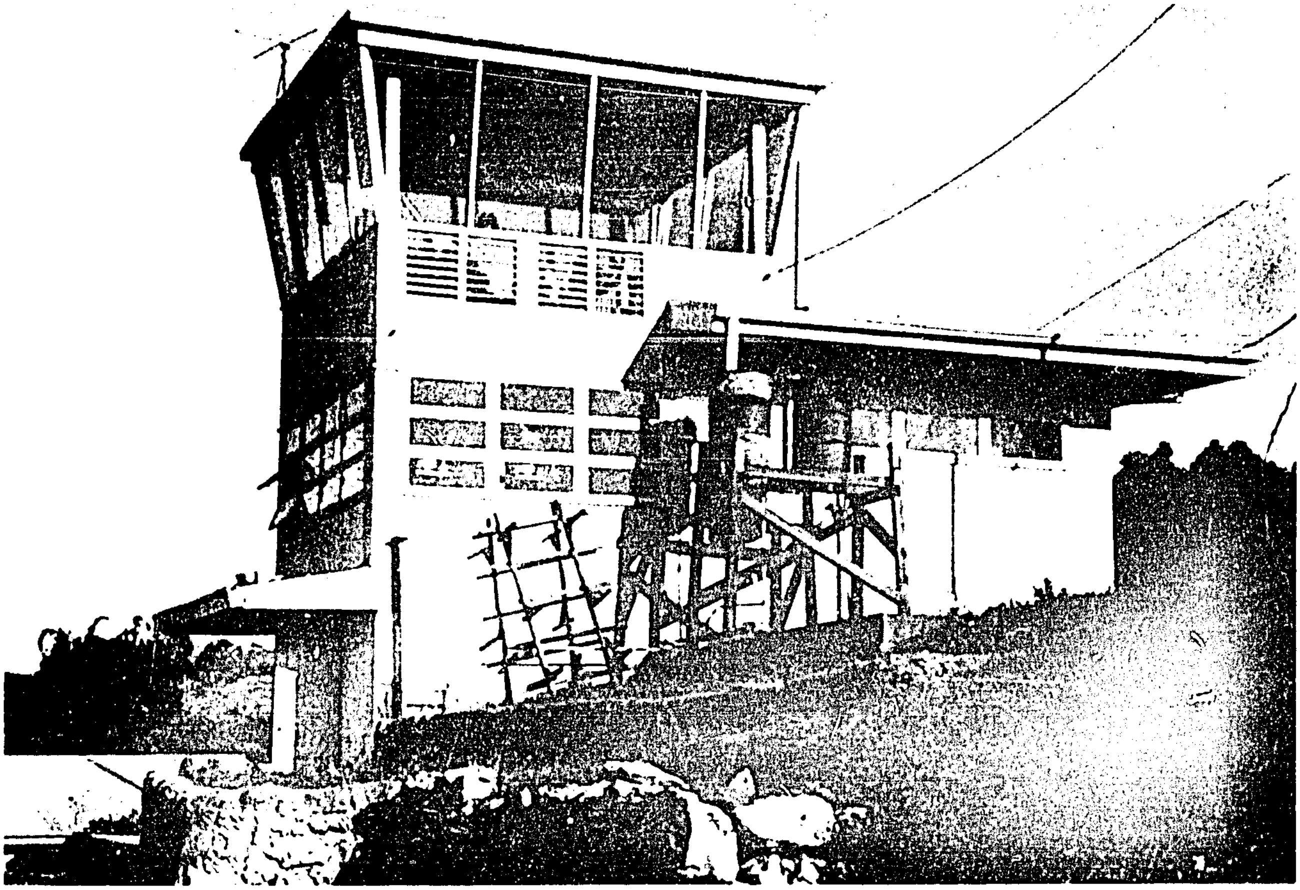
of adequate fixed communication service capability and in many cases lack of backup equipment for mobile communications equipment. Discrete communications equipment and frequencies are not available for the approach control function at either of the three locations that provide APP service and interference with the ADC function often results The Davao facility is sited too close to the runway and operating quarters are severely cramped. The Zamboanga tower cab is too low to permit a good view of the airport operating area. Several facilities lack altimeters and adequate wind direction and velocity equipment. At others there is no record that existing equipment has been calibrated since original installation. Many instances where service to the "users" was severely hampered because of extended outages of electronic and other equipment were reported to the survey team. The usual reason given was the non-availability of spare parts.

At Bacolod, the third busiest airport in the Philippines, a control tower was planned some time ago. Construction was scheduled to start in December 1965. Monies appropriated for this purpose were not released, however, and ADC service is still not available. A complement of controllers have been providing airport advisory service to arriving and departing traffic since September 1965, from an old building that used to house the transmitters for a Philippine Air Lines radio beacon facility. Full ADC and APP service is definitely needed at this airport.

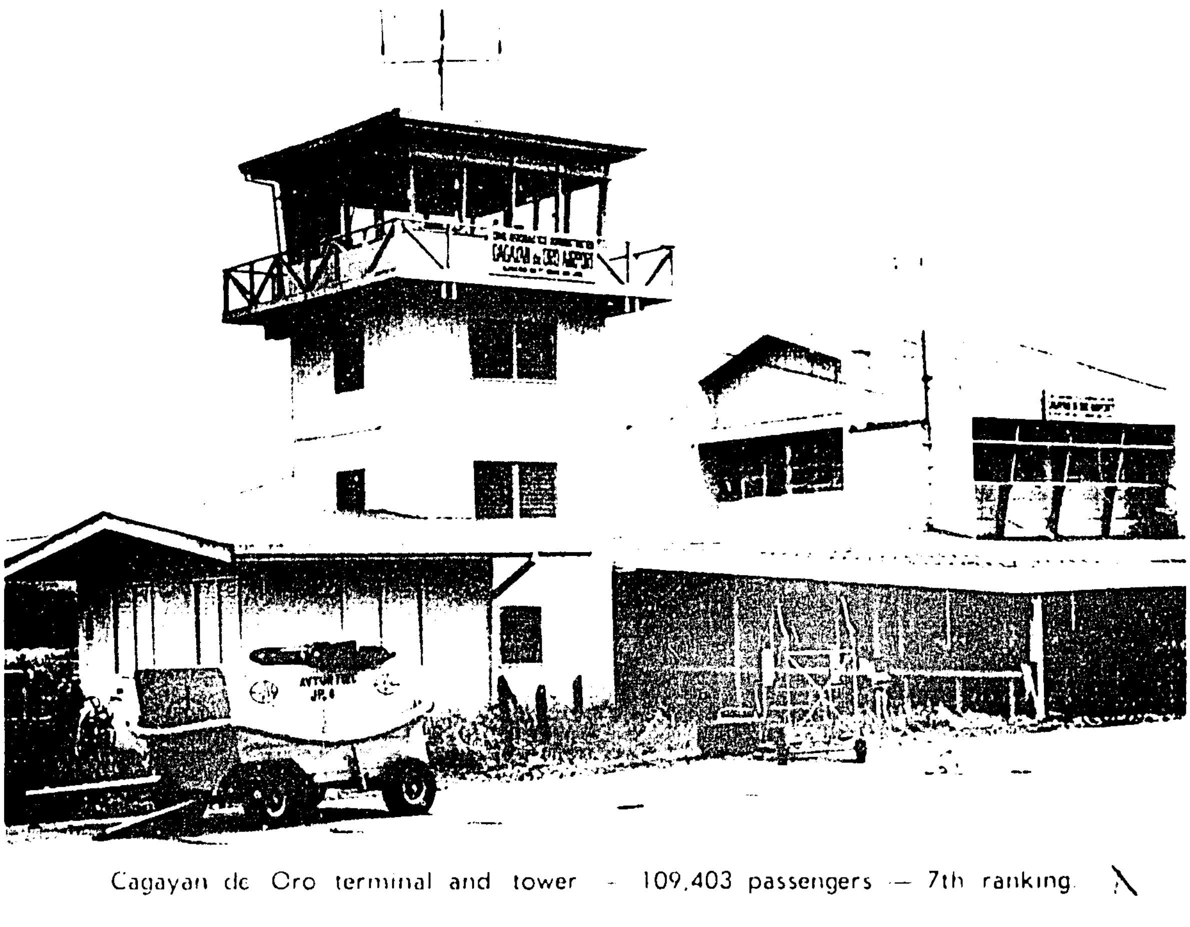
c. Quality of Service

During this survey, all CAA air traffic facilities were visited by members of the Team. Operations and procedures were observed and discussed with controllers and supervisory personnel as well as facility and Airways Operation Division management personnel. Air traffic service provided by the various facilities was extensively monitored from the cockpit of air carrier, government and civil aircraft and through use of portable VHF receivers.

Certain safety standards are prerequisites to the air navigation and air traffic processes. Navigation aids and communications equipment must be adequate, accurate and reliable, and air traffic service must be provided in a safe manner. A good portion of the communications equipment and most navigation aids operated and maintained by the CAA do not meet these safety standards. Many NAVAIDs are not monitored properly and flight inspection of the system is not accomplished as required to ensure satisfactory operation. Air traffic facilities are further condoning this compromise to safety bv using this communication equipment to issue clearances for aircraft to proceed with reference to these NAVAIDs under instrument flight rules. In



Baguio control tower



Cagayan de Oro terminal and tower - 109,403 passengers — 7th ranking.

event of an accident, the legal ramifications of such practices are quite obvious.

Excessive delays to air traffic are common throughout the system during busy periods, particularly at the major terminals. Air traffic delays to aircraft may occur in many ways. For example, an inbound aircraft that is not permitted to start enroute descent early enough to be at the appropriate altitude for approach to an airport is delayed the length of time it subsequently takes the pilot to descend after he reaches his destination on the appropriate approach fix. Air traffic procedures and/or clearances that restrict departing aircraft by requiring them to climb to certain altitudes and then come back over the navigational facility at the airport, or to shuttle prior to crossing specific navigational fixes also delay aircraft the time it takes to perform the required maneuvers. Increased segregation of departure routings from those assigned to arriving traffic would do much to speed up the flow of traffic and reduce the amount of coordination required to keep aircraft separated. Initial steps have been taken along this line for departures from the Manila International Airport and some other terminal areas. However, many terminal arrival and departure procedures still need much improvement.

Two or more controllers in one facility and controllers in separate facilities must coordinate their activities and keep each other informed regarding air traffic movements within the areas affected by them. This action must be accomplished in advance of the flight of the aircraft and any delay in performing this activity often results in a direct delay to the aircraft concerned. If available procedures do not permit the continuous and smooth flow of traffic during busy periods, delay factors are introduced and tend to "add up" for subsequent aircraft in the system.

Lack of adequate CAA equipment and communications capability is another basic reason for many of the delays and deficiencies in the present system. At many locations the controllers just have inadequate tools to work with. Much of the time defective equipment takes an abnormally long time to repair or replace. Adequate backup aeronautical mobile and fixed communications equipment does not exist at several locations. Unreliable circuits hamper coordination and passing of aircraft movement information. Most of these deficiencies are directly related to a critical shortage or complete lack of spare parts and test equipment and failure to maintain adequate standards of performance. At one busy location unsatisfactory arrangements and relationships between Airways Operations and Airways Engineering personnel have contributed to serious misunderstandings and extended periods have occurred when equipment did not perform properly if at all.

Given the proper tools in the form of adequate equipment and procedures, the controller must be capable of performing the job. Mistakes that occur in the provision of air traffic service are extremely dangerous, and under certain circumstances they have unfortunately been measured in terms of loss of life and property. The Team observed many examples of excellent application of air traffic control procedures. However, many examples of below average and unsatisfactory procedures and provision of service were also noted. Lack of standardization in communications practices and in the application of procedures and techniques were prevalent throughout the system. Lack of adequate coordination standards exist and in some instances complete absence of basic coordination processes are being condoned. Many letters of agreement among facilities are out of date and procedures therein obsolete. It was also observed that controllers in many cases do not follow procedures contained in current agreements. Application of air traffic control is a complex, dynamic process with constantly changing perspectives. Close coordination with other controllers in accordance with established standards is one of the most important aspects of a controller's duty and personal attitudes or other factors cannot be allowed to interfere with this.

From personal observation and discussions with facility administrative personnel, it is apparent these deficiencies are directly related to a shortage of well-trained and qualified control personnel. The CAA operates an ATC training school which has adequate space and well equipped area control and approach control laboratories. In the past, this school has devoted most of its attention to teaching newly hired personnel the basic and elementary processes of air traffic control, consequently, graduates must still be considered trainees. During the past five years the CAA has conducted three of these basic certification courses (with a total of 94 graduates) and the fourth is now in progress. After completing this basic course the individual must devote a considerable length of time in advanced "on-the-job" training under expert instructional supervision to become a rated journeyman controller. At best, it normally takes a minimum of two to three years to accomplish this since most new employees have little if any previous aviation experience. While CAA traffic facilities generally have their authorized personnel complements filled, we found that "on-the-job" training in these facilities is not being conducted to the degree necessary to sustain a qualified complement of control personnel. For example, only 16 out of the current complement of 27 controller II (journeyman) and senior controllers in the Manila ACC have area ratings. Only 8 controllers in the ACC have been area rated in the past three years. In Manila tower, only one of the 10 controller II and senior controllers has an approach control rating. From information we have received apparently no one has received an approach

X 178

control rating in the facility during the past five years.

An aggressive, properly oriented training program is absolutely necessary to properly qualify existing non-rated and future control personnel for performance of safe air traffic services.

Saturation of the CAA's present air traffic system has already been reached. Military stopgap projects such as preferential international routing, traffic tunnelling concepts, and establishment of the Southeast Asia Military Altitude Reservation Facility have only been partially effective in maintaining a compromise to permit the flying of civil aircraft into, over, and through the Manila FIR. However, the present system will not support many additional stopgap projects and immediate action is required. Civil air carriers and International Air Transport Association (IATA) have publicly expressed alarm concerning the problems they are experiencing with the CAA's overloaded ATC system. During our contacts with the domestic airlines, civil aviation and PAF operational people, each were quite emphatic in their criticism of the CAA's capability to handle traffic expeditiously and safely in the existing airway system.

Extended delays to IFR aircraft are common and operational flight hazards and less than minimum separation incidents are taking place with increasing frequency. We are deeply concerned over the number of such occurrences personally observed by the Survey Team and reported by the various aviation interests contacted. The present airway, communications, and air traffic system does not function in a manner that would be recognized by any major ICAO subscriber nation.

3. Communications

The CAA operates ten Airways Communications Station (ACS) facilities. Table IV-1 lists these stations and indicates the primary and backup (or standby) aeronautical mobile service (air/ground communications) and aeronautical fixed service (point-to-point communications) capability of each.

Similar to Air Traffic Control facilities, many Airways Communications Stations do not have adequate back-up or standby equipment for mobile and fixed communications. When extended outages occur due to lack of spare parts, communications services are seriously hampered.

There are two Area Control Centers (ACC), seven Aerodrome Control (ADC), and five Approach Control Facilities (APP). To properly

Table IV-1

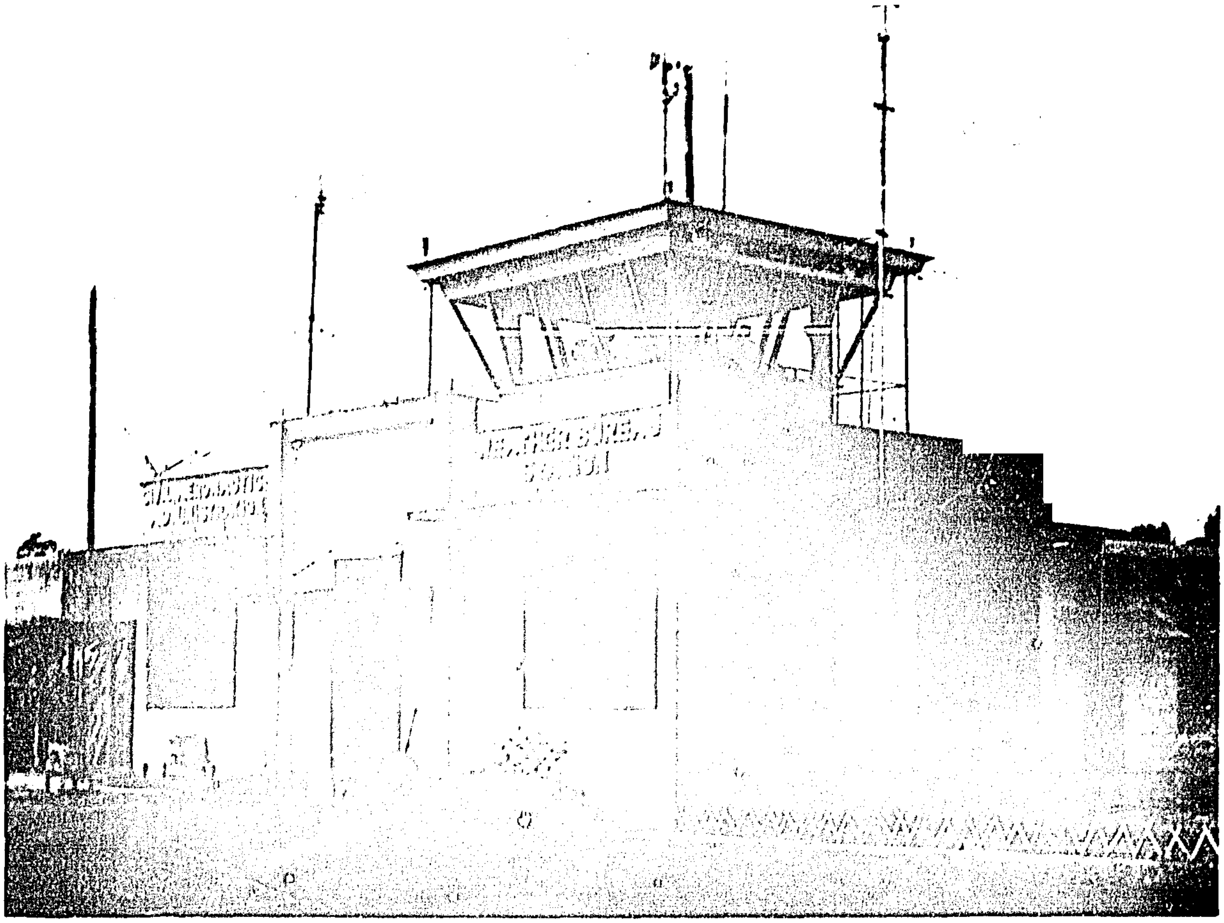
EXISTING COMMUNICATIONS FACILITIES

	MOBILE				FIXED					
	VHF	(Stby)	HF	(Stby)	HF	(Stby)	CW	(Stby)	Radio Teletype	(Stby)
Laoag	x	x	x	-			x	x		
Baguio							x	x		
Manila			x	x	x	x	x	x	x	x
Legaspi	x	-	x	-			x	-		
Virac			x	-			x	-		
Cebu			x	-	x	-	x	x	x	x
Tagbilaran	x	-	x	-			x	-		
Bacolod	x	x			x	(x)				
Romblon	x	-	x	-	x	-	x	-		
Zamboanga			x	x			x	x		

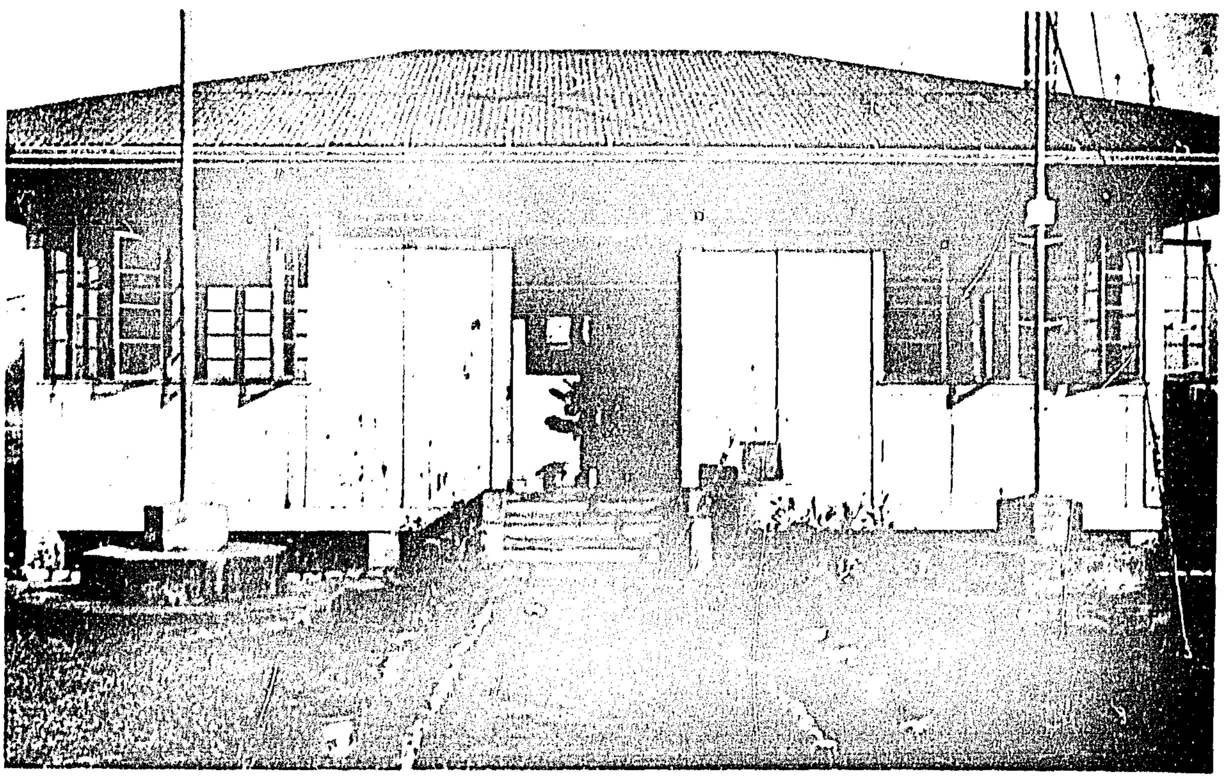
(x) Receiver only

perform their function, each must necessarily be equipped with adequate Aeronautical Mobile and Fixed Service Communications. As indicated in Section IV A-2, many deficiencies exist in the communications capability of these facilities. All but one of the control towers utilize 118.1 mHz for Air-Ground VHF communications. APP functions at four locations and the Cebu Sub-ACC also use this frequency. The five ACS facilities that have VHF capability are also on the same frequency. Congestion and interference are prevalent a good portion of the time and particularly during busier traffic periods. From jet altitudes it is often extremely difficult if not impossible to work individual facilities on 118.1 mHz because of the number of aircraft and ground stations using it. It is a basic requirement that ACC, ADC, APP and ACS service functions be provided on discrete frequencies. The importance of air traffic clearances, advisories, and aircraft movement information is such that all possible interference must be eliminated. A requirement also exists for discrete VHF frequencies within each of the ACC, ADC, or APP functions when two or more facility's areas of radio coverage overlap.

Wherever possible, air-ground communications requirements for enroute purposes should be satisfied by the use of Very High Frequency, however, because of the lack of Airways Communications Stations, and distance and terrain problems involved, particularly in Mindanao, it will be necessary to use High Frequency (HF) for some time to come.



Legaspi airway communications station and Weather Bureau facility. In spite of its appearance this facility does not provide aerodrome traffic control service. Legaspi, with 82,417 passengers in 1965, ranks 10th in the nation.



Laoag airway communications station and airport Weather Bureau station

Several of the existing Airways Communications Stations lack a VHF frequency for Air-Ground Communications and 6619.5 kHz is being used for this purpose. The frequency is quite congested and considerable interference results, particularly from the users' standpoint. This is further compounded by the present practice of frequently using 6619.5 kHz for point-to-point communications. The Cebu Sub-ACC reported they rarely are able to work aircraft on the frequency because of interference from other stations. Although normally satisfactory during the daytime, 6 mHz reliability is well below acceptable standards much of the time at night. Transmissions from stations in Communist China also cause considerable interference and often render the frequency unusable for extended periods during night and early morning hours. Several stations reported the reliability of this frequency does not normally exceed 60%.

The only voice frequency presently used for point-to-point communications is 6700.5 mHz. Reliability of this frequency is reported as generally satisfactory in the Luzon and Central Visayan areas. Continuous wave (CW) frequencies are also available at some stations. Because of inherent propagation problems and relatively short distances between stations, the 6 mHz frequency does not provide satisfactory point-to-point communications in the Mindanao area. This frequency is also being utilized at various locations by Airways Engineering personnel for maintenance coordination and other administrative traffic. Congestion and interference exist now and will further increase as more stations are added to the system.

In accordance with ICAO standards, it is a requirement that reliable point-to-point voice circuits exist between the Manila ACC and adjacent ACC's to facilitate the transfer of flight data, accomplish coordination, etc. Without the interchange of flight data on all aircraft movement, an area controller is unable to provide the air traffic service he is responsible for. He cannot provide adequate service to aircraft about which he lacks sufficient information. Even more serious are the aspects involved with providing service to known traffic without sufficient information concerning other aircraft which may be occupying the same airspace.

The situation described exists between Manila ACC and the Cebu sub-ACC. The interchange of flight movement data is frequently not accomplished, or transferred too late to be of use. The USAF has provided SSB capability between the two facilities; however, transfer of control messages on many aircraft are not being received until they are already in the receiving ACC's area.

The same general situation, i.e., lack of adequate point-to-point voice circuits, exists among both centers (Manila ACC and Cebu Sub-ACC) and the ADC, APP and ACS facilities in their respective areas of responsibility. The same condition exists between the Manila ACC and some of the oreign Area Control Centers responsible for Flight Information Regions adjacent to the Manila FIR. Again, in each case the interchange of flight movement data is frequently not accomplished or is transferred too late to be of use. Unreliable point-to-point communications is thus a major contributing factor to a dangerous situation.

4. Navigational Aids and Communications Equipment

The majority of electronics equipment operated by CAA for domestic airway service is World War II surplus that was installed by the USCAA in the late 1940's. A few items of air/ground equipment and some test equipment were provided by Australia under the Colombo Plan in the late 1950's. The VORs, other than the one at Manila, are all Collins type 401's and were installed in the late 1950's. Due to age of the majority of the equipment, spare parts are a Maintenance and performance standards do not exist for several reasons, principally because of inadequate test equipment, and lack of spare parts. Tools and working equipment for most domestic facilities are, for all practical purposes, non-existent.

It is not the intent of this report to criticize the use of old equipment which is presently rendering a semblance of service. Indeed radio communications equipment seldom becomes obsolete until a different mode of signal emission comes into being. Radio transmitters and receivers, when properly maintained can render the same service intended by the manufacturer almost indefinitely.

The Team views with deep concern the fact that electronics equipment owned and operated by the CAA in the Philippine Airways System has reached its present state of deterioration simply through lack of a proper maintenance program. This lack of maintenance of all sorts of equipment seems to be common to the entire Government sector. On the other hand, the Private sector is generally doing an admirable job despite supply problems. One example close at hand is the excellent manner in which Philippine Air Lines maintains their communications equipment at the provincial locations and it is interesting to note that the PAL equipment in most cases is of World War II vintage similar to that utilized by CAA.

It would be redundant to attempt an extensive analysis of factors contributing to the lack of maintenance of things in the Government sector, but without wishing to belabour the subject unduly we would like to itemize briefly those deficiencies which have been repeatedly observed and seem to be most applicable to the CAA.

1. Lack of Government support of the CAA's activities in budgetary matters.

2. Inadequate warehousing and distribution of spare parts.

3. Inability of CAA to keep highly qualified technicians due to low salaries.

4. Absence of a compulsory technician training program.

5. Absence of an effective field management program. This involves regular field inspections by headquarters personnel, and closer supervision of field employees activities.

6. Poor morale on the part of field employees due to extensive delays in filling requisitions for repair parts, and general over-all lack of attention to needs of technicians in the field.

7. Almost total absence of test equipment and tools.

8. Lack of appreciation for uniform standards of performance.

At some locations we found harmonious relations to exist between maintenance and operations personnel but, conversely, we also encountered facilities where they were openly antagonistic to each other. At the latter locations, the poor quality of service was obvious.

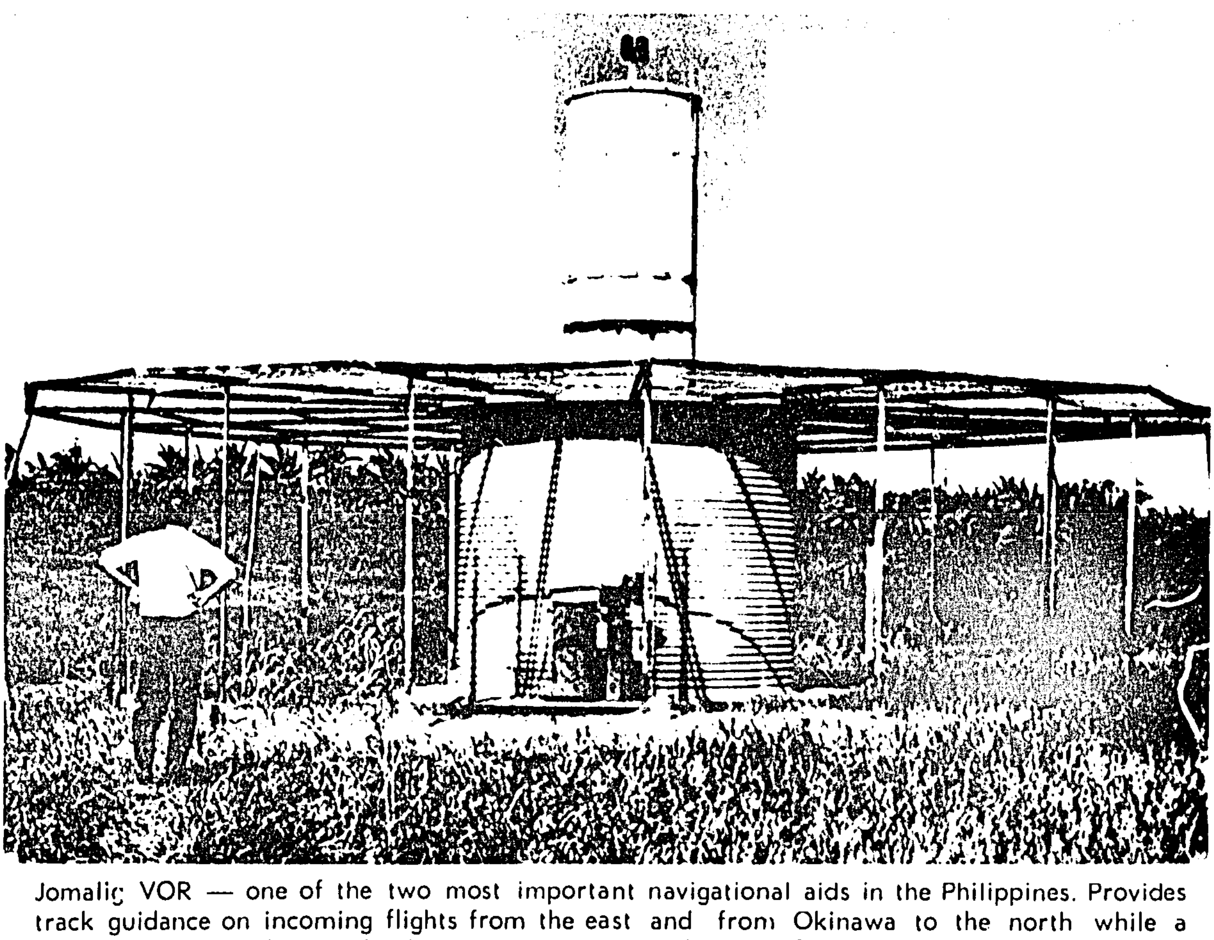
To illustrate specific deficiencies of the system by category we offer the following:

a. <u>VOR</u>

Of the eight Collins 401 VOR's operated by CAA, only one was determined to alarm by shifting the monitor phase selector off-course in excess of 2 degrees, and only one was monitored by any semblance of remote "status indicating" device in the associated communication facility. The automatic transfer units are not utilized because the filaments are not energized on the standby equipment. Under this condition, 4 minutes are required for the standby transmitter to cycle "on the air" and stabilize. The automatic transfer unit, however, only allows 2 minutes for the monitor unit to accept the signal, thus the standby transmitter would be shut-down prior to getting "on the air" and stabilizing.

X 184

VOR installation at Cagayan de Oro



Jomalig VOR — one of the two most important navigational aids in the Philippines. Provides track guidance on incoming flights from the east and from Okinawa to the north while a similar VOR at Lubang island provides ingress and egress for all airways to the west.

Most of the VOR's appear to be well sited except one which has never been acceptable and another which would probably be satisfactory were it not for the fact that CAA erected two steel NDB antenna towers over 100 ft. high with a flat-top antenna approximately 600 ft. from the VOR. To compound the situation at this latter location, the Philippine Air Force constructed a large "A" frame type chapel with sheet metal roof approximately 1500 ft. from the VOR. Only 2 of the 8 operate primarily from commercial electrical power, and one facility does not have a monitor and another is on test basis. Identification signal on neither has been removed.

b. NDB

Six of the 12 NDB's operated by CAA were visited by Team members, however, none of the 6 visited were operating within the criteria stipulated by ICAO standards nor were they emitting the power advertised in the Aeronautical Information Publication (AIP). One NDB was empirically determined to be operating at one-sixth the power indicated in the AIP; another could only be received for approximately 7 miles from the station. Another was operating at half power, etc. NOTAMS were not issued for any of these conditions. None of the locations had an impedance measuring instrument to facilitate accurate antenna tuneup, and two of the antenna tuning units were not metered.

Three of the six CAA NDB's located on airports present a hazard to air navigation considering the 250 ft. and 7 to 1 clearance criteria from the runway centerline. Philippine Air Lines operates five NDB's on an unscheduled basis for PAL flights only, and one on a continuous basis. Three of the six are hazards to air navigation under the criteria cited above.

c. Communications

The Team visited all airways communication facilities, towers, and/or centers that are operated by CAA. It was observed that a few facilities were in good condition but most were unsatisfactory. At one location a center has not been able to communicate on one VHF frequency for several months; at another a communication station can only communicate on high frequency for approximately 40 miles. In both instances, the problem could be rectified with minor antenna maintenance. In general, the quality of modulation at all locations was poor.

d. Technical Requirements

(1) General

(a) Navigational aids should comply with the ICAO monitoring standards.

(b) For VHF communications equipment we recommend Federal Aviation Administration standards.

(c) For all other equipment, we recommend compliance with the manufacturer's instruction manuals.

(d) Specific requirements by category are:

(2) VOR 1/

Suitable equipment located in the radiation field shall provide signals for the operation of an automatic monitor. The monitor shall transmit a warning to a control point and either remove the identification and bearing information components from the carrier or close the facility down completely if any one or a combination of the following deviations from established condition arises:

(a) A change in excess of one degree at the monitor site of the bearing information transmitted by the VOR;

(b) A reduction of 15 per cent in the modulation components of the radio frequency signals voltage level at the monitor of either the subscriber or variable phase signals or both;

(c) A failure of the monitor. Failure of the monitor itself shall automatically remove from the VOR radiation the components giving bearing information.

(3) NDB 2/

For each NDB suitable means shall be provided to enable detection of any of the following conditions at an appropriate location:

(a) A decrease in radiated carrier power of more than 50% below that required for the rated coverage;

(b) Failure to transmit the identification signal;

1/ ICAO Annex 10, Part I, Section 3. 3. 7
2/ ICAO Annex 10, Part I, Section 3. 4. 8

(c) Malfunctioning or failure of the means of monitoring itself.

(4) <u>VHF Air/Ground Communications</u> 3/

(a) Transmitter output frequency - within ± .005% of assigned frequency.

(b) Modulation levels - voice peaks 50-100%
- audio tone 85-100%

(c) Power output - 75-100% of rated output

(d) Receiver sensitivity 4/ - not more than 16 MV to produce 10 mw in 600 ohm with 10 PB S/N ratio.

(e) Squelch action - not more than 4 MV to open.

(f) AVC level control - output within 4.5 DB from 15.0 MV to 1.0 V input.

(g) Maximum audio power level - at least 0.8 watt.

B. Conclusions

The Team concludes that aeronautical services provided by the Philippine CAA are both inadequate and unsafe, and that positive action should be taken at an early date to correct this condition. That the present aviation environment is hazardous is borne out by the large number of commercial and military accidents which have occurred during the past few years. Almost without exception these crashes could have been avoided had there existed adequate navigational aids, communications and weather information. It is significant that these accidents took place while aircraft were enroute rather than at terminal areas, which leads the Team to conclude that from the standpoint of safety, first priority in developing the Philippine Aeronautical environment should go to development of the Airways System.

In our evaluation of the present Airways System, we have necessarily focused attention on the status of the main features as well as such diverse subjects as spare parts supply factors, supervision, maintenance of equipment, and ATC operational procedures.

3/ From FAA Handbook SM P 6500.2
4/ From FAA Handbook AF P 6500.28

188

In Section V we examine the status of Support Services which, although treated as separate subjects, directly relate to an evaluation of the present system.

Specifically, the Team's findings highlight the following areas:

1. A serious lack of navigational aids.

2. NAVAIDs presently installed are, with a few exceptions, ineffective.

3. Item 2 above can be attributed to the following factors:

   (a) Absence of an adequate facility flight inspection program.

   (b) Lack of maintenance standards.

   (c) Lack of spare parts at field installations.

   (d) Almost total absence of test equipment.

   (e) Low morale on the part of many field personnel.

4. The provision of Air Traffic Services is well below standard because.

   (a) "User" needs far exceed the capacity of the ATC system.

   (b) Controllers have inadequate and insufficient tools to work with.

   (c) Control procedures and techniques lack standardization.

   (d) Effective communication between the pilot and controller is not possible in much of the controlled airspace.

   (e) Reliable communications among facilities do not exist to permit effective coordination of aircraft movements.

5. Inadequate communications capability in both the fixed and mobile areas can be attributed to factors indicated in Item 3 that apply to the equipment component. It was generally found that communicators were competent and doing a good job with the tools at hand. They are hampered by the following:

   (a) Cramped quarters.

189

(b) Rundown condition of typewriters and electronics tools of the trade.

(c) Awkward operational configuration.

(d) Unreliable transmitters and receivers.

(e) Radio frequency and propagation problems involving interference and other factors.

6. The efficiency of the Airways System as a whole is seriously affected by a shortage of well-trained personnel. It is believed this stems from:

(a) Lack of a re-training program in the electronics maintenance area.

(b) Failure to provide advanced and refresher training to operations personnel who have been assigned to field locations directly following graduation from basic training classes.

(c) Lack of an active evaluation program to assure that facility operations personnel are adhering to accepted procedural standards.

7. In the Systems Support area, the Team finds that airport and navigational aid conditions are not accurately portrayed in Notices to Airmen (NOTAMS). This is not because of error at the main Airways Information Service (AIS) office but can be attributed among other things to the following:

(a) Lack of general knowledge at the field level of when the transmission of a NOTAM is required.

(b) Inability of the communications system to deliver NOTAM information to concerned locations.

(c) Reluctance of field electronics personnel to issue NOTAMS regarding malfunctioning of facilities under their control.

8. The Team observed a serious shortage of current weather data at most locations visited. With the exception of Trunkline Airports weather information regarding conditions enroute, and at other terminals, was either lacking entirely or out of date. This was due to:

(a) Majority of the Weather Bureau's 49 weather stations are

X 190

located in nearby cities and their reports cannot accurately portray conditions as they occur at the airport.

(b) Lack of an airways communications system to rapidly transfer weather information throughout the system.

To correct the deficiencies brought to light in this Section is necessarily an expensive process. In another section, cost estimates are presented and it will be noted that a figure of slightly under ten million dollars has been developed for commodity costs alone. We are unable to quote contractors' fees.

The Team recognizes that built-in delays are inherent in projects of this sort. This is due to slow processes in arranging for financing, entering into contractual arrangements and ordering equipment. We would be fortunate indeed if the first components of the system would begin to arrive in less than two years from the date negotiations begin.

This means then that it would be probably three years before the aviation industry would begin to feel the very first effects of the 5-year development plan.

The Team feels that a delay of this magnitude is intolerable and that some measure of improvement must begin immediately. We are therefore planning an interim or rehabilitation phase to start as soon as the necessary arrangements can be made. In following documentation, we refer to this portion of the plan as "Phase I". It is estimated that this phase would cost approximately $614,000 and would consist of rehabilitating all navigational aids and communications facilities as well as supplying new equipment where indicated. Phase I is only a step towards improved safety in the present system; therefore, it should be immediately followed in dovetail fashion by a second phase which would ultimately result in an airways system capable of handling all traffic needs for the foreseeable future.

C. Proposed Action

The existing Airway System, its navigation aids, air traffic and fixed and mobile communications facilities are discussed in Section IV-A. Section IV-B consists of a summary of findings brought out in IV-A and reaches certain conclusions leading to a course of action.

IV-B concludes that enhancement of the Airways System should be divided into two phases: Phase I would consist of a program aimed at bringing the present airway system up to an acceptable standard of service through provision of certain items of new equipment and rehabilitation of presently

191

installed equipment.

Phase II presents the 5-year airway and facility development program which is engineered in increments to match anticipated growth factors in the airways system. It should be noted that all new equipment recommended for procurement and installation in Phase I will become a part of the Phase II program.

It will be noted that throughout Sections IV-A and IV-B the Team has mentioned lack of properly trained personnel. Recommendations relating to this subject are not contained in IV-C but can be found as a separate Section (VI--Staffing and Training).

That portion of this document which immediately follows deals only with the proposed course of action in Phase I.

1. Phase I--Interim Rehabilitation

A rehabilitation of all existing NAVAIDS is required to provide adequate, accurate and reliable navigational guidance to aircraft operating along each airway and in each terminal area in the present system. NAVAID maintenance and modification should be accomplished as necessary to ensure compliance with appropriate ICAO standards.

Rehabilitation of the existing Manila ACC, Manila OFACS/ACS, Lahug Tower/Cebu ACC, and Cebu ACS facilities is not included in Phase I. The Manila ACC and OFACS/ACS facilities will be moved to the International Terminal Building as soon as the current equipment installation and subsequent modifications as required are accomplished. The CAA has tentative plans to construct a new building at Mactan for the Cebu Sub-ACC and ACS. Money has been released for this project and we strongly recommend it be accomplished as soon as possible. A new building for these facilities is preferred to their being moved to another location such as the existing Mactan terminal building. A new building is more suitable to the present needs of these facilities and would permit future expansion which will most certainly be required. CAA plans also include a general rehabilitation of Lahug tower to permit the continued provision of ADC service at this airport.

Other existing air traffic and airways communication facilities and equipment should be rehabilitated as required to obtain satisfactory operation. Sufficient additional aeronautical telecommunications equipment should be provided these facilities (1) to permit satisfactory air/ground communications capability with aircraft operating

192

anywhere in controlled airspace, and (2) to establish adequate point-to-point communications capability to facilitate coordination and the passing of aircraft movement information among facilities. Again, compliance with ICAO standards is recommended to assure satisfactory performance of the air traffic and aeronautical telecommunications system, including the provision of adequate back-up or standby capability.

a. NAVAIDS

This section outlines recommended action to upgrade existing CAA navigational aids to the technical requirements outlined in Section IV-A-4d. To this end, we have elected to present these recommendations in two parts: VOR and NDB.

Because all new equipment recommended for procurement in the Phase I plan would be absorbed in the Phase II program, a considerable amount of test equipment is included. Although the majority of the existing VOR shelters will be discarded in Phase II, we feel that they will be required to provide equipment protection for another 4 to 5 years. Therefore, in the interim these shelters should be rehabilitated. We do not recommend any major cable projects unless the installation will also serve Phase II.

The Team could not minutely examine all of the NAVAID facilities to determine component and spare part requirements. We have therefore consolidated items such as wire, hardware, tubes, fuses, resistors, etc., into a common heading of hardware and supplies.

A detailed outline of Phase I NAVAID recommendations is as follows:

(1) Recommended Alterations of All Existing VOR's

(a) Disassemble the Romblon facility and cannibalize same for spare parts.

(b) Provide adequate vacuum tubes and parts to allow filaments on the standby equipment at all locations to remain "on."

(c) Activate the automatic transfer units and overhaul monitors to meet standards as outlined in the technical requirements section.

(d) Bury 5,000 feet of new power cable from the power house to the facility at Cagayan de Oro. 150 feet of conduit will be required under the runway. If frangible conduit is used, it should be encased in concrete. The existing cable reportedly shorts when wet. Also there is considerable voltage drop because sections of the original cable have been replaced by cable of insufficient size to accommodate 2400V. Accordingly, 220V is presently being fed into the cable. The transformers at each end are reported to be satisfactory. Although the Cagayan de Oro facility is scheduled for replacement in the Phase II Plan, we recommend burying a 12-pair control and audio cable along with the power cable because the new VOR should be constructed on the same site. Note that it is imperative that this work be done prior to runway repairs.

(e) At Zamboanga we recommend nothing be done until the NDB and transmitter station are relocated. After the above action has been accomplished and a subsequent flight check indicates the facility is either in or near tolerance, we recommend burying 1,000 feet of new power and control cable in lieu of the present overhead cable. If the facility is still out of usable tolerance after relocating the NDB and transmitters, we recommend cannibalizing the equipment for use as spare parts for the remaining VOR's until the Phase II Plan materializes.

(f) Install a 16-foot radius counterpoise on the Lubang facility. Because this facility is presently operating without a counterpoise, flight checks indicate a 150-degree "cone of confusion" over the station.

(g) Overhaul and extensively rust-proof the Jomalig counterpoise and equipment shelter.

(h) Perform some rust prevention and paint counterpoises and equipment shelters at all VOR locations.

(i) Install fixed-tuned VHF receivers for "off air" monitoring at each associated airway communications station or air traffic control facility.

(j) Install visual/aural alarm on each receiver.

NOTE: It will be necessary for power house mechanics to continue monitoring Jomalig and Lubang until such time as VHF links can be installed under the Phase II program.

The USAF is presently burying power and control cables to the Mactan (Cebu) facility which will assist in rectifying present deficiencies at that location.

Additionally, each VOR facility should be provided test equipment as described below.

NOTE: The Manila VOR is presently in the process of being replaced. Although some test equipment may be provided by the contractor, we recommend Manila be supplied with the same test equipment package as the other VOR's because that which will not be required at the VOR could well be utilized in the training school.

Field Detector, VOR, portable
Insulation tester, DC
Oscilloscope, 5", VHF with dolly
Tube checker
Volt-ohm-milliameter
VOR test generator
VTVM, DC-AC-RF
Wattmeter, VSWR indicator

(2) Recommended Reconfigurations of Existing NDB's

(a) Install new 1,000 watt system at Cebu because the existing equipment is beyond economical repair. The flat-top antenna to be rehabilitated in lieu of replacement because in the Phase II Plan we recommend decommissioning the Cebu NDB and transferring the new electronic equipment to Puerto Princesa.

(b) Transfer existing Cebu equipment to Laoag for use as spare parts.

(c) Install new 1,000 watt system in relocated transmitter station at Zamboanga because existing equipment, except the antenna, is beyond economical repair. The existing Colombo Plan antenna should be used with new equipment at the new site.

(d) Install new 400 watt system at Romblon because existing equipment is beyond economical repair. The flat-top antenna should be satisfactory after rehabilitation.

(e) Install the CAA modified 250 watt equipment (already on hand) with new antenna tuning unit at Legaspi because the existing system is totally inadequate. Rehabilitate the flat-top antenna.

(f) Cannibalize equipment made surplus by the above action at Zamboanga, Romblon, and Legaspi, as necessary, to effect repairs on the remaining NDB's.

195

(g) Rehabilitate the remaining NDB's and install new antenna tuning units on all except Bacolod and Rosario. These two systems are in good condition.

(h) Install a visual/aural alarm receiver with antenna in the associated airway communication station or air traffic control facility.

Additionally, each NDB facility should be provided test equipment as described below. Manila personnel would share test equipment between Rosario, Antipolo and Inner Marker facilities.

Ammeter, AC
Ammeter, RF (3)
Decade resistance box
Impedance measuring box
Transceiver (2)
Oscilloscope, 5"
Volt-Ammeter, Clamp-on, AC

b. Aeronautical Communications Requirements

(1) Mobile Communications

(a) An additional VHF frequency for the APP functions at Mactan, Cagayan de Oro, Davao and Zamboanga is recommended to eliminate existing interference with the ADC function at these locations. Discrete VHF frequencies among facilities for ADC and/or APP functions should also be provided at those locations where facility areas of radio coverage overlap.

(b) A common enroute air/ground VHF frequency, to provide effective communications at short ranges, is recommended for each airways communications station and the Cagayan de Oro and Davao air traffic facilities. This enroute communications capability should be on a discrete channel which does not interfere with frequencies used for ACC, ADC, and APP functions.

(c) HF voice capability is required to provide enroute air/ground communications with aircraft operating outside areas of VHF coverage. The present 6619.5 kHz frequency should be changed to a more suitable frequency in the 6 mHz band to avoid interference from foreign stations. A common 3 mHz frequency should be added to provide an acceptable standard of communications during night and early morning hours.

(d) It is recommended that the following facilities have HF voice communication capability on 3 mHz and 6 mHz frequencies to provide satisfactory air/ground coverage in the domestic airways system.

Laoag ACS	Legaspi ACS	Cebu ACS
Manila ACS	Romblon ACS	Zamboanga ACS
		Davao Tower

Exhibit IV-D shows the location of facilities providing enroute mobile communication services after Phase I. The shaded areas indicate approximate VHF coverage above terrain or at 5000 feet mean sea level altitude whichever is higher.

(2) Fixed Communications

(a) HF voice frequency 6700.5 kHz is presently used for point-to-point communication by four Airways Communication Stations and one Control Tower. This frequency provides satisfactory communications in the Luzon and Central Visayan areas and its use is recommended at all ACS facilities north of an east-west line through and including Cebu. CW capability for backup presently exists for all these stations except Bacolod. Standby HF voice capability should be provided there.

(b) In addition to 6 mHz voice, 3 mHz capability is recommended for stations south of Cebu to compensate for short distances involved and inherent wave propagation. To reduce interference, the 6 mHz frequency should be other than 6700.5 kHz. Cagayan de Oro tower, Davao tower, Cebu ACS, and Zamboanga ACS should have capability on both 6 mHz and 3 mHz to assure 24-hour coverage. The dual equipment required to provide this service will also satisfy backup needs. Because of its proximity to Cebu, Tagbilaran would only need 3 mHz. The station's existing CW provides backup.

(3) Additional/New Equipment

Additional equipment required to provide the air/ground VHF and HF voice, and point-to-point HF voice and CW capability is listed below by individual facility.

(a) Laoag ACS

Main HF Air/Ground (Xmt/Rcv) 3 mHz
Main HF Point-to-Point voice (Xmt/Rcv) 6 mHz

(b) Manila ACS

Main VHF Air/Ground (Xmt/Rcv)
Standby VHF Air/Ground (Xmt/Rcv)

(c) Romblon ACS

Standby VHF Air/Ground (Xmt/Rcv)
Main HF Air/Ground (Xmt/Rcv) 3 mHz

(d) Legaspi ACS

Standby VHF Air/Ground (Xmt/Rcv)
Main HF Air/Ground (Xmt/Rcv) 3 mHz
Main HF Point-to-Point voice (Xmt/Rcv) 6 mHz

(e) Virac ACS

Main VHF Air/Ground (Xmt/Rcv)
Standby VHF Air/Ground (Xmt/Rcv)
Main HF Point-to-Point voice (Xmt/Rcv) 6 mHz

(f) Bacolod ACS

Standby HF Point-to-Point voice (Xmt only) 6 mHz

(g) Cebu ACS

Main VHF Air/Ground (Xmt/Rcv)
Standby VHF Air/Ground (Xmt/Rcv)
Main HF Air/Ground (Xmt/Rcv) 3 mHz
Standby HF Air/Ground (Xmt/Rcv)
Main HF Point-to-Point voice (Xmt/Rcv) 6 mHz (for south frequency)
Main HF Point-to-Point voice (Xmt/Rcv) 3 mHz (for south frequency)

(h) Mactan Tower

Main VHF Air/Ground (Xmt/Rcv)
Standby VHF Air/Ground (Xmt/Rcv)

(i) Tagbilaran ACS

Standby VHF Air/Ground (Xmt/Rcv)

(j) <u>Cagayan de Oro Tower</u>

Two main VHF Air/Ground (Xmt/Rcv)
Two standby VHF Air/Ground (Xmt/Rcv)

(k) <u>Davao Tower</u>

Two main VHF Air/Ground (Xmt/Rcv)
Two standby VHF Air/Ground (Xmt/Rcv)
Main HF Air/Ground (Xmt/Rcv) 6 mHz
Main HF Air/Ground (Xmt/Rcv) 3 mHz

(l) <u>Zamboanga ACS</u>

Two main VHF Air/Ground (Xmt/Rcv)
Two standby VHF Air/Ground (Xmt/Rcv)
Main HF Point-to-Point voice (Xmt/Rcv) 6 mHz
Main HF Point-to-Point voice (Xmt/Rcv) 3 mHz

Table IV-2 indicates how facilities would be equipped to provide enroute air ground and point-to-point communications service upon completion of Phase I.

TABLE IV-2

PHASE I. ENROUTE MOBILE, AND FIXED COMMUNICATIONS CAPABILITY

	Mobile (Air/Ground)					Fixed (Point-to-Point)								
	VHF		HF			HF			CW		Radio Teletype		1/ SSB	Microwave Link 1/
	Main	Stby	Main		Stby	Main		Stby	Main	Stby	Main	Stby		
FACILITY			6mHz	3mHz		6mHz	3mHz							
Laoag	x	x	x	x		x			x					
Baguio						x			x					
Manila	x	x	x	x	x	x		x	x	x	x	x	x	x
Romblon	x	x	x	x		x			x					
Legaspi	x	x	x	x		x			x					
Virac	x	x				x			x					
Bacolod	x	x				x		x						
Cebu	x	x	x	x	x	x(n) x(s)	x(s)		x	x	x	x	x	x
Tagbilaran	x	x					x		x					
Cagayan de Oro	x	x				x	x							
Davao	x	x	x	x		x	x							
Zamboanga	x	x	x	x		x	x		x	x				

(n) 6 mHz HF frequency used by Cebu and stations to the north.
(s) 6 mHz and 3 mHz HF frequency used by Cebu and stations to the south.
1/ Military circuit and equipment.

EXHIBIT IV-D
PHASE I ENROUTE AERONAUTICAL MOBILE COMMUNICATIONS

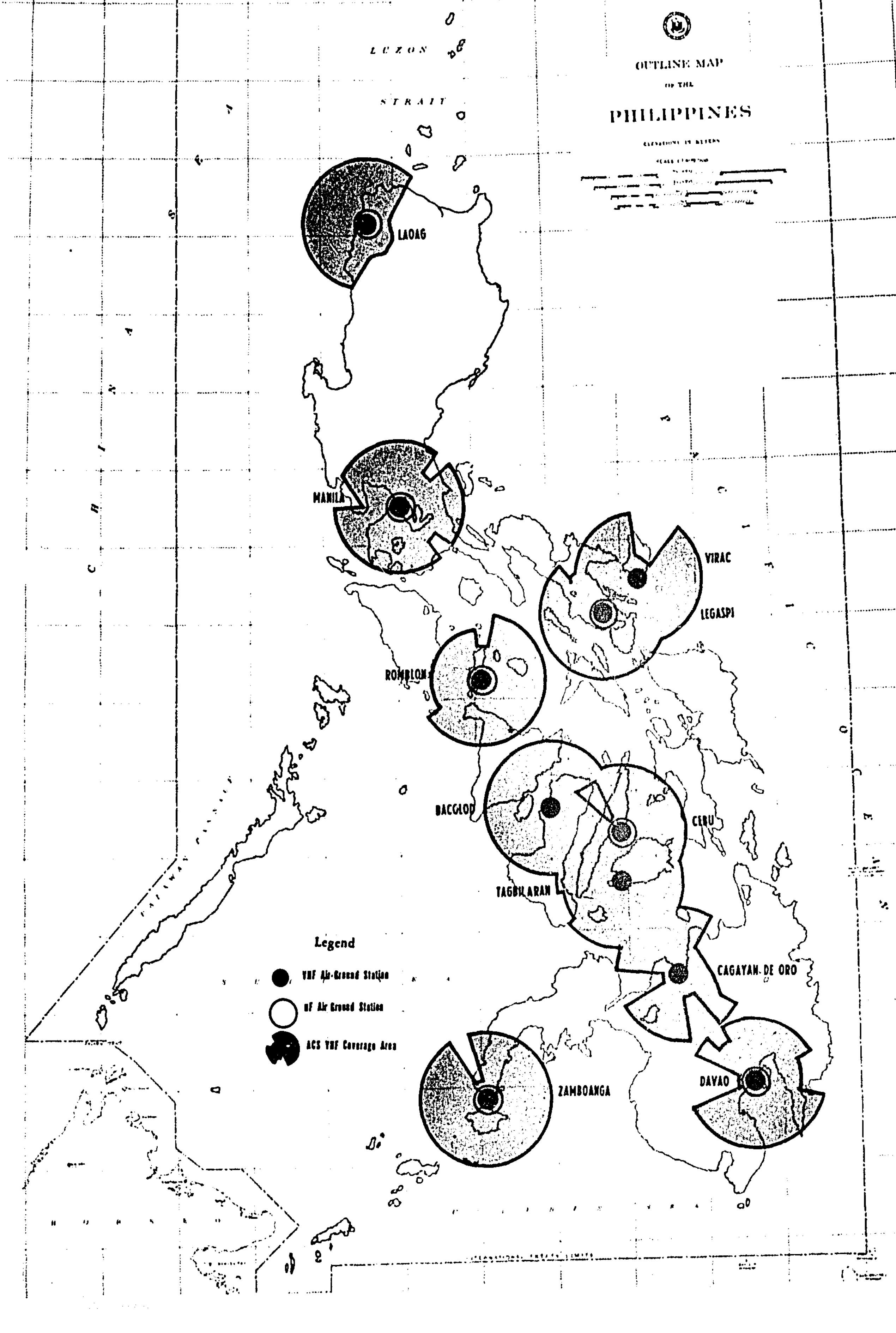


Exhibit IV-E depicts the aeronautical fixed communication service among facilities after Phase I.

c. ATC and Communications Electronic Equipment

This section outlines recommended action to upgrade existing CAA air traffic control and communication facilities to the technical requirements outlined in section IV-A-4d.

As previously stated, all new equipment recommended for procurement in the Phase I plan would be transferred to the Phase II program. For this reason, more sophisticated High Frequency (HF) equipment is being recommended for Phase I than would actually be required. As the Phase II program proceeds, however, this HF equipment will provide the "backbone" of the backup system.

The major electronics components of Phase I are test equipment and additional communications equipment, the cost of which can be easily determined since most are off-the-shelf items. Immediate improvements, however, should be realized by performing antenna overhaul, equipment reconfiguration and alignment, replacing electronic components, installing new cable, etc. For these latter items, the Team can only give an approximate estimate. As mentioned in a previous section it would be most difficult to provide a detailed analysis of each piece of equipment used in the present system, consequently coaxial, power and control cables, wire, hardware, connectors, switches, condensers, resistors, etc., for all existing facilities are consolidated as "hardware and supplies."

(1) Recommended Reconfigurations of Existing Communications Equipment

(a) Install 14 new 4 channel 350 watt HF transmitters at the following locations: Laoag (2), Romblon (1), Legaspi (2), Bacolod (1), Cebu (4), Davao (2), and Zamboanga (2).

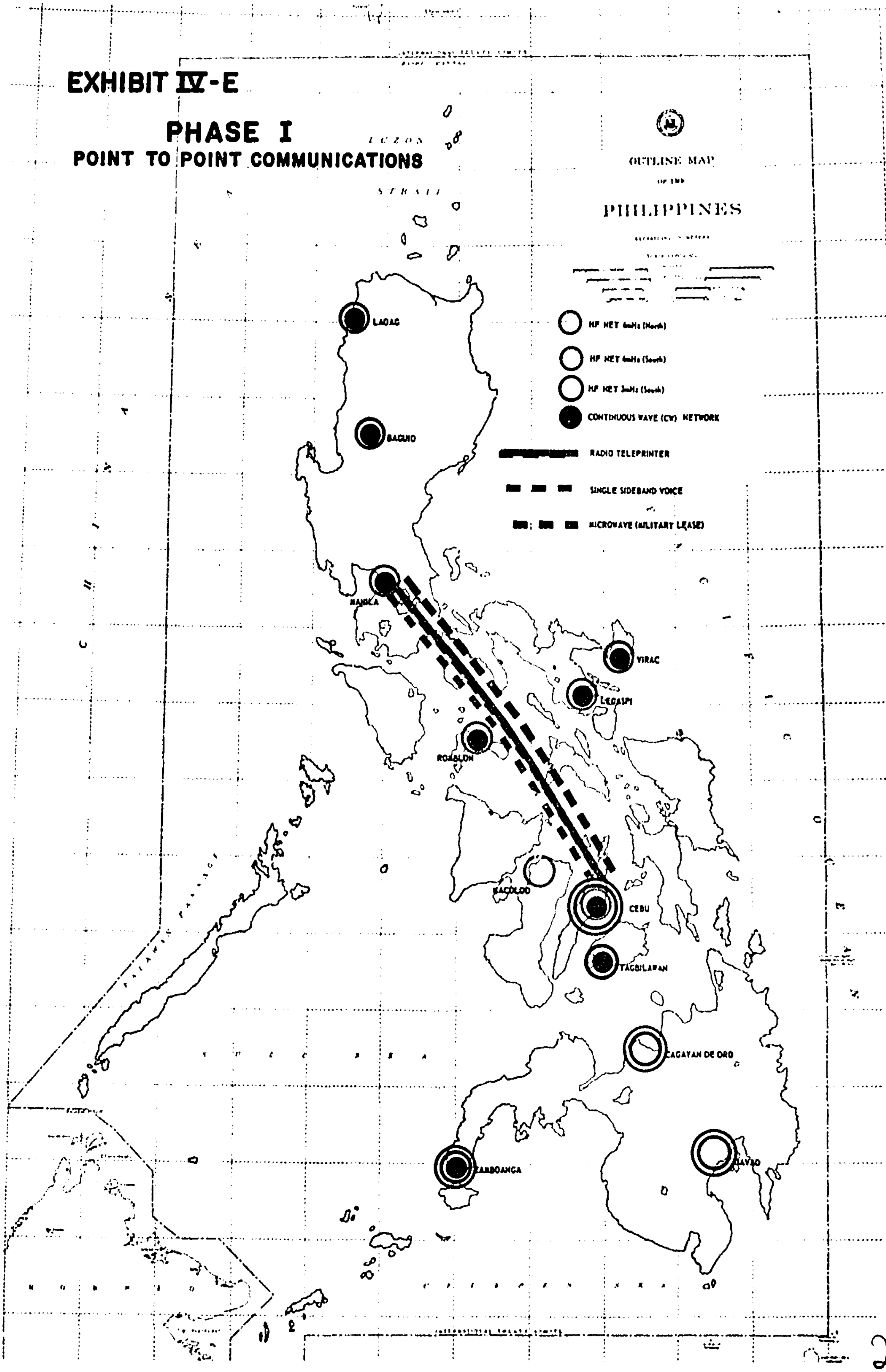
(b) Install new doublet antennas (1 for each of the transmitters) at each location indicated above. In most cases existing poles can be utilized.

(c) Rehabilitate existing HF transmitters and antennas at each location. Install antenna switching units to enable full utilization of the new 4 channel transmitters on any of the HF antennas.

(d) Install 13 new single-channel HF receivers at Laoag (2),

EXHIBIT IV-E

PHASE I
POINT TO POINT COMMUNICATIONS



Romblon (1), Legaspi (2), Cebu (4), Davao (2), and Zamboanga (2).

(e) Install new tunable whip antennas (1 for each HF receiver) at each location. The whip antennas to be mounted atop the communication or control facility.

(f) Rehabilitate existing HF receiving equipment and antennas at each location.

(g) Install 23 new 50 watt, crystal controlled, VHF transmitters and fixed-tuned VHF receivers complete with separate antennas at Manila (2), Romblon (1), Legaspi (1), Virac (2), Cebu (4), Tagbilaran (1), Cagayan de Oro (4), Davao (4), and Zamboanga (4).

(h) Rehabilitate existing VHF equipment with special attention devoted to antennas and transmission lines.

(i) Install 12 new dual channel amplifiers at (1 each) Laoag, Manila, Romblon, Legaspi, Virac, Cagayan de Oro (2 each), Cebu Davao and Zamboanga.

(j) Install 20 new self-contained transistorized speakers at Laoag (2), Manila (1), Romblon (2), Legaspi (2), Virac (2), Cebu (4), Cagayan de Oro (1), Davao (3), and Zamboanga (3). As these speakers are self-contained with built-in amplifiers, provision should be made to inter-switch them with any circuit.

(k) Rehabilitate existing CW transmitters, receivers, and antennas by replacing components where necessary.

(l) Rehabilitate all required ancillary equipment by replacement of cables, wires and equipment components as necessary. Fabricate and modify consoles, switching panels, connecting frames, etc. as necessary.

(m) Additionally, each communication facility should be provided test equipment as described below.

Audio attenuator
Audio oscillator
Bridge, capacitance-resistance
Headphones
Modulation monitor
Noise meter
Oscilloscope, 5" VHF

Receiver test set
RF load, 250-watt VHF
Signal generator VHF/UHF
Signal generator LF
Tube checker
Volt-ohm-milliameter
VTVM, DC-AC-RF
Wattmeter, VSWR indicator
Insulation tester, D. C.

d. Cost Estimating Phase I

An across the board 25% extra was added to all original commodity cost estimates for several reasons; some being:

1. Transportation
2. Overhead
3. Price increases

The 25% margin was not added to hardware and supplies which include such items as wire, cable, components, fabrication material, insulators, tubes, fuses, tools, etc. Exhibit IV-F displays the method by which the 25% factor was applied.

The $250,000 recommended for hardware and supplies will require prorating at the time Phase I is implemented. Some locations will of course require considerably more of this type support than others. As previously stated, the Team could not devote the time required to determine all requirements, however, it was noted that large amounts of hardware and supplies will be necessary to rehabilitate the system.

The Phase I Program should not increase yearly maintenance costs except for a slight increase in power bills and electrical power generating fuel consumption. Actually, a reduction in maintenance costs from a manpower standpoint should result because of an increase in productivity stemming from increased technical proficiency. This, we are sure can be brought about through adoption of the Team's recommendation that CAA expand their electronics training school[1/] and more explicitly that they re-train and carefully examine existing technical personnel. By process of upgrading their existing technical staff, we envision a vast improvement in efficiency. As a further incentive for greater productivity, the CAA should make representation aimed at elevating technician salaries to those levels enjoyed by

1/ See Section VI--Staffing and Training

X 204

EXHIBIT IV-F

PHASE I - ELECTRONICS PROGRAM
(in dollars)

		Laoag	Baguio	Manila	Romblon	Legaspi	Virac	Bacolod	Cebu	Tagbilaran	Cag.de Oro	Davao	Zamboanga	Jomalig	Lubang	Alabat	Cabanatuan	Total
COMMUNICATIONS	HFXMT A/G	5,000			5,000	5,000			10,000			10,000	10,000					45,000
	HFRCV A/G	640			640	640			1,280			1,280	1,280					5,760
	HFXMT P/P	5,000				5,000		5,000	10,000									25,000
	HFRCV P/P	640				640		640	1,280									3,200
	HFANT XMT	1,500			750	1,500		750	3.750			1,500	1,500					11,250
	HFANT RCV	300			150	300	150	150	750			300	300					2,400
	VHFXMT A/G			2,400	1,200	1.200	2,400		4,800	1.200	4,800	4,800	4,800					27,600
	VHFRCV A/G			800	400	400	800		1,600	400	1,600	1,600	1,600					9,200
	VHFANT			150	150	150	150		300	150	300	300	300					1,950
	TEST EQUIP	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000					36,000
VOR	MON RCVR	460							460		460	460	460	460	460			3,220
	TEST EQUIP	3,000		3,000					3.000		3,000	3,000	3,000	3,000	3.000			24,000
	PWR & CTL CABLE										12,200							12,200
NDB	400WNDB				10,200													10,200
	1 KW NDB								12,000				12,000					24,000
	NDB RCVR	412		1,648	412	412		412	412	412			412					4,532
	TUNING UNIT	1,143		1,143		506				506						1,143	1,143	5,584
	TEST EQUIP	2,000		2,000	2,000	2,000		2,000	2,000	2,000			2,000			2,000	2,000	20,000
MISCELLANEOUS	AOD SUPPLIES 1/	400	400	400	400	400	400	400	400	400	400	400	400					4,800
	MNTNC VEHICLE	2,000		2,000		2,000		2,000	2,000		2,000	2,000	2,000					16,000
	Sub-Total	25,495	3,400	16,541	24,302	23,148	6,900	14,352	57,032	8,068	27,760	28,640	43,052	3,460	3,460	3,143	3,143	291,896
	25% for Engineering, Administrative, Crating and Shipping Costs																	72,974
	Hardware and Supplies																	250,000
																	GRAND TOTAL	$614,870

1/ Airway Operations Division supplies such as typewriters, headphones, microphones, etc.

private industry--this however, only when they merit the salary and position.

Electronics equipment recommended for installation in Phase I also includes one year supply of spare parts. Additionally, the equipment should be relatively easy to maintain and we do not envision difficulties in procuring spare parts when required. We do wish to emphasize, however, that the equipment must be maintained in a manner that would be recognized by the manufacturer in order for these statements to be valid.

Table IV-3

TOTAL ESTIMATED COSTS (NEW EQUIPMENT ONLY) IN PHASE I FOR EACH LOCATION

Alabat	$ 3,928
Bacolod	17,940
Baguio	4,250
Cabanatuan	3,928
Cagayan de Oro	34,700
Cebu	71,290
Davao	35,800
Jomalig	4,325
Laoag	31,868
Legaspi	28,935
Lubang	4,325
Manila	20,675
Romblon	30,377
Tagbilaran	10,085
Virac	8,625
Zamboanga	53,816
TOTAL	$364,870

Hardware and supplies will require pro-rating at time of implementation on a need basis.

2. Phase II--Five-year Development Plan

This section presents a five-year development plan for the expansion of the Philippine Airway System to meet air traffic activity needs. Recommendations are presented for airways, NAVAIDS, air traffic and communications facilities, aeronautical mobile and fixed communications service, and associated electronic equipment required in the proposed system.

a. Standards

The CAA is empowered to provide necessary air navigation facilities and air traffic control and communications services to insure efficient utilization of the navigable airspace and the safe and expeditious flow of air traffic. Thus, the CAA has the responsibility for providing enroute components of the airways system to allow aircraft to serve qualified aviation communities, to provide terminal facilities and services at airports, and to assist aircraft in starting and terminating their flights.

In the Philippines, no specific criteria or standard has been established for allocating air navigation facilities and associated operational services. The International Civil Aviation Organization (ICAO), of which the Philippines is a member state, specifies guidelines in the form of international standards and recommended practices to be followed in determining the needs of an airway system. The criteria therein are quite general however, and do not attempt to cover the many types of situations that may arise because of the complex nature of the functions involved.

The Team was asked by the CAA to apply U. S. Federal Aviation Administration (FAA) standards wherever possible in determining the needs of the Philippine Airway System. This we have done and our recommendations in the five-year development plan are based upon FAA airway planning standards wherever their application is feasible. The criteria utilized in our planning are generally based on air traffic demand because volume of traffic and passenger movement is a tangible and measurable indication of the need for air navigation facilities and air traffic control services.

Since the CAA (like the U. S. FAA) must operate, maintain, and improve their air navigation system within budgetary limitations, it is not possible, nor would it be economically feasible, to satisfy each and every operational need. Similarly, air traffic demand does not by itself always constitute a requirement for an air navigation facility or air traffic service. Previous air traffic and passenger movement activity information available to the Team was also limited. For these reasons our planning has been oriented to adjustments as indicated by growth or reduction in air traffic activity.

This was required to establish an orderly distribution of facilities and services at locations where they benefit the greatest number of users for the least cost consistent with safety and operational efficiency. Locations where service is recommended were individually evaluated to determine whether the combination of tangible and intangible benefits is commensurate with the cost of the facility and/or service.

b. Traffic

Complete statistical information concerning passenger movement, air carrier schedules and air traffic activity compiled by the Team is presented in various exhibits in Section II of this report. For ease of reference, certain pertinent information therein is also being presented in this section.

The following six tables depict statistical information for various national airports and air carrier route segments. Each table indicates the respective airports or flight segments by rank according to the volume of activity being reported. Tables IV-4, IV-6, and IV-7 each contain a separation line. Air navigation and air traffic services are proposed for each location or segment listed above this line except as noted. Reference to these tables, use of the statistics therein and application of recommended standards and criteria are made in later portions of this subsection.

c. Proposed Airway System

We recommend the Philippine National Airway System be based primarily upon the use of VOR navigational facilities. This facility is a more stable and accurate navigation aid and its use permits greater flexibility in establishing an airway system with segregated inbound/outbound traffic flows. For this reason, the five-year development plan also recommends that busier routes in the present system be replaced as soon as possible with a system based upon VOR navigation facilities.

We further recommend that application of accepted criteria be utilized in establishing the width of airways/routes in the VOR system. This criterion basically designates domestic VOR airway/route width as four nautical miles either side of the centerline to a point 51 nautical miles from the NAVAID where it increases in width on a 4.5 degree angle to 10 miles on each side of the route centerline at a distance approximately 130 miles from the NAVAID. This criterion provides best utilization of airspace particularly in the high altitude strata where lateral traffic separation within 51 nautical miles of a facility could be provided in less than half the airspace presently required, and airspace savings would continue to be realized in decreasing amounts out to a distance in excess of 100 miles from a VOR facility.

The present domestic airway system terminates 100 miles from shore-

209

TABLE IV - 4

DOMESTIC & INTERNATIONAL PASSENGER MOVEMENTS BY AIRPORT

Rank	Airport	CY 1965
1	Manila	1,339,465
2	Mactan	970,000
3	Bacolod	250,186
4	Davao	199,410
5	Zamboanga	118,317
6	Iloilo	117,626
7	Cagayan de Oro	109,403
8	Cotabato	98,186
9	Bancasi (Butuan)	84,117
10	Legaspi	82,417
11	Tacloban	63,543
12	Dumaguete	56,868
13	Jolo	53,551
14	Dipolog	52,360
15	Daet	50,980
16	Cauayan	49,665
17	Maria Cristina (Iligan)	46,989
18	Kalibo	46,601
19	Tuguegarao	45,633
20	Surigao	41,670
21	Laoag	38,518
22	Roxas	38,485
23	Buayan (General Santos)	36,511
24	San Jose (Mindoro)	33,396
25	Mamburao	32,782
26	Misamis (Ozamis)	28,058
27	Baguio	27,959
28	Masbate	26,161
29	Aparri	24,706
30	Marinduque	23,896
31	Tagbilaran	19,644
32	Naga	18,894
33	Virac	18,036
34	Calapan	17,872
35	Romblon (Tablas)	17,798
36	Calbayog	17,540
37	Puerto Princesa	13,615
38	Lubang	11,132
39	Siargao	8,408
40	Vigan	8,037
41	Sanga-Sanga (Tawi-Tawi)	6,570
42	Tandag	6,472
43	Basco	6,015
44	San Jose de Buenavista	5,998
45	Malaybalay	5,843

TABLE IV - 5

DOMESTIC SCHEDULED AIR SERVICE (AM/FOA/PAL)
NUMBER OF FLIGHTS PER ONE WEEK PERIOD

(Ranking by Points Served)

Rank		Number of Flights (in & out)	Average Annual Rate (%) Change in Air Carrier Operations (Past 6 Years)
1	Cebu (Mactan)	728	20.4
2	Manila	726	9.1
3	Bacolod	266	9.0
4	Davao	208	34.4
5	Cagayan de Oro	192	10.4
6	Zamboanga	184	19.2
7	Cotabato	180	19.4
8	Iloilo	154	6.3
9	Dumaguete	108	27.4
10	Legaspi	102	10.7
11	Dipolog	98	22.5
12	Mamburao	84	27.8
13	Bancasi (Butuan)	80	6.0
14	Cauayan	78	22.6
15	Jolo	76	39.5
16	Tacloban	72	No Change
17	Surigao	70	21.4
18	Buayan (General Santos)	68	14.2
19	Tuguegarao	68	14.9
20	Maria Cristina (Iligan)	66	8.1
21	Misamis (Ozamis)	56	2.9
22	Romblon (Tablas)	56	12.2
23	Laoag	42	10.6
24	Aparri	40	11.1
25	Baguio	40	19.0
26	Roxas	40	9.4
27	San Jose (Mindoro)	40	10.6
28	Daet	38	3.4
29	Calbayog	28	(6.3)
30	Kalibo	28	(5.0)
31	Marinduque	28	31.6
32	Masbate	28	2.0
33	Vigan 1/	28	No Change
34	Tagbilaran	26	11.1
35	Bislig (Private)	24	No Change
36	Virac	20	9.3
37	Lubang	16	8.3
38	Malabang	16	(9.0)
39	Mambajao 2/	16	No Change
40	Takurong	14	No Change

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X 210

Rank		Number of Flights (in & out)	Average Annual Rate (%) Changes in Air Carrier Operations (Past 6 Years)
41	Allah Valley	14	No Change
42	Calapan	14	3.1
43	Naga	14	No Change
44	Puerto Princesa	14	11.1
45	Larap	12	(2.8)
46	Sablayan 3/	12	No Change
47	Basco	8	5.6
48	Catarman	8	(10.0)
49	Ormoc	8	No Change
50	Tandag 4/	8	No Change
51	Sanga-Sanga (Tawi-Tawi)	8	13.9
52	Antique	6	No Change
53	Del Pilar	6	(11.3)
54	Guiuan	6	(8.3)
55	Hilongos	6	(16.7)
56	Malaybalay	6	(10.0)
57	Siargao	6	(25.0)
58	Sorsogon	6	(10.0)
		4,394	

1/ Air Carrier Service began Jan. 22, 1965
2/ Air Carrier Service began May 9, 1966
3/ Air Carrier Service began Dec. 21, 1966
4/ Air Carrier Service began Dec. 17, 1964

TABLE IV - 6

DOMESTIC SCHEDULED AIR SERVICE (AM/FOA/PAL)
NUMBER OF FLIGHTS PER ONE WEEK PERIOD

Ranking by Non-Stop Segments

Rank	Segments			Total
1	Cebu	-	Manila	150
2	Bacolod	-	Cebu	104
3	Bacolod	-	Manila	80
4	Bacolod	-	Iloilo	70
5	Jolo	-	Zamboanga	68
6	Cagayan de Oro	-	Cebu	54
7	Cagayan de Oro	-	Davao	54
8	Cebu	-	Dumaguete	54
9	Cebu	-	Cotabato	46
10	Cauayan	-	Manila	42
11	Cebu	-	Surigao	42
12	Dipolog	-	Dumaguete	42
13	Legaspi	-	Manila	41
14	Cebu	-	Tacloban	40
15	Butuan	-	Cebu	40
16	Davao	-	Buayan (Gen. Santos)	40
17	Iloilo	-	Manila	39
18	Cebu	-	Davao	38
19	Manila	-	Zamboanga	36
20	Mamburao	-	Manila	34
21	Cotabato	-	Zamboanga	32
22	Cauayan	-	Tuguegarao	28
23	Cebu	-	Dipolog	28
24	Cebu	-	Iloilo	28
25	Manila	-	Marinduque	28
26	Manila	-	Romblon	28
27	Baguio	-	Manila	26
28	Cebu	-	Maria Cristina (Iligan)	26
29	Cotabato	-	Davao	26
30	Cotabato	-	Maria Cristina (Iligan)	26
31	Davao	-	Manila	26
32	Daet	-	Manila	25
33	Cebu	-	Zamboanga	22
34	Kalibo	-	Romblon	22
35	Mamburao	-	San Jose (Mindoro)	22
36	Aparri	-	Laoag	20
37	Aparri	-	Tuguegarao	20
38	Cebu	-	Tagbilaran	20
39	Legaspi	-	Virac	20
40	Manila	-	Roxas	20
41	Bancasi (Butuan)	-	Cagayan de Oro	14
42	Bancasi	-	Surigao	14

(continued next page)

X 212

Rank	Segments		Total
43	Cagayan de Oro	- Maria Cristina	14
44	Cagayan de Oro	- Manila	14
45	Cagayan de Oro	- Misamis	14
46	Calapan	- Mamburao	14
47	Calbayog	- Manila	14
48	Calbayog	- Tacloban	14
49	Cebu	- Misamis	14
50	Cotabato	- Buayan (Gen. Santos)	14
51	Cotabato	- Misamis	14
52	Dipolog	- Misamis	14
53	Iloilo	- Roxas	14
54	Laoag	- Vigan	14
55	Legaspi	- Masbate	14
56	Manila	- Masbate	14
57	Manila	- Naga	14
58	Manila	- Tuguegarao	14
59	Manila	- Vigan	14
60	Daet	- Legaspi	13
61	Manila	- Puerto Princesa	11
62	Bacolod	- Dumaguete	12
63	Bislig	- Butuan	12
64	Bislig	- Davao	12
65	Davao	- Zamboanga	12
66	Larap	- Manila	12
67	Manila	- San Jose (Mindoro)	12
68	Manila	- Tacloban	12
69	Baguio	- Cauayan	8
70	Basco	- Laoag	8
71	Cagayan de Oro	- Malabang	8
72	Cagayan de Oro	- Mambajao	8
73	Catarman	- Legaspi	8
74	Cebu	- Mambajao	8
75	Cebu	- Ormoc	8
76	Cotabato	- Malabang	8
77	Buayan (Gen.Santos)	- Takurong	8
78	Jolo	- Sanga-Sanga (Tawi-Tawi)	8
79	Lubang	- Mamburao	8
80	Lubang	- Manila	8
81	Surigao	- Tandag	8
82	Dipolog	- Zamboanga	7
83	Allah Valley	- Cotabato	7
84	Allah Valley	- Buayan	7
85	Cotabato	- Takurong	7
86	Baguio	- Tuguegarao	6
87	Cagayan de Oro	- Malaybalay	6
88	Cagayan de Oro	- Tagbilaran	6
89	Cebu	- Hilongos	6
90	Guiuan	- Tacloban	6

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Rank	Segments			Total
91	Kalibo	-	Manila	6
92	Legaspi	-	Sorsogon	6
93	Mamburao	-	Sablayan	6
94	Roxas	-	Romblon	6
95	Sablayan	-	San Jose (Mindoro)	6
96	Siargao	-	Surigao	6
97	Antique	-	Iloilo	3
98	Antique	-	Manila	3
99	Del Pilar	-	Manila	3
100	Del Pilar	-	Puerto Princesa	3
		Total		2,191

214

TABLE IV - 7

CY 1966 AIRPORT RANKING--TOTAL AIR CARRIER OPERATIONS

1	Manila	55,578
2	Mactan	32,753 1/
3	Bacolod	11,824
4	Cagayan de Oro	7,876
5	Davao	7,625
6	Cotabato	6,986
7	Zamboanga	6,180
8	Iloilo	4,956
9	Legaspi	4,390
10	Dumaguete	4,038
11	Cauayan	3,718
12	Dipolog	3,518
13	Bancasi (Butuan)	3,464
14	Maria Cristina (Iligan)	3,376
15	Tacloban	3,256
16	Surigao	2,786
17	Tuguegarao	2,646
18	Misamis	2,388
19	Mamburao	2,374
20	Roxas	2,274
21	Jolo	2,210
22	Laoag	1,900
23	Kalibo	1,896
24	Buayan (General Santos)	1,828
25	Baguio	1,818
26	Daet	1,748
27	Romblon	1,668
28	San Jose	1,614
29	Masbate	1,200
30	Tagbilaran	1,180
31	Vigan	1,170 2/
32	Marinduque	1,066
33	Calbayog	1,050
34	Aparri	1,008
35	Calapan	970
36	Malabang	968 3/
37	Virac	736
38	Allah Valley	712 3/
39	Naga	646
40	Puerto Princesa	644
41	Lubang	554
42	Ormoc	390
43	Basco	356 3/
44	Malaybalay	312 3/
45	Sanga-Sanga (Tawi-Tawi)	306 3/

1/ Total Air Carrier Operations for Lahug and Mactan Airports.

2/ Not included for service since commercial operations have been erratic during previous years and now only resumed again in January 1965.

3/ Not included for service due low number of Air Carriers flights presently scheduled.

TABLE IV - 8

AIRCRAFT OPERATIONS - CY 1965

Rank	Airport	Commercial	Private	Military	Total
1	Manila	57,226	52,624	21,938	131,788
2	Cebu (Lahug only)	30,090	11,558	3,088	44,736
3	Bacolod	13,668	5,806	390	19,864
4	Davao	9,258	5,130	428	14,816
5	Zamboanga	5,815	6,218	884	12,917
6	Cagayan de Oro	8,372	1,072	731	10,175
7	Iloilo	6,714	2,956	360	10,030
8	Cotabato	5,728	1,260	290	7,278
9	Baguio	1,982	2,372	1,964	6,318
10	Legaspi	5,536	426	282	6,244
11	Cauayan	4,854	1,090	158	6,102
12	Plaridel	118	5,884	4	6,006
13	Bancasi (Butuan)	3,682	1,092	58	4,832
14	Dipolog	4,098	264	122	4,484
15	Dumaguete	3,508	616	160	4,284
16	Tuguegarao	3,604	176	228	4,008
17	Maria Cristina (Iligan)	3,446	390	142	3,978
18	Surigao	3,686	160	68	3,914
19	San Jose (Mindoro)	3,048	300	250	3,598
20	Mamburao	3,306	126	56	3,488
21	Tacloban	2,882	400	186	3,468
22	Roxas	2,970	230	230	3,430
23	Kalibo	2,502	220	410	3,132
24	Misamis	2,112	912	102	3,126
25	Laoag	2,488	254	318	3,060
26	Jolo	2,114	504	130	2,748
27	Daet	2,560	54	68	2,682
28	Buayan (General Santos)	1,938	566	138	2,642
29	Aparri	1,720	278	124	2,122
30	Masbate	1,484	294	92	1,870
31	Calapan	1,152	364	210	1,726
32	Tagbilaran	904	732	86	1,722
33	Calbayog	1,430	152	108	1,690
34	Bagabag	--	1,572	52	1,624
35	Lubang	894	56	598	1,548
36	Malabang	1,454	28	44	1,526
37	Vigan	1,226	98	144	1,468
38	Naga	898	402	162	1,462
39	Marinduque	1,226	98	126	1,450
40	Romblon	1,226	90	112	1,428
41	San Fernando	90	582	718	1,390
42	Tandag	482	600	38	1,120

(continued next page)

216

Table IV-8, continued
Aircraft Operations - CY 1965

Rank	Airport	Commercial	Private	Military	Total
43	Puerto Princesa	862	206	46	1,114
44	Rosales	138	668	120	926
45	Allah Valley	806	76	40	922
46	Malaybalay	500	192	210	902
47	Virac	736	18	144	898
48	San Jose de Buenavista	682	66	102	850
49	Hilongos	584	192	60	836
50	Sanga-Sanga (Tawi-Tawi)	332	144	96	572
51	Basco	384	26	108	518
52	Baler	2	344	150	496
53	Palanan	16	374	44	434
54	Guiuan	288	12	82	382
55	Sorsogon	292	40	36	368

TABLE IV - 9

AIRCRAFT OPERATIONS - CY 1966

Rank	Airport	Commercial	Private	Military	Total
1	Manila	55,578	57,688	23,023	136,289
2	Cebu (Mactan & Lahug)	32,763	14,794	35,354	82,912
3	Bacolod	11,824	6,026	380	18,230
4	Davao	7,626	8,780	246	16,651
5	Zamboanga	6,180	7,735	1,147	15,062
6	Iloilo	4,956	4,000	442	9,398
7	Cagayan de Oro	7,876	856	622	9,354
8	Cotabato	6,986	1,370	114	8,470
9	Baguio	1,818	2,976	2,288	7,082
10	Legaspi	4,390	344	232	4,966
11	Cauayan	3,718	1,040	174	4,932
12	Bancasi (Butuan)	3,464	924	106	4,494
13	Dumaguete	4,038	332	80	4,4[illegible]0
14	Plaridel	2	4,434	12	4,448
15	Tacloban	3,256	344	244	3,844
16	Maria Cristina (Iligan)	3,376	342	58	3,776
17	Dipolog	3,518	116	60	3,694
18	Jolo	2,210	586	332	3,128
19	Misamis	2,388	674	50	3,112
20	Surigao	2,786	120	40	2,946
21	Tuguegarao	2,646	108	156	2,910
22	San Fernando	88	1,930	788	2,806
23	Roxas	2,274	198	126	2,598
24	Mamburao	2,374	154	34	2,562
25	Laoag	1,900	228	290	2,418
26	Buayan (General Santos)	1,828	368	88	2,284
27	San Jose (Mindoro)	1,614	138	392	2,144
28	Kalibo	1,896	146	84	2,126
29	Daet	1,748	30	42	1,820
30	Romblon	1,668	44	82	1,794
31	Masbate	1,200	466	72	1,738
32	Vigan	1,170	222	160	1,552
33	Tagbilaran	1,180	266	84	1,530
34	Rosales	40	1,308	90	1,438
35	Lubang	554	174	662	1,390
36	Calapan	970	222	118	1,310
37	Marinduque	1,066	90	148	1,304
38	Bagabag	164	1,036	78	1,278
39	Aparri	1,008	122	60	1,190
40	Calbayog	1,050	94	20	1,164
41	Naga	646	340	142	1,128
42	Puerto Princesa	644	232	108	984

(continued next page)

Table IV-9, continued
Aircraft Operations - CY 1966

Rank	Airport	Commercial	Private	Military	Total
43	Malabang	968	14	--	982
44	Tandag	254	662	4	920
45	Virac	736	10	154	900
46	Allah Valley	712	44	18	774
47	Hilongos	534	104	32	670
48	San Jose de Buenavista	596	18	36	650
49	Sanga-Sanga (Tawi-Tawi)	306	158	146	610
50	Malaybalay	312	126	136	574
51	Ormoc	390	104	50	544
52	Lingayen	20	506	12	538
53	Baler	--	350	134	484
54	Basco	356	8	84	448
55	Iba	--	280	94	374

Military Airports

	Itinerant	Local	Total
1. Clark AB	168,853	63,308	232,161
2. Cubi NAS	24,685	75,998	100,683
3. Sangley NAS	22,645	23,493	46,138

line, beyond which oceanic routes commence and oceanic separation standards apply. These standards require 100 nautical miles lateral separation between route centerlines or 20 minutes longitudinal (time) separation between aircraft at the same altitude. We recommend that oceanic route extensions to the domestic VOR airways/routes be designated to permit reduced separation minima along VOR radials extending into oceanic control area pursuant to the standard documented by ICAO[1]. This standard permits reduction in the 100 nautical mile lateral separation when electronic aids to air navigation enable the pilot in command of an aircraft to determine accurately the aircraft's position. These oceanic route extensions to the VOR airway system should extend to the maximum distance which would be compatible with a suitable minimum reception altitude (150-175 NM) as determined by flight inspection. This would permit the application of reduced separation minima for considerable distances within the oceanic area which is not now possible. The prime objective would be to extend these routes to a point where lateral oceanic separation would exist between the various heavily travelled oceanic route centerlines that converge on domestic airway ingress/egress fixes.

Accomplishing these recommendations will greatly increase controller capability for providing efficient service with maximum utilization of airspace.

(1) NAVAID Criteria

U. S. FAA criteria specify that a community served by an airport becomes a candidate for IFR navigation capability between the airport and enroute structure when:

(a) it has 200 or more annual instrument approaches, or

(b) it has 1, 825 or more annual passenger originations.

An instrument approach is defined as an IFR approach made by an aircraft to an airport when the visibility is less than three miles and/or the ceiling is at or below the minimum initial approach altitude: No statistics were available for the number of instrument approaches conducted to national airports in the Philippines.

Direct application of the criteria of 1, 825 or more passenger originations (3, 650 passenger movements) for CAA operated airports is not considered feasible. The Team was only able to obtain passenger movement information for one year, CY 1965, and firm

1/ ICAO Document 4444-RAC/501/8, Part III, Paragraph 11.1.

statistics, based upon adequate historical data, could not be developed to assure that these passenger movements would be sustained or would increase in years to come.

Through analysis of airline schedules for the past six years we were able to establish an average rate of change in the number of scheduled air carrier operations during this period and thus obtain a substantial indication of growth or decline in the number of passenger movements. The right hand column of Table IV-5 in this subsection indicates the annual average percent of change in scheduled operations during the six-year period. Annual decreases are shown in parenthesis. It should be noted that higher ranking airports all show substantial increases while most of the lower ranking airports show no change or a definite decline.

To establish a criterion from which we could select those airports which would qualify for IFR navigation capability, we compared this information with the number of passenger movements for each airport shown in Table IV-4. We determined that, with the exception of Calbayog and Kalibo, the airports in Table IV-4 that recorded 5,000 or more passenger originations (10,000 or more total passenger movements) were also airports which had recorded growth in scheduled operations during the six-year period. Airports with less than 5,000 passenger originations generally show no change, small increases or a definite decline in scheduled operations.

The cost of NAVAID installation in the Philippines is substantial because a considerable amount of site development is required at many locations and engine generated power must be provided for most installations. In the judgment of the Team, expenditures of such large sums of money cannot be justified at lower activity locations where cost/benefit ratios are questionable. Our recommendations then must be limited to those locations where a sufficient number of passenger movements will be maintained to warrant the expenditure for facilities and/or service.

For this development plan we are recommending that IFR navigation capability be provided only to those airports which reported 5,000 or more passenger originations (10,000 passenger movements). Thirty-eight national airports meet this criterion. They are the locations listed in Table IV-4 above the separation line. Calbayog and Kalibo are included. Although annual schedules at these locations have declined 6.3 and 5.0 percent, respectively, for six years, a reduction in passenger movements at this same general rate for the next several years would not drop these locations below the recommended criterion.

Dual transmitters are recommended for all VOR, TVOR, and NDB NAVAID facilities to assure continuous operations.

U. S. FAA standards require that VOR/VORTAC facilities comprise the primary system for short-range navigation. Most tactical air navigation (TACAN) or distance measuring equipment (DME) equipped aircraft operating in and through the Philippines are jet aircraft. It is also apparent that during the next several years the majority of DME equipped aircraft using the domestic system will be operating above FL 240. We do not recommend that VOR facilities be provided with DME equipment except where such facilities are required to provide guidance for international and domestic traffic in the high altitude airway system. In the interest of cost/benefit, it is also not considered appropriate to recommend DME installations at facilities where a military TACAN is installed as a collocated or even an adjacent facility.

An Instrument Landing Facility (ILS) is required (by U. S. criteria) at an airport which records 700 or more annual instrument approaches with certain additional provisos. As stated before, instrument approach activity figures were not available for Philippine airports. ILS installations recommended in this report are justified by individual location.

Airport Surveillance Radar, with Air Traffic Control Radar Beacon System (ASR/ATCRBS) capability, meets establishment criteria for approach control locations recording a total of 20,000 or more annual instrument operations and 100,000 or more annual itinerant operations at all airports (located within radar coverage) under its jurisdiction.

An Automatic Terminal Information Service (ATIS) facility transmits transcribed terminal information to aircraft arriving and departing terminal areas. An airport with an Airdrome Control Service recording 100,000 or more annual itinerant operations is a candidate for ATIS.

An airport recording 50,000 or more annual itinerant operations is a candidate for a VOR Test Facility (VOT) providing a certified VOR ground check point is not available or capable of being established. An airport recording 75,000 or more annual itinerant operations is eligible for a VOT regardless of whether a certified VOR ground check point exists.

(2) Navigation Facilities

The airway system we have proposed is based upon enroute VOR, terminal VOR (TVOR), and Non-Directional Radio Beacon (NDB) navigation facilities (see Exhibit IV-G). Twenty-three VOR's make up the basic enroute system. Nineteen of these facilities will also provide terminal service to qualified locations. Enroute facilities are required at Ormoc and San Fernando and their location at these airports will permit terminal service. TVOR's are recommended at eleven locations to provide terminal service. Although performance is basically the same as a VOR, the TVOR is a less expensive navigation aid and operates at a lower power. The TVOR's also provide enroute service over the shorter distances to supplement the basic enroute system.

Thirteen NDB's are recommended. They provide a means for enroute navigation via the longer airway segments and terminal service to lower activity locations. At other terminals they supplement existing facilities as approach aids. An NDB is recommended at some terminal locations in the interest of cost/benefit. For example, Jolo is a relatively busy terminal location and as such qualifies for the installation of a VOR facility. However, from our inspection of the area it appears the nature of terrain in the vicinity of this location precludes installation of a VOR at the airport which could provide reliable enroute and instrument approach course guidance. The only satisfactory site appears to be atop an 823-foot hill approximately 2 miles on a bearing of 40 degrees from the airport. A VOR installation at this site would be extremely expensive because of the high cost of site development, the need for engine generated main and standby power and a VHF link to control and monitor the facility. Because of the terrain, instrument approach altitude minimums would also be high. The cost of a VOR at this site exceeds that of an NDB facility (with engine generated main and standby power) by approximately $175,000. For this reason the NDB facility is recommended at Jolo.

DME facilities are recommended at those NAVAID locations that support the high altitude airway system providing a TACAN installation does not exist as a collocated or adjacent facility at the same location. These facilities materially assist the pilot in planning and executing enroute descents and the air traffic controller in his separation of climbing and descending jet traffic.

The ICAO indicates the standard for establishing ILS facilities at international airports.[1/] Manila airport is regularly used by international air services. It qualifies for installation of ILS, and one is presently being installed. Mactan is the primary international alternate airport in the Philippines. As such, this airport should have the NAVAID

1/ ICAO Publication: International Standards and Recommended Practices, Aeronautical Telecommunications, Annex 10, Chapter 2.

capability required for an international airport. Additionally, the future potential of this airport as being one regularly used by international air services must be considered. Traffic growth has also been considerable in recent years. A conservative projection of traffic activity at Mactan indicates that total operations will exceed 100,000 within five years. For these reasons we are recommending and programming an ILS installation at Mactan in the fifth year of this plan. Admittedly, this recommendation is based in part upon projection and probability. As such, establishment of the facility should be subject to critical scrutiny by the CAA prior to actual installation.

Manila International Airport qualifies without question for installation of ASR/ATCRBS equipment. This installation should be ASR-5 (or equivalent) to provide the quality of radar service needed at this high activity terminal.

An ATIS facility transmits transcribed terminal information, such as wind velocity and direction, altimeter setting, active runway, instrument approach in use, etc., to aircraft arriving and departing terminal areas. It permits the air traffic controllers to concentrate more on their primary function of controlling traffic by eliminating the necessity of furnishing this information to each aircraft and reduces frequency congestion in the terminal area. Manila International Airport qualifies for ATIS and installation is recommended.

The airway system recommended is primarily based upon the use of VOR facilities. In all, 34 VOR and TVOR facilities are recommended. A definite need exists for a test signal for the pre-flight checking of aircraft VOR receivers. Manila and Mactan airports meet accepted criteria for VOT and installation is recommended.

Installation or retention of CAA NAVAID's is recommended at the following locations:

<u>VOR Facilities</u>

1. Laoag
2. Aparri
3. Cauayan
4. San Fernando
5. Cabanatuan
6. Manila
7. Jomalig
8. Alabat
9. Lipa
10. Lubang
11. Legaspi
12. Masbate
13. Roxas
14. Ormoc
15. Iloilo
16. Cebu (Mactan)
17. Bancasi (Butuan)
18. Cagayan de Oro
19. Dipolog
20. Iligan
21. Cotabato
22. Davao
23. Zamboanga

TVOR Facilities

1. Tuguegarao
2. Daet
3. Mamburao
4. San Jose (Mindoro)
5. Kalibo
6. Bacolod
7. Tacloban
8. Dumaguete
9. Surigao
10. Misamis (Ozamis)
11. Buayan (Gen. Santos)

NDB Facilities

1. Baguio
2. Antipolo
3. Rosario
4. Naga
5. Calapan
6. Marinduque
7. Virac
8. Romblon
9. Calbayog
10. Puerto Princesa
11. Tagbilaran
12. Zamboanga
13. Jolo

DME Facilities

1. Aparri
2. Cabanatuan
3. Manila
4. Iloilo
5. Jomalig
6. Lipa
7. Alabat
8. Ormoc

ILS Facilities

1. Manila
2. Mactan

ASR/ATCRBS Facility

1. Manila

ATIS Facility

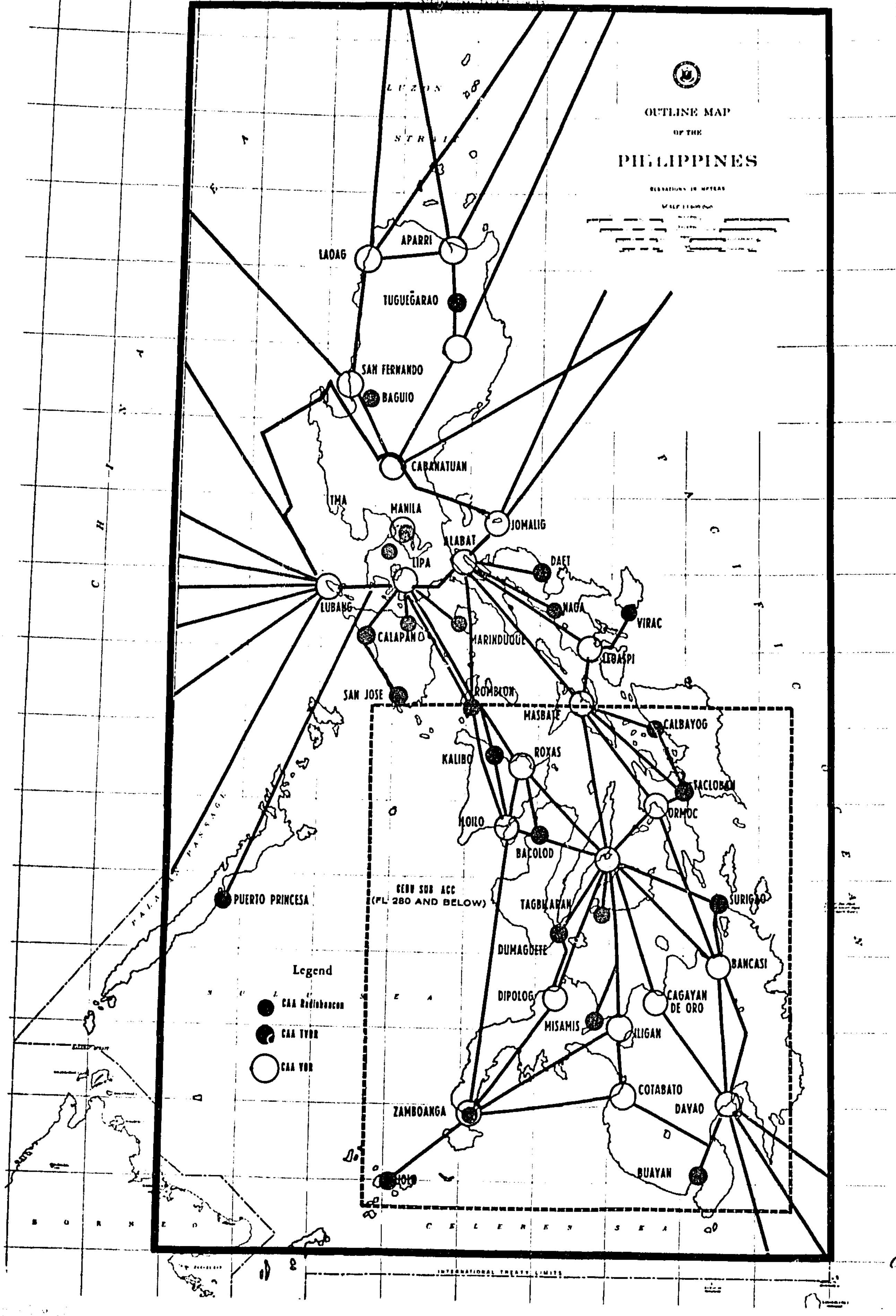
1. Manila

VOT Facilities

1. Manila
2. Mactan

1/ Following the installation of VOR or TVOR facilities at existing CAA NDB locations, we recommend decommissioning of NDB's at locations other than those listed here.

EXHIBIT IV-G
PROPOSED LOW ALTITUDE AIRWAY SYSTEM



226

(3) Priorities:

A complete airway system, with sufficient navigation aids as well as effective air traffic and communications service is required. Obviously all requirements of the system cannot be met simultaneously and a schedule of priorities is necessary. We have scheduled installation of facilities and equipment in the five-year plan in four increments as follows:

1. First 2 years
2. 3rd year
3. 4th year
4. 5th year

Considerable engineering work, site survey and other planning activity will be required prior to the actual installation of initial facilities, and for this reason the first increment is scheduled for 2 years. It should be possible to accomplish planning activity for later increments in advance of the installation year.

The priority schedule is based upon the need to provide enroute and terminal service to higher activity locations first and to lesser activity stations in an orderly progression. In a few instances, lower activity stations receive service in the early increments because installation of facilities that serve them is needed to provide enroute service to higher activity locations. The following schedule is recommended for installation of NAVAID facilities:

FIRST 2 YEARS	3RD YEAR	4TH YEAR	5TH YEAR
VOR Facilities			
Lipa	Dipolog	Ormoc	Aparri
Roxas	Cabanatuan	Cebu	Cagayan de Oro
Iloilo	Cauayan	Jomalig	San Fernando
Cotabato	Alabat	Luban	
Iligan	Legaspi		
Bancasi (Butuan)	Masbate		
Zamboanga			
Manila (Training Facility)			
TVOR Facilities			
Bacolod	Tacloban	Daet	Mamburao
	Dumaguete	Kalibo	San Jose
		Tuguegarao	Misamis
		Surigao	
		Buayan	

227

FIRST 2 YEARS	3RD YEAR	4TH YEAR	5TH YEAR
NDB Facilities			
Naga (50 W)	Marinduque (50 W)		
Virac (50 W)	Calbayog (100 W)		
Calapan (50 W)	Puerto Princesa (1 KW)		
Jolo (100 W)	Baguio (50 W)		
DME Facilities[1/]			
Lipa	Cabanatuan	Jomalig	Aparri
Iloilo	Alabat	Ormoc	
ILS Facility			
			Mactan
ASR/ATCRBS Facility			
	Manila		
ATIS Facility			
	Manila		
VOT Facilities			
Manila			
Mactan			

Because of the size of the VOR and TVOR installation program, the Team is recommending these installations be accomplished on a turn-key contract basis. This aspect is further discussed in a later portion of the report. It is mentioned here only to indicate why the lower activity locations, at which NDB facilities are installed, receive service in the first two priority increments. The NDB facilities can be installed by the CAA, thus they appear early in the program.

(4) System Increments

(a) First 2 years.

1/ DME facilities should be installed concurrently with the VOR facilities at these locations.

228

The installation of NAVAIDS recommended in this increment will permit establishment of additional airways shown in Exhibit IV-H. When added to the existing system, this airway configuration will provide enroute and terminal service to the 10 highest ranking terminals in total passenger movements (see Table IV-4). Maria Cristina (Iligan) and Roxas are also included to satisfy requirements for enroute service to other Locations. The existing airway system and installation of NDB facilities during this period permit service to eight additional locations. Thus, 19 of the 38 qualifying terminals are served in the first two years.

(b) 3rd year (Exhibit IV-I)

Eight additional airports receive enroute and terminal service. An alternate route from Manila to Mactan becomes available as well as a more direct VOR routing between Mactan and Zamboanga. Addition of the VOR at Cauayan provides a shorter route to the north from Manila to Okinawa and Tokyo. Service is now available to 14 of the 16 highest ranking terminals in total passenger movements.

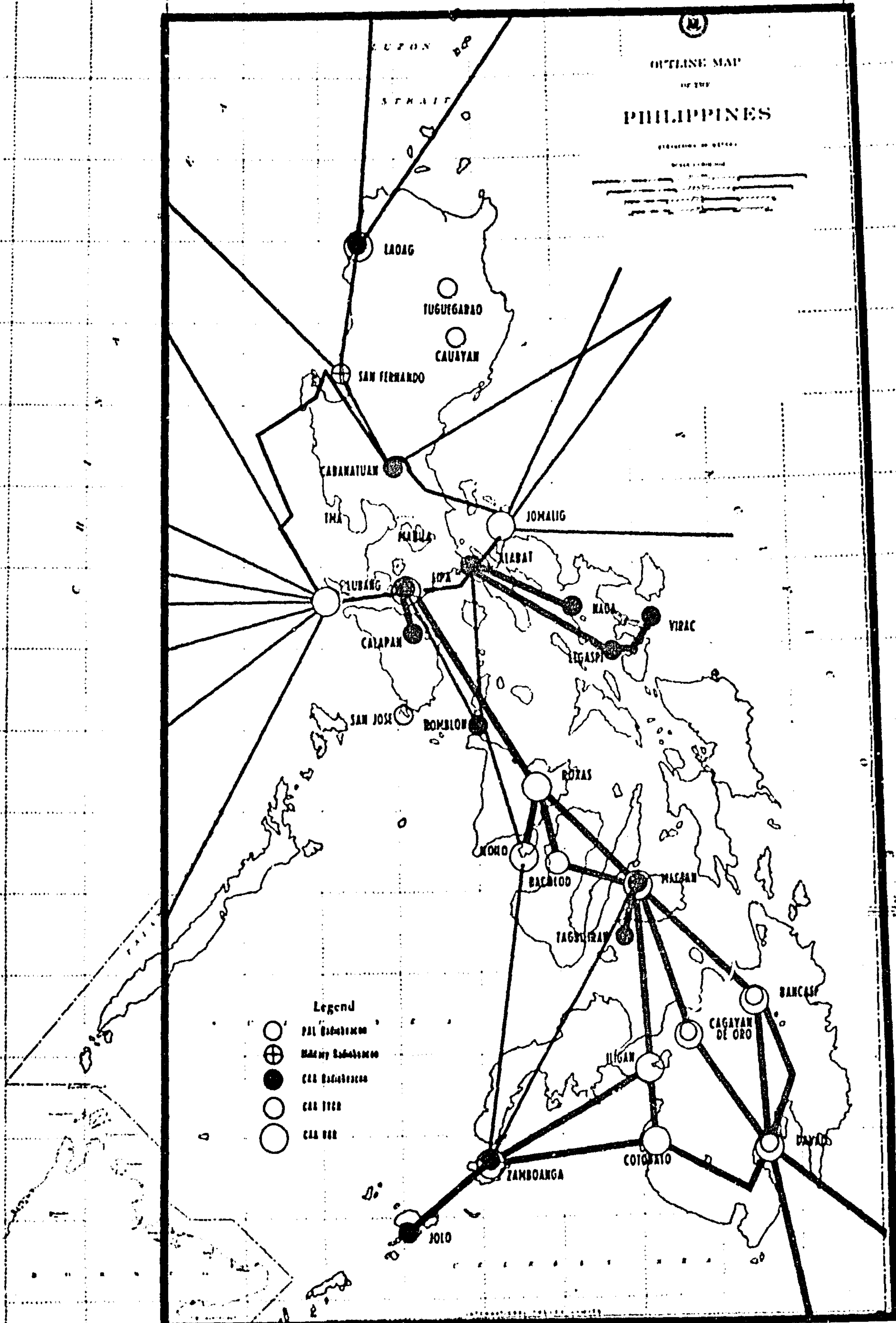
Masbate receives service due to the need for an enroute VOR at this location, and Marinduque, Calbayog and Puerto Princesa are included through establishment of NDB facilities.

An NDB is also installed at Baguio. Recommendation for this facility is not intended to provide enroute IFR or terminal service. Because of airport location and terrain, it is extremely doubtful that a safe instrument approach procedure to this airport is possible that would offer ceiling or visibility landing minimums lower than that required for VFR flight. Baguio was the ninth busiest airport in the Philippines in total aircraft operations in calendar years 1965 and 1966. Over 25 percent of these operations were air carrier aircraft. The NDB here is recommended only as an aid to assist VFR aircraft in their operations to and from this airport.

(c) 4th year (Exhibit IV-J)

Six additional qualifying airports receive enroute and terminal service. The 23 highest ranking passenger movement locations are included as well as 33 of the 38 airports which qualify for service. An alternate route from Manila to Davao and a more direct VOR routing from Manila to Iloilo are now available. To provide the required route from Tacloban to Mactan, installation of a VOR at Ormoc is necessary and this community also receives terminal service.

EXHIBIT IV-H
AIRWAY SYSTEM - FIRST 2 YEARS



230

EXHIBIT IV-I
AIRWAY SYSTEM - 3rd YEAR

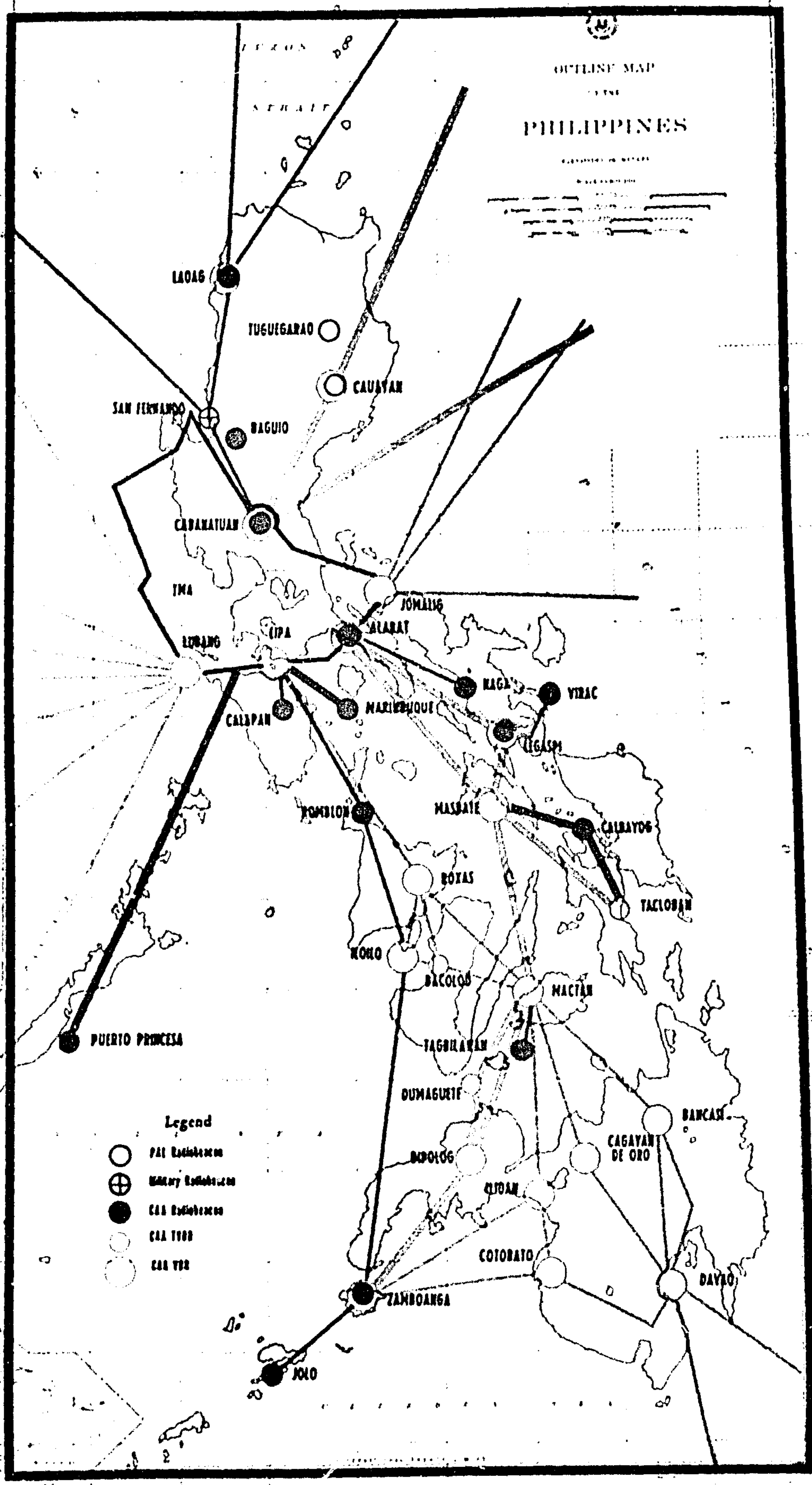
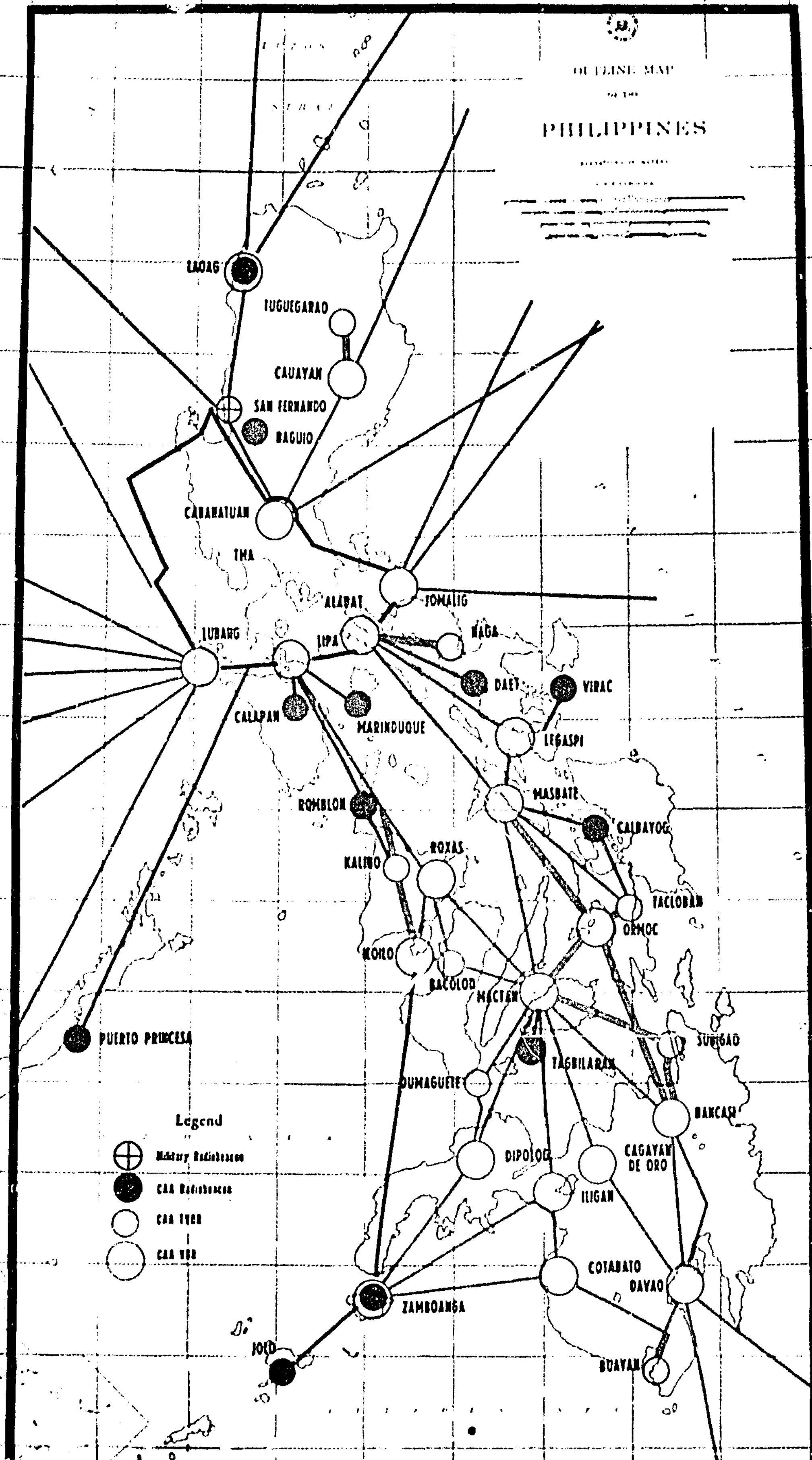
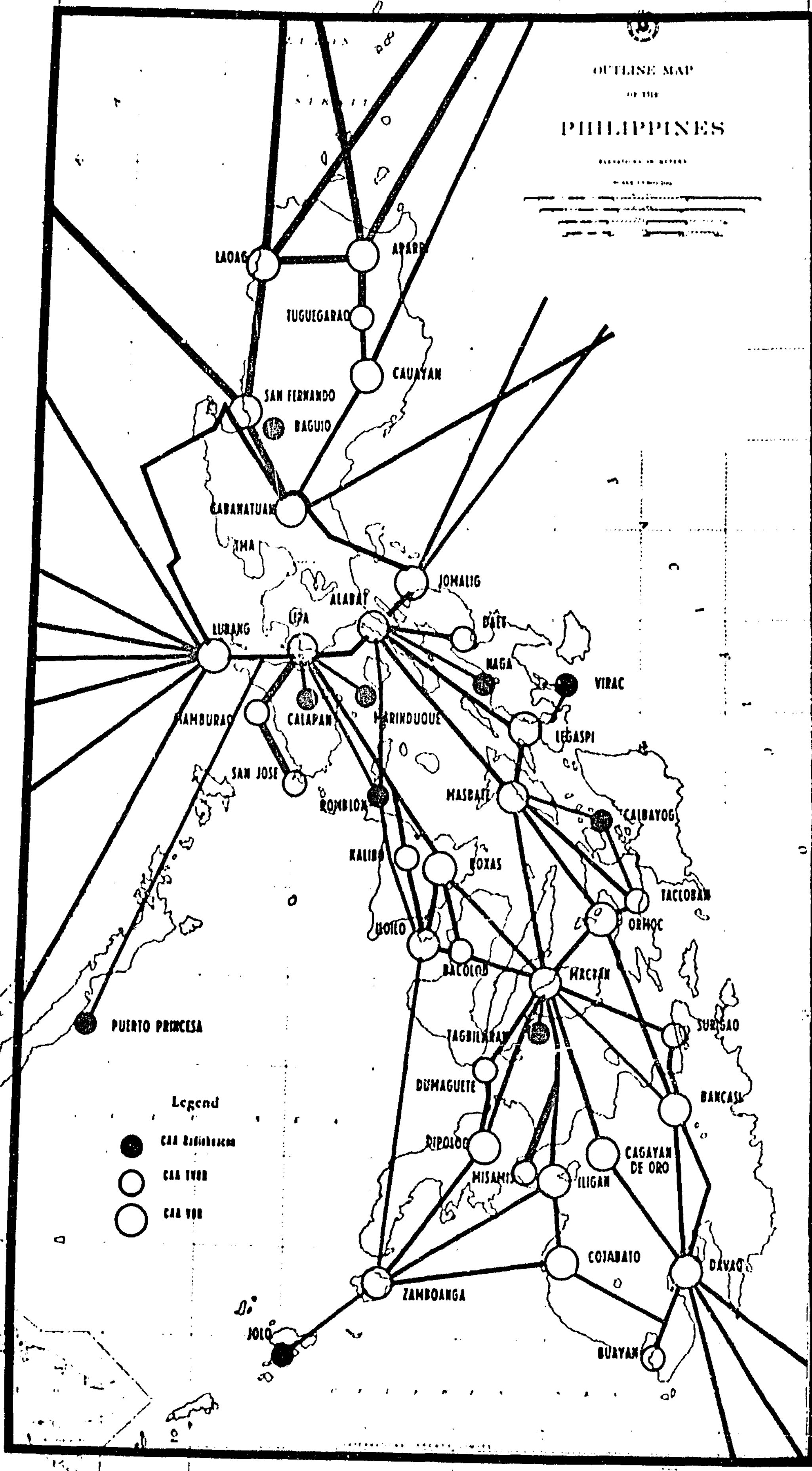


EXHIBIT IV-J
AIRWAY SYSTEM - 4th YEAR



232

EXHIBIT IV-K
AIRWAY SYSTEM - 5th YEAR



(d) 5th year (Exhibit IV-K)

The remaining five locations that qualify for service are included. An enroute aid is required at San Fernando airport and this location also receives terminal service. With the complete airway system, enroute and terminal service is now provided for 38 of the 42 highest ranking airports in scheduled air carrier operations (Table IV-7). (Baguio cannot be considered as receiving terminal service.) Airways are also provided to accommodate the 40 busiest air carrier non-stop flight segments (Table IV-6), and a total of 60 of the 100 different flight segments presently scheduled. Each of these 60 segments are served by direct or very nearly direct airway routings.

(5) High Altitude Airway System

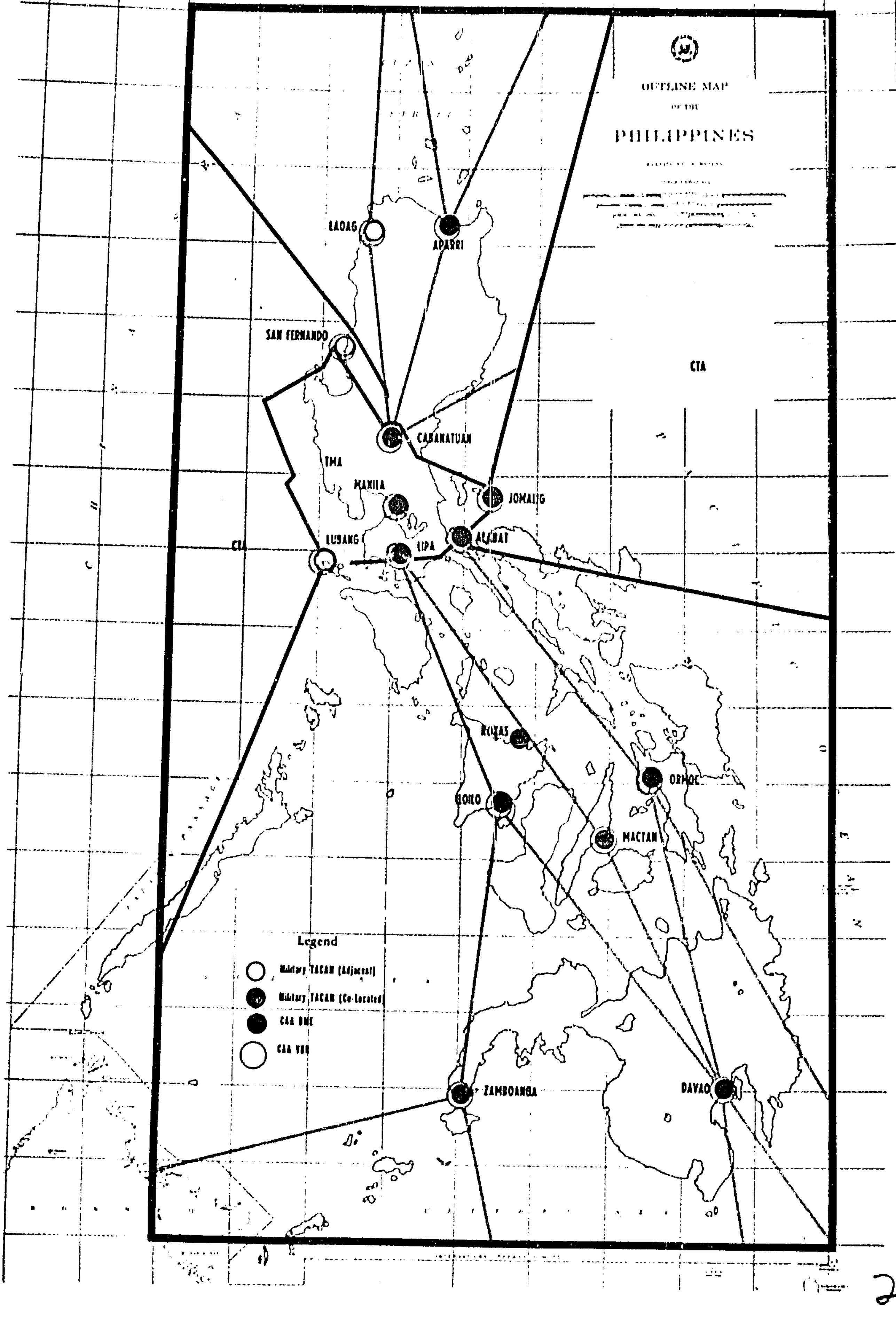
The recommended high altitude VOR airways are shown in Exhibit IV-L. No additional VOR facilities are required to support this system.

The proposed domestic airway alignment basically provides route segregation for inbound/outbound traffic flow to the north and south of Manila. Alternate routes, which bypass the higher activity direct route via Mactan, are provided for Manila-Davao traffic. User route planning as well as air traffic control flexibility will be enhanced by the designation of additional oceanic routes and oceanic control area (CTA).

It is intended that the two CTA's be designated to serve both the low and high altitude strata. They are only shown on the high altitude exhibit for ease of reference. The recommended altitude limits of these CTA's are: lower limit--FL 50 and upper limit--FL 450. The present CTA, extending east from the Jomalig VOR to the FIR boundary, is enlarged slightly to the south to include oceanic ingress/egress routing via the Alabat VOR. To the west, from Poro Point and Lubang to the FIR boundary, CTA is also recommended to encompass the several oceanic routes.

Proposed DME locations are also included in Exhibit IV-L. All are collocated with VOR installations. Also depicted are the existing and proposed military TACAN facilities. Where collocated DME aids are not installed, TACAN facilities (either collocated or adjacent) will be available to provide distance information to pilots from each of the 14 VOR locations that make up the system.

EXHIBIT IV-L
PROPOSED HIGH ALTITUDE AIRWAY SYSTEM



d. Air Traffic Facilities

The Philippine Government, as an ICAO Contracting State, has determined that Air Traffic Service will be provided in accordance with ICAO standards[1/] in the territory over which it has jurisdiction. The CAA has been designated as the authority responsible for providing Air Traffic Control Service, Flight Information Service and Alerting Service within airspace designated as the Manila FIR. This subsection deals with the Area Control, Approach Control and Aerodrome Control Services required to provide adequate En Route and Terminal Air Traffic Service to users of the Airway System recommended in the Five-year Development Plan. Our recommendations concerning Flight Information and Alerting Services appear in a later section of the report.

Three types of facilities provide Air Traffic Control Service. They are the Area Control Center (ACC), Approach Control (APP), and Aerodrome Control (ADC) facilities. Enroute and Terminal Service for IFR flights in the System are normally provided by one or more Area Control Center(s). At certain airports, where warranted by air traffic volume, Aerodrome Control towers are required to provide service for VFR traffic and to assist in the provision of service to IFR aircraft. Additionally, the volume of IFR traffic in a given terminal area may require the provision of Approach Control Service for arriving and departing IFR flights. When APP Service is required in a terminal area, it is normally collocated with an Aerodrome Control tower facility.

(1) Criteria

Area Control centers are required to provide Air Traffic Control Services for the safe and expeditious flow of IFR traffic. The ACC is the hard core of enroute traffic control. However, because of the necessarily integrated nature of the Airway System, this facility may serve both enroute and terminal functions. For example, the ACC may provide service for controlled flights at many airports with instrument approach procedures where the volume of IFR traffic does not warrant establishing an aerodrome control and approach control facility.

Long Range Radar (LRR) provides the controller with a visual presentation of his traffic and results in higher utilization of the airspace by permitting reduced separation minima to be employed when traffic is under radar control. Secondary surveillance radar

1/ ICAO Document, Annex 11, Air Traffic Services.

is an integral part of an Enroute Radar System. Its basic function is to supplement LRR by transmitting interrogating signals to transponder equipped aircraft to facilitate radar identification. Basically, U.S. FAA criteria permit establishment of Long Range Radar to provide radar coverage on airways and routes with 60 or more IFR peak day flights.

U. S. FAA criteria specify that an airport with 24,000 or more annual itinerant aircraft operations is a candidate for an airport control tower. Direct application of these criteria in the Philippines are not considered feasible, however, for several reasons. At most of the busier airports, commercial air carrier aircraft operations considerably exceed the number of military and private aircraft operations. Because of the larger volume of passenger movements involved, the need for adequate Air Traffic Service is considerably increased. Additionally, terrain considerations and the remoteness of certain higher activity locations, particularly in the Mindanao area, preclude the effective provision of this service from adjacent locations. Inability to establish Remote Center Air/Ground (RCAG) and Remote Communication Outlet (RCO) facilities in these areas must also influence the criteria for providing ADC and APP Service. Conversely, ADC should not be provided at airports reporting a low volume of aircraft movements since the cost of providing service becomes excessive for the number of aircraft involved. Using a criterion of 15,000 annual operations as a broad guideline, permits the best combination of cost versus benefit when all relevant factors are considered.

Approach Control Service may be implemented at Aerodrome Control towers on airports having a radio navigational aid that is suitable for holding purposes and an approved approach procedure, or if the airport has an ILS installed or programmed, provided that the service can be implemented within the basic resources of the facility. This service may be extended to an adjacent airport within 30 nautical miles using direct or indirect communications if air/ground coverage exists at the final approach altitude over the navigation aid serving the adjacent airport. Communications equipment necessary to provide a discrete approach control channel and associated point-to-point communications may be requested when:

<u>At ADC Tower Airports</u>--5,000 or more annual instrument operations are recorded and the airport has an Instrument Landing System programmed.

<u>At Adjacent Non-Tower Airports</u>--1,500 or more annual instrument operations or 1,825 or more annual passenger originations are recorded and the airport is within 30 nautical miles of the Approach Control facility.

Adherence to the above FAA criteria is recommended for establishing APP facilities in this Development Plan except with regard to the communications equipment necessary to provide a discrete Approach Control channel. This means that each ADC tower will also provide APP Service where a suitable navigational aid serves the airport. At lower activity ADC locations discrete frequencies for local control and ground control functions are not required, therefore discrete approach control channels are being recommended to reduce frequency congestion and interference at APP locations regardless of whether an ILS is installed or programmed.

(2) Area Control Centers

Two ACC facilities, located at Manila and Cebu (Mactan), are recommended to provide enroute IFR service within the proposed Airway System. Although certain factors support providing this service for the entire System from one facility at Manila, they are far outweighed by other considerations. Reliable fixed and mobile communications capability is an absolute System requirement. A link communications system will provide the main point-to-point communications for Luzon and the Visayan area. Several repeater sites in this ystem will also serve as remote outlets for mobile communications. Aeronautical fixed communication requirements for the Mindanao area will be satisfied in a different manner. Manila and Mactan are the major air traffic hubs in the country and the major communications switching centers should also be at these locations. The fixed and mobile communications system will be in the building stage during the first several years. Many factors may affect the reliability of this system until sufficient experience is gained to assure that its components will remain reliable during adverse conditions. For example, quite severe weather, with heavy precipitation and very high winds, often occurs during the several tropical storms recorded each year. The relatively large number of terminal areas to receive air traffic service in the southern half of the Archipelago also support the need for an ACC facility in the Cebu area.

Only general requirements of the two ACC facilities are discussed since many factors will influence the actual requirements. Detailed operational, procedural and engineering planning by the CAA will be required to determine specific needs. Minimum communication switching requirements were jointly determined by a member of the Team and representatives of the Airways Operations Division.

Remote Center Air/Ground (RCAG) communications facilities are recommended to provide direct pilot-controller two-way radio-telephonic communication in as much of the domestic system as possible commensurate with costs involved. In those portions of the ACC areas of responsibility

X 238

not served through RCAG installations, two-way communication with IFR aircraft will be accomplished by relay through Airways Communication Stations. Specific recommendations for the required mobile communications, including the location of remote sites, are included here. Aeronautical fixed communications requirements for air traffic and ACS facilities are contained in section IV. C. 2. f. of the report.

Cebu ACC

As indicated in Phase I recommendation, we support the immediate construction of a new building at Mactan for the Cebu sub-ACC and ACS. Considerable expansion of the Cebu ACC facility will be required as the Five-year Development Plan is implemented. A requirement for up to seven control sectors will exist depending upon the air traffic activity experienced during this period and the operational procedures employed to handle the air traffic. Additional sectors for flight data, the coordinator and supervisor positions, as well as installation of other ancillary equipment (recorders, etc.) will be required. Communication switching system requirements indicate that a total of 40 terminations in the facility will be necessary. This number will accommodate the estimated minimum basic requirement of 33 terminations when Phase II of this Plan is complete, and provide enough spares to satisfy additional requirements which may occur during this period and permit later expansion.

During the development plan we recommend the Cebu ACC area of responsibility conform generally to the boundaries depicted on Exhibit IV-G at FL 280 and below. In later years, as the capability of the new Cebu facility permits, and if communications with facilities in the Mindanao area can be further improved through the use of a link communications system, it should be feasible to expand the Cebu ACC area of responsibility to include the higher altitudes and additional airspace in the southern portion of the Manila FIR. In the interim, however, we do not recommend such action due to the limited direct controller-to-pilot communications capability of the System in the Cebu ACC area of responsibility.

Single channel remote VHF capability from RCAG sites at Romblon, Negros and Majic (Cebu) are recommended to provide direct controller-to-pilot air/ground communications. These should be discrete ATC frequencies to reduce interference and permit added flexibility among sectors in the ACC facility. Capability for VHF emergency frequency 121.5 mHz should also be provided the Cebu ACC from RCAG sites at Negros and Majic (Manila ACC will have this capability from the Romblon site). Dual transmit/receive equipment is recommended for each VHF channel to provide backup. Radio coverage from these sites will include several of the higher activity airway segments and ATC communications with IFR aircraft in the remainder of the Cebu ACC area of responsibility would be accomplished through Airways Communication Stations.

Manila ACC

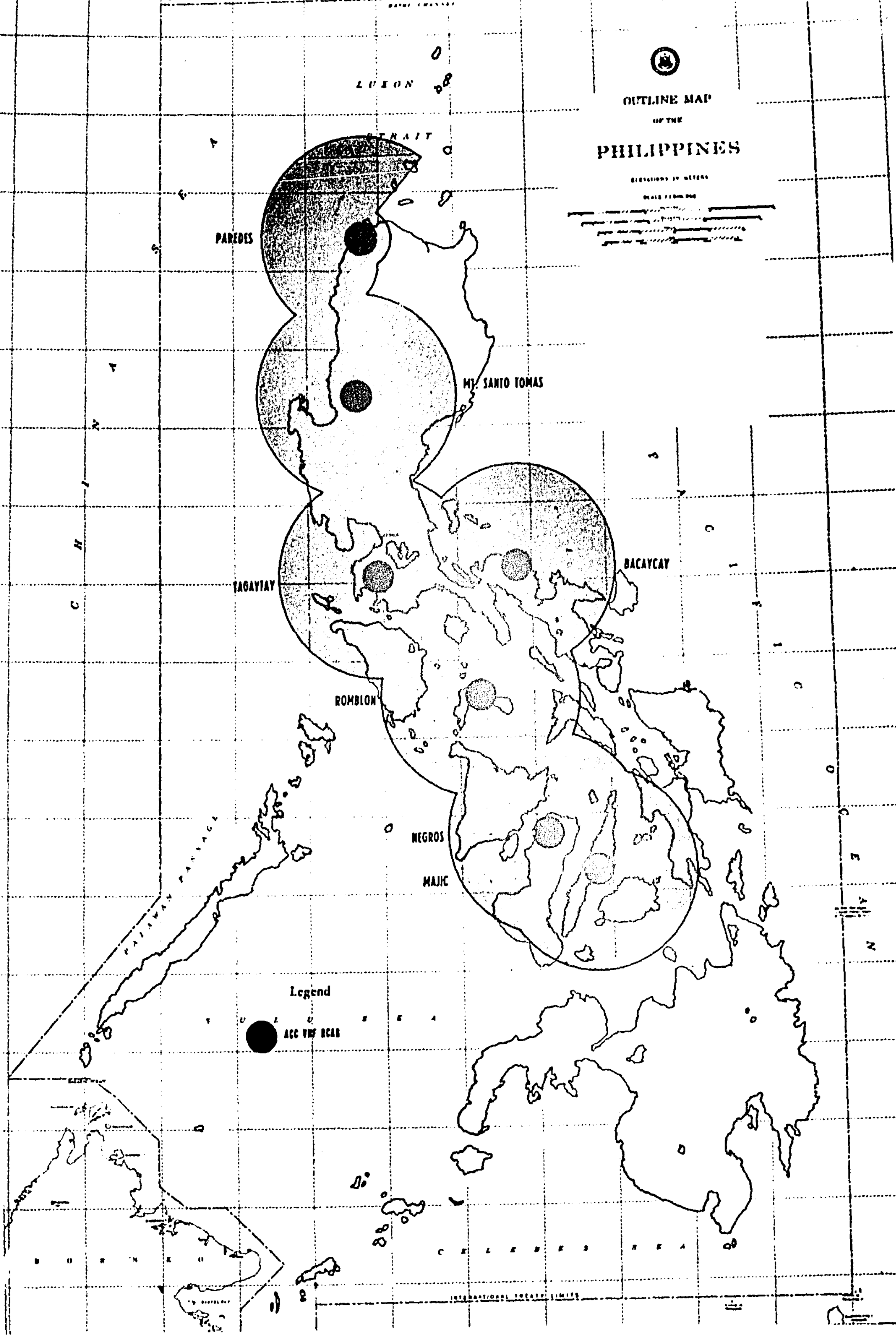
The CAA plans to re-engineer and modify the new ACC facility located in the Manila International Terminal Building as soon as possible to provide area air traffic service in the Manila FIR. The Manila ACC's area of responsibility should include the entire Manila FIR at altitudes above FL 280 and that portion of the FIR at lower altitudes which excludes the Cebu ACC area of responsibility described above. As the Five-year Plan is implemented, additional consoles will be required to provide an estimated minimum of seven control sectors. This figure includes those required for oceanic control. Additional sectors for flight data, coordinator positions, and other ancillary equipment will also be required. The communications switching system should have a capability of at least 45 terminations to provide five spares. The minimum basic requirement when the Phase II is complete is estimated as 40 terminations.

Single channel remote VHF capability from RCAG sites at Laoag, Mt. Santo Tomas, Tagaytay, Bacaycay, Romblon and Majic is recommended to provide direct controller-to-pilot communications. These should each be discrete ATC frequencies to reduce interference and permit sector flexibility in the facility. Capability for VHF emergency frequency 121.5 mHz should be included from the Laoag, Mt. Santo Tomas, Tagaytay, Bacaycay, and Romblon sites. Again, dual transmit/receive equipment is recommended for each VHF channel to provide backup. Air/ground radio coverage from these sites will include the major domestic airway segments in Manila's area of responsibility. ATC communications with IFR aircraft in the remaining portions of the FIR would be accomplished through ACS facilities.

Aeronautical mobile communications coverage from the Remote Center Air/Ground sites recommended in this section is depicted in Exhibit IV-M.

IFR traffic activity on several of the airways and routes providing ingress/egress to the Manila, Clark AB, and Cubi Point NAS terminal areas regularly exceeds the criteria for long range radar. Radar capability for the Manila ACC is considered a basic requirement; however, several factors preclude early establishment of such a system. Due to terrain, adequate radar coverage of the airways/routes involved can only be attained through the use of a minimum of three remote sites.

EXHIBIT IV-M
PHASE II RCAG AERONAUTICAL MOBILE COMMUNICATIONS COVERAGE



Site selection and development, access road and power line requirements, availability of equipment, and the need to completely re-engineer the new ACC facility to accommodate the radar equipment are just a few of the major cost considerations involved to establish the system and remote radar to the ACC facility. In addition to the enormous cost involved, accomplishing such a plan would take considerable time and it is extremely doubtful this type of system could be operational for at least five to seven years.

We recommend the requirements for an enroute radar air traffic system be satisfied through joint-use of existing and proposed air defense radar. This Air Defense System would supplement the present terminal radar systems at Cubi Point NAS, Clark AB and the airport surveillance radar proposed for Manila in the third year of this Plan. Thus, coverage would be available to provide complete air traffic radar service on all routes arriving and departing the Manila complex. Costs would be far less than those involved with a separate long range system and the service could be provided at a much earlier date. We recommend the long range radar presentations from those air defense radar sites in the vicinity of Poro Point, Lubang and Paracale be used in the System. Placement of Air Traffic Control personnel at these sites would be required to provide the service. An agreement between the CAA and the military interests involved would, of course, be a prerequisite to this Plan. Communication and other equipment aspects would have to be jointly determined. The Team was informed that this concept of operation has been discussed among military and CAA interests and met with the general approval of those concerned. The concept proved satisfactory in the United States several years ago and we strongly recommend its application in the Philippines to provide the required enroute radar air traffic services.

(3) Aerodrome Control (ADC) and Approach Control (APP) Facilities

We recommend ADC service be provided from aerodrome control towers at the following seven airports:

1. Manila
2. Lahug
3. Bacolod
4. Mactan
5. Cagayan de Oro
6. Davao
7. Zamboanga

Provision of APP service from these control tower facilities is recommended for each location except Lahug. IFR aircraft arriving and departing this airport use the Mactan radio navigation aid facilities and APP service to these aircraft should continue to be provided by the Mactan air traffic facility. ADC and APP service is presently provided at the locations recommended above except for Bacolod and for some time the CAA has planned to provide service there. Because of the proximity of the Iloilo and Bacolod airports, and the large volume of air carrier traffic at Iloilo, we recommend the Bacolod air traffic facility also provide APP service for Iloilo airport.

Except at Cagayan de Oro, the 15,000 annual aircraft operations criterion was exceeded in CY 1966 at each airport where ADC service is recommended. Commercial air carrier activity at Cagayan de Oro totalled 7,876 operations in CY 1966 however, and scheduled commercial flights have increased at the rate of 10.4% per year for the past six years. Also because of the airport location, elevation, and nature of the surrounding terrain, adverse weather conditions often prevail. For these reasons, we recommend that approach control service continue to be provided by an aerodrome control facility at this airport.

Air carrier operations are no longer scheduled at Lahug due to the recent move of domestic airline facilities to Mactan airport. During CY 1966, Lahug recorded a total of 17,550 military and general aviation aircraft operations. Future utilization of Lahug airport by these aviation segments is indefinite at this time, and we are not including any recommendations for improved ATC facilities. We recommend retention of aerodrome control at Lahug only as long as traffic activity warrants this service.

The volume of airport operations at Baguio is considerably below the criteria we recommend for providing aerodrome control. The CAA provides this service there now. We have programmed an expansion of the ACS function at Baguio during the first 2-year increment to obtain improved enroute air/ground communications capability in this area. We feel that airport advisory service provided by the ACS facility will adequately serve user needs. Therefore, ADC is not included in our plan. Continuing this service at Baguio is at the option of the CAA.

We recommend the operating quarters in each control tower facility be equipped with temperature and humidity control. The following schedule is recommended to establish and/or improve ADC and APP facilities during the 5-year development plan. Aeronautical mobile communications requirements are included. Dual transmit/receive equipment for each VHF channel is recommended to provide backup. Recommendations for aeronautical fixed communications are contained in Section IV.C.2.f. No recommendations are included for the Manila control tower on the premise that any additional requirements there will be satisfied by the CAA when the new approach control facility on the fourth floor is commissioned.

FIRST 2 YEARS

1. Construct a new control tower facility at Bacolod. Three operating positions in the tower cab will be required to perform the ADC, APP and flight data functions. Interphone capability should be provided each position. Three VHF frequencies are required--one each for ground control, local control and approach control. A separate ground control frequency is considered essential to accommodate the additional clearance delivery workload due to the higher volume of commercial air carrier traffic at Bacolod. The discrete APP frequency should be remoted to the Negros high site to provide radio coverage at the final approach altitude over the navigation aid at Iloilo airport.

2. Construct a new control tower facility at Davao. The existing facility is located too close to the runway and presents a definite hazard. Additionally, the physical dimensions of the structure are inadequate to accommodate the facilities and equipment necessary to provide the service required at Davao. A combined ADC/ACS facility is recommended. Three operating positions will be required to perform the ADC, APP and communications functions. Interphone capability should be provided each position. Four VHF frequencies are required --one each for local control, approach control, the enroute ACS function and to provide capability on emergency channel 121.5 mHz. HF air/ground capability on 6 mHz and 3 mHz is also required for the ACS function to provide enroute communications along airway segments where location of terrain precludes adequate VHF coverage.

3. Provide additional facilities and equipment in the existing Cagayan de Oro control tower, as required, to establish a combined ADC/ACS facility with three operating positions and VHF frequency capability the same as that recommended for Davao.

4. Provide one additional VHF frequency at the Mactan tower for ground control. The volume of traffic at Mactan warrants separation of ground control and the associated clearance delivery workload from the local control function to further reduce frequency congestion and interference.

5. Provide additional facilities and equipment in the existing Zamboanga control tower as necessary to establish three operating positions to perform the ADC, APP and flight data functions. Interphone capability should be provided each position. Additional VHF capability beyond that provided in Phase I, should not be required.

244

FOURTH YEAR

A new terminal building at Zamboanga, to replace the present one, is programmed for the fourth year of the airports development plan. A new control tower facility will thus be required. We recommend the tower cab be located on top of the proposed terminal building structure. The new facility should have the same capability as the previous one; i.e., as recommended above in the program for the first 2 years. Except for the structure, console layout, air conditioning, etc., it is not anticipated that additional new electronic equipment will be required.

FIFTH YEAR

A new control tower building is recommended for Cagayan de Oro to replace the present one. This is based upon our assumption the present building will be beyond economical repair and its replacement will be warranted by the fifth year. Several factors during the interim years may influence this requirement and the validity of this expenditure should be subject to careful scrutiny by the CAA prior to construction. The new facility should have essentially the same capability as that provided the present one during the first two years. Similar to the new Zamboanga facility, it is not expected that a significant amount of new electronic equipment would be required.

e. Airways Communication Station (ACS) Facilities

The basic function of a system of ACS facilities is to provide enroute service to airborne aircraft. Air/ground communications are required on airways at and above minimum enroute IFR altitudes and along regularly travelled VFR routes at the most used altitudes. In those portions of the airway system where ACC facilities do not have the capability of direct controller-to-pilot communications through RCAG sites, Airways Communication Station (ACS) facilities must be the medium for relaying clearances and position reports between ACC traffic controllers and pilots for the separation of IFR enroute air traffic. ACS facilities also have the basic role of providing air/ground communications and enroute services for VFR aircraft. Air/ground communications include broadcasts of general interest to all enroute aircraft and specific information to individual pilots upon request. It also includes other essentials such as VFR position reports, flight plan changes, search and rescue actions, and pilot reports (PIREP's) of flight conditions aloft. Fundamentally it consists of updating the pilot on changes in conditions since his departure and providing him with new information pertinent to the route ahead, destination or alternate.

The ACS air/ground system provides the only communications and aeronautical information service available to VFR general aviation. Commercial air carriers may have their company communications systems and the military has its base operations offices to provide these services for their aircraft; however, they must depend on the ACS facilities when information is not available through these other channels.

In addition to the primary function of air/ground communication, these stations operate the radio navigation aid system and the point-to-point communication system which is most essential to the air traffic control system and the safe and expeditious movement of all air traffic. They are the prime means for monitoring navigation aids (VOR/VORTAC and NDB) and of providing constantly updated accurate aeronautical information regarding airports, airway facilities, obstructions, restricted areas, and other hazards to flight. Additional functions include flight assistance services such as preflight pilot briefing; issuance of information, suggestion, and advice to aircraft during flight; assistance to aircraft in difficulty; initiating search and rescue action; issuance of information in the form of airport advisory service 1/ to aircraft using airports where ADC service is not provided; the handling of flight plan and arrival messages; issuance of Notices to Airmen; and participation in the Weather Bureau weather observation program.

(1) Criteria

As stated above, the basic function of the ACS facility is to provide enroute service to airborne aircraft. No amount of preflight activity or flight assistance service should qualify a location for an ACS unless there also exists a requirement for air/ground communications. Wherever possible, more than one location should be served by one station when remote control of the air/ground facilities is economically, operationally and technically feasible. The operational requirements for ACS facilities recommended in this plan were determined by the Team on a site by site appraisal of the air/ground communication needed to implement the airway structure and associated VFR routes. These requirements govern the need for the new service recommended, the retention or relocation of existing service, and the discontinuance of service at certain existing locations.

(2) Proposed ACS Facilities

ACS facilities at the following locations are recommended to provide

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1/ Airport advisory service is the issuance by radio of airport condition, surface winds, altimeter setting, active runway and known local traffic information to arriving and departing flights.

adequate communications facilities in the proposed airway system:

1. Laoag
2. Tuguegarao
3. Cauayan
4. Baguio
5. Manila
6. Naga
7. Virac
8. Legaspi
9. Masbate
10. Marinduque
11. San Jose (Mindoro)
12. Roxas
13. Iloilo
14. Cebu
15. Calbayog
16. Tacloban
17. Dumaguete
18. Surigao
19. Puerto Princesa
20. Bancasi (Butuan)
21. Cagayan de Oro
22. Maria Cristina (Iligan)
23. Dipolog
24. Davao
25. Buayan (General Santos)
26. Cotabato
27. Zamboanga
28. Jolo

The ACS facilities listed for Cagayan de Oro and Davao represent the communications portion of combined ADC/ACS facilities recommended at these locations. This combination is more economical and considered feasible due to the volume of activity at these airports.

Each Airways Communication Station (or ACS function of a combined ADC/ACS facility) should have single channel VHF transmit/receive capability with backup equipment to provide enroute air/ground communications. Remote Communication Outlet (RCO) location of transmitters and receivers is required for the Baguio, Manila and Cebu stations. The Bureau of Telecommunications sites on Mt. Santo Tomas (Baguio ACS), Romblon (Manila ACS), and Majic (Cebu ACS), and the CAA site at Tagaytay (Manila ACS) are recommended.

Earlier in the report we recommended capability on emergency VHF frequency 121.5 mHz be provided through RCAG sites to the Manila and Cebu ACC facilities. Local capability on this frequency was also recommended at the combined ADC/ACS facilities at Davao and Cagayan de Oro. To provide adequate coverage in remaining areas of the system we recommend VHF capability on 121.5 mHz, with dual equipment for backup, be included for the ACS facilities at Tuguegarao, Cauayan, Marinduque, San Jose, Naga, Virac, Legaspi, Masbate, Calbayog, Roxas, Tacloban, Dumaguete, Surigao, Butuan, Iligan, Dipolog, Cotabato, Buayan, Zamboanga, Jolo, and Puerto Princesa.

VHF coverage areas from the network of ACS facilities are depicted in Exhibit IV-N. Profiles of coverage in this exhibit are shown for 5,000 feet mean sea level altitudes or the surface, whichever is higher. As indicated, VHF coverage will be available throughout the domestic airway system and associated routes except for these areas: north of Luzon towards Basco, Palawan, San Jose de Buenavista and south of Iloilo towards Zamboanga, and parts of Mindanao and the Tawi-Tawi group. To provide enroute air/ground communications to aircraft operating in these areas, transmit/receive capability on 6 mHz and 3 mHz is recommended at the Laoag, Manila, Davao, Zamboanga, Iloilo and Puerto Princesa ACS facilities.

The CAA recently implemented the provision of airport advisory service by ACS facilities. We strongly recommend this service be provided by each of the ACS facilities included in this plan.

Aeronautical fixed communications requirements for the ACS network of facilities are included in the next subsection of this report.

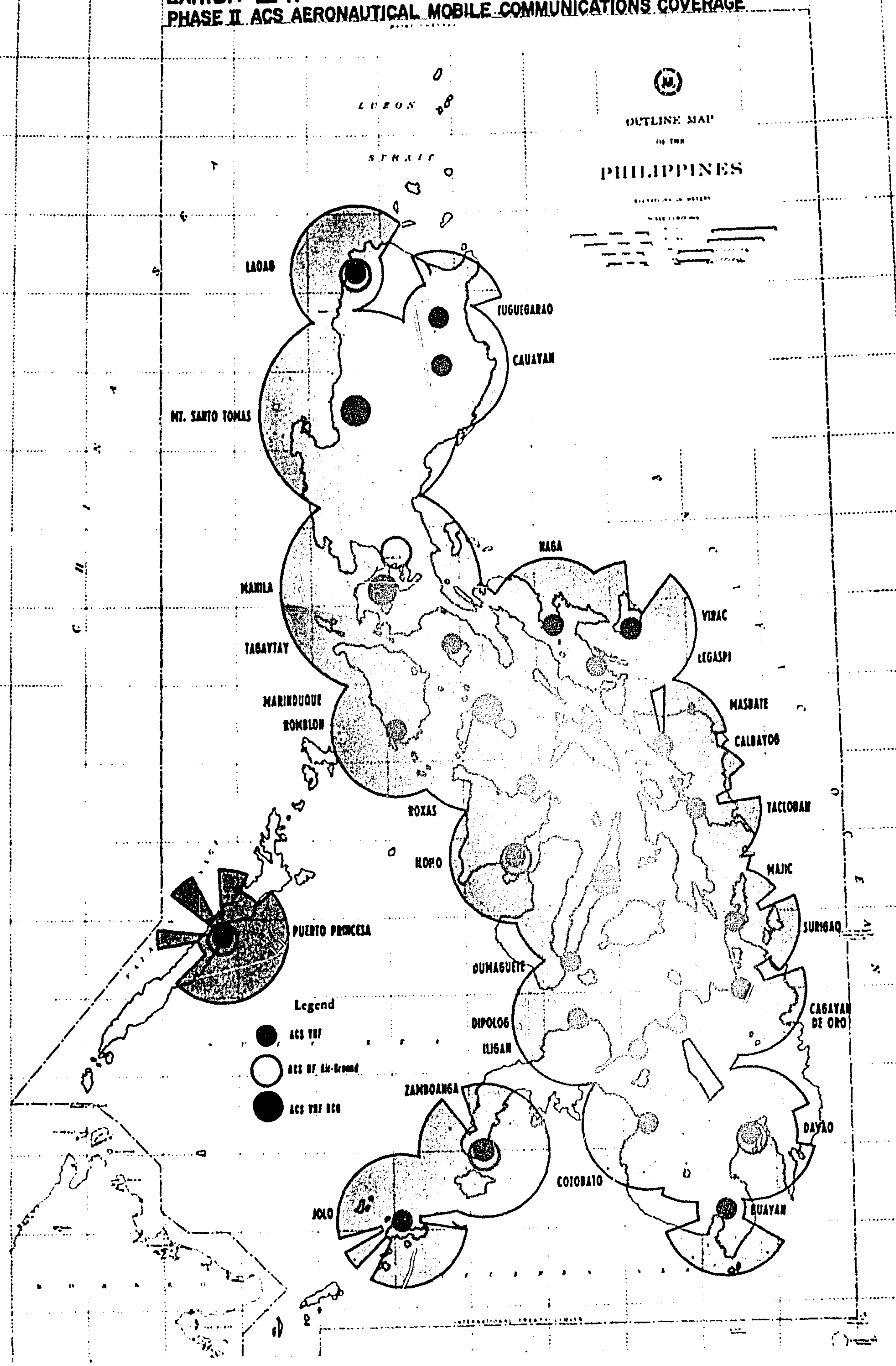
(3) Priorities

The following priority schedule is based upon the need to provide communication service along the higher activity airways and routes first. Installation of new ACS facilities is scheduled in four increments to correspond with the planned airway system. Enroute communications, monitoring of navigation aids, as well as other required functions will thus be available as the system is established.

First 2 Years	3rd Year	4th Year	5th Year
Roxas	Jolo	Tuguegarao	San Jose (Mindoro)
Iloilo	Dipolog	Surigao	Marinduque
Cotabato	Cauayan	Buayan	Puerto Princesa
Iligan	Masbate	Laoag	
Bancasi	Tacloban	Zamboanga	
Legaspi	Dumaguete		
Naga	Calbayog		
Baguio			

Except for Legaspi, Laoag, Zamboanga and Baguio, existing facilities are not included in this schedule since recommendations in Phase I included general rehabilitation of ACS facilities and provided added equipment. Legaspi and Laoag are included here to provide new facilities at these locations. We do not feel it would be economically feasible to renovate the Legaspi ACS and recommend a new station during the first increment. By the fourth year of the program we feel the same situation will prevail at Laoag. Zamboanga is included in the fourth year to indicate the requirement that this station should be removed to the new terminal building programmed for that year. At Baguio we recommend expansion of the present facility to establish an

EXHIBIT IV-N
PHASE II ACS AERONAUTICAL MOBILE COMMUNICATIONS COVERAGE



ACS in lieu of ADC with equipment to provide VHF air/ground communications from the Bureau of Telecommunications high site at Mt. Santo Tomas.

We recommend the existing Romblon ACS be decommissioned when the RCO on Romblon island is commissioned. Manila ACS will then be capable of providing air/ground coverage in this area and the Romblon facility will no longer be required. Likewise, the Tagbilaran ACS will not be required when the RCO at Majic (Cebu) is commissioned since the Cebu ACS will be capable of providing coverage there.

f. Aeronautical Fixed Communications

The expeditious and orderly flow of air traffic depends upon an effective communications system. The exchange of aircraft movement data through this system enables air traffic controllers to safely separate aircraft on instrument flight plans and to furnish essential services to aircraft operating on visual flight plans. The nature of the air traffic control system requires that certain manned control facilities be connected with a minimum number of interphone or similar type circuits to make the system work regardless of activity. For example, it is necessary that adjacent ACC facilities be connected. In addition, all ATC facilities such as aerodrome control towers, approach control facilities, airways communications facilities, etc., within an Area Control Center area of responsibility must be connected to the ACC to exchange ATC information needed to provide separation of aircraft operating on instrument flight plans.

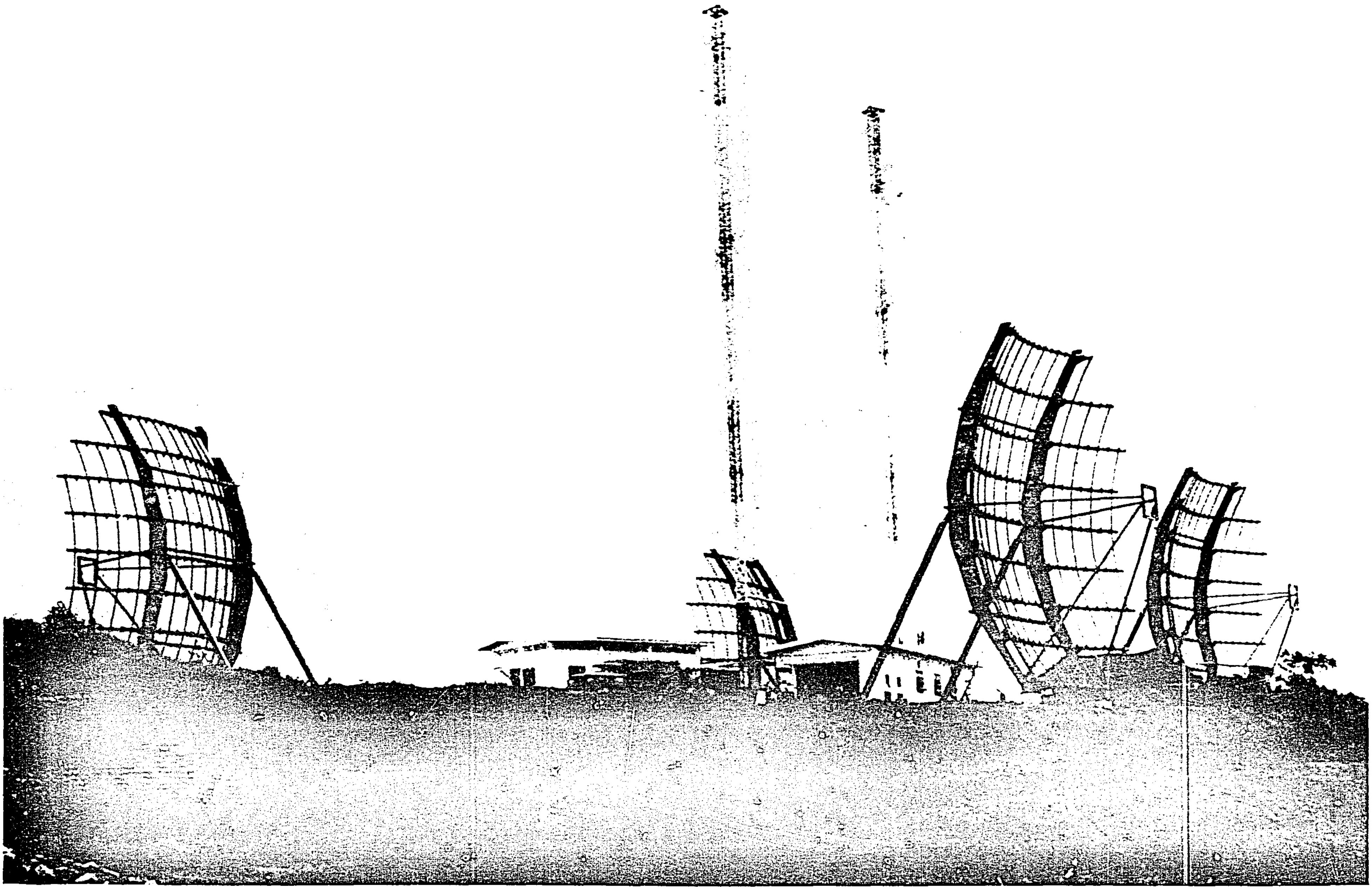
International standards for air traffic service requirements for communications are described in the ICAO Air Traffic Services document, Annex 11, chapter 6. Indication by time, of the speed with which the communication should be established, is provided in this document as a guide to communications services, particularly to determine the types of channels required. We have endeavored to meet these standards insofar as possible in our recommendations for fixed communications. In the Philippines, many different situations arise in the provision of an adequate point-to-point system. Dependable land-line capability exists only in a few areas. The island configuration and mountainous terrain further complicate the provision of adequate fixed communications. Present or planned communications capability exists in certain areas but is lacking in others.

In examining this problem, the Team immediately discarded a proposal to establish a national microwave system exclusively for aviation purposes as too expensive (an estimated $5.5 million) and turned to a study of existing and/or proposed commercial or government circuitry. We found that the Bureau of Telecommunications (a branch of the Department of Public Works) is presently involved in an expansion program covering all of the Philippines except Mindanao (see Exhibit IV-P). This project is being carried out by International Telephone and Telegraph Company in conjunction with BUTEL and consists of a combination of troposcatter, microwave and very high frequency links reaching almost every location recommended for service in our proposed airways development plan. The BUTEL timetable (see Exhibit IV-Q) indicates system completion date well in advance of scheduled aviation requirements.

The President has directed all Philippine government agencies to avail themselves of the BUTEL circuitry rather than install additional facilities. In consonance with this directive and in the interest of economy the Team analyzed anticipated BUTEL capability and found that the system as planned, if maintained and operated properly, will adequately serve the needs of aviation. Anticipated channel requirements have been discussed with BUTEL engineers and it was indicated that these requirements could be met at most locations and with slight expansion at the remainder. Since both the BUTEL and CAA are presently divisions of a parent agency, the matter of leased channel and other costs was not discussed as this is considered to be an internal Philippine government matter.

In accepting the responsibility for handling aviation communications, the BUTEL must recognize that this is not a commercial type of service and that messages relating to aircraft movement are highly perishable, therefore, this service must be given the highest priority possible. The Team notes with some apprehension that BUTEL has in the past shared CAA's inability to secure funds for maintenance of facilities, and wishes to emphasize that responsibility for the aviation service carries with it a requirement for the utmost in reliability.

As previously pointed out, the BUTEL circuitry does not at present extend into Mindanao past Cagayan de Oro, although it is understood that plans call for embracing this area at a later date. In the absence of other facilities in Mindanao and because of extensive aviation activity in this area, the Team proposes wide use of Single Sideband radio equipment for fixed communications purposes. This is admittedly expensive but appears to be the most reliable means of serving both the ACC and inter-ACS requirements without additional frequencies and equipment. As previously mentioned, it is proposed to use the Upper Sideband for communications to and from the ACC and the Lower Sideband for ACS to ACS communications, and eventually when BUTEL services are made available to Mindanao, this equipment would be used for backup.



Bureau of Telecommunications Tropscatter repeater and distribution facility on Mt. Majic near Cebu. One of the sites for proposed collocation of the CAA VHF air-to-ground communications system. Others would be located along with BUTEL facilities at Negros, Mt. Sto. Tomas, Romblon and Mt. Gonzales.

Elsewhere in the system we are indicating the requirement for a Sideband circuit between Manila and Cebu for backup purposes, as well as between Bacolod and Cebu. At all other locations served by BUTEL circuitry, conventional AM radio installations are required for backup purposes in case of BUTEL circuit failure. (For an examination of the eventual fixed communications network see Exhibit IV-0).

In addition to trunk line point-to-point communications, many local circuits will be required at CAA facilities for exchange of information with aviation agencies and/or offices in the near vicinity. For example, air traffic and ACS facilities should have the capability to communicate with the local operations office of each major user of the system. In some instances these local requirements may be satisfied by discrete or multidrop circuits. At larger terminals, it is often necessary to establish teletypewriter circuits to meet requirements for collection and transmission of non time-critical data among facilities. Local circuits are necessary for ATC coordination among control sectors within a facility, as well as among facilities in a given local area. Requirements for these local circuits must be individually determined to satisfy operational needs. These requirements may change on relatively short notice depending upon air traffic activity and the operational procedures involved.

Our recommendations in this study are limited to the minimum point-to-point trunk line communications channels required to adequately provide service in the recommended airway system. Additional local circuit requirements should be individually determined by the CAA.

1. BUTEL Channel Requirements

This portion pertains to voice, data, and signalling channels required from the BUTEL point-to-point trunk line communication systems. In order to clearly depict what each channel requirement and capability is expected to be, we elected to itemize the circuits by location and service. For this reason there are numerous footnotes which describe the functions expected at the end of this portion.

1/ ACC-ACS

Manila-Laoag-Cauayan-Tuguegarao
1 voice channel

Manila-Naga-Legaspi-Virac-Masbate
1 voice channel

Manila-San Jose
1 voice channel

EXHIBIT IV-O

PHASE II

POINT TO POINT COMMUNICATIONS

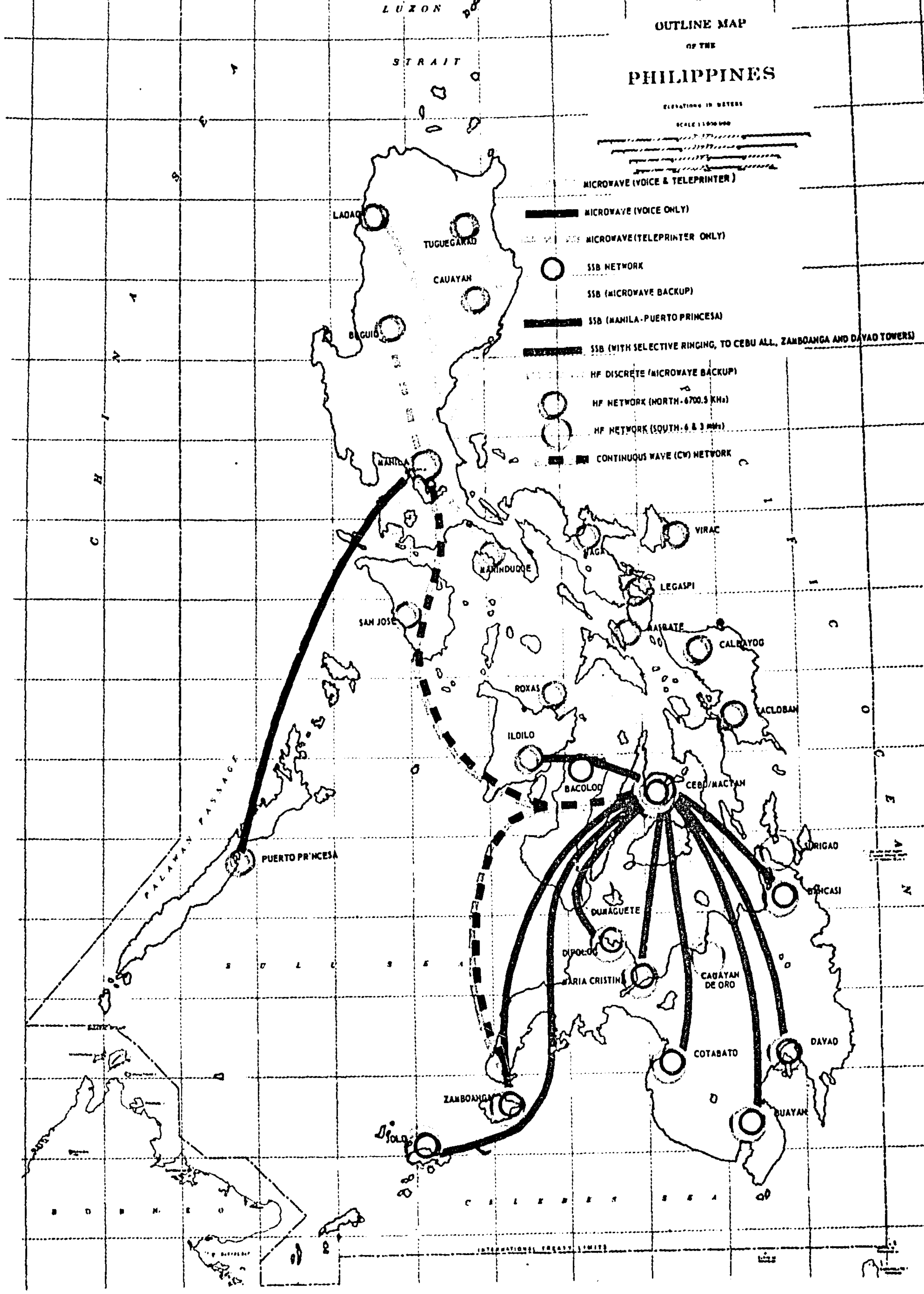


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EXHIBIT IV-P PHASE 1 AERONAUTICAL COMMUNICATIONS

BUREAU OF TELECOMMUNICATIONS

PRESENT AND PROPOSED CIRCUITS

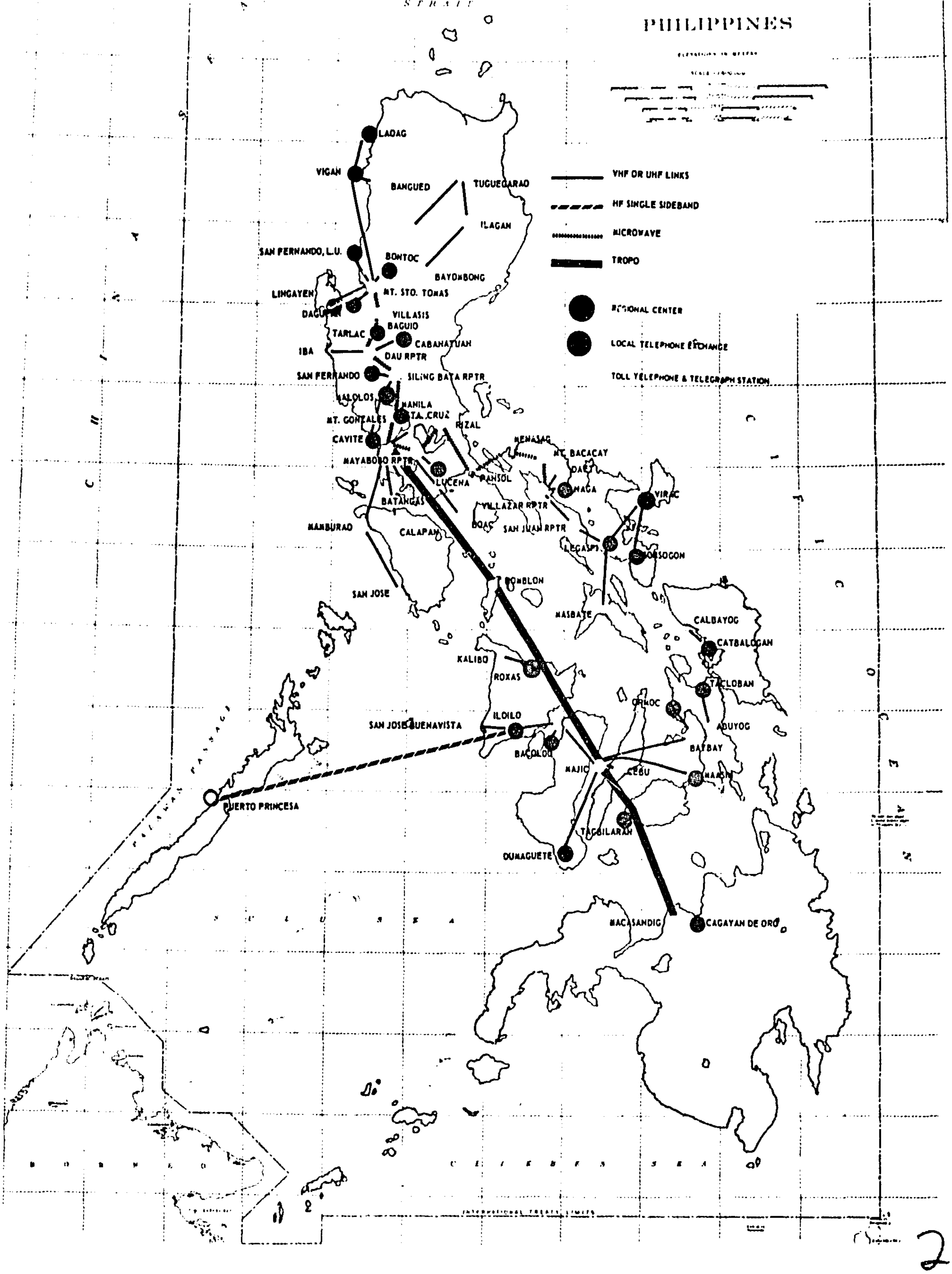

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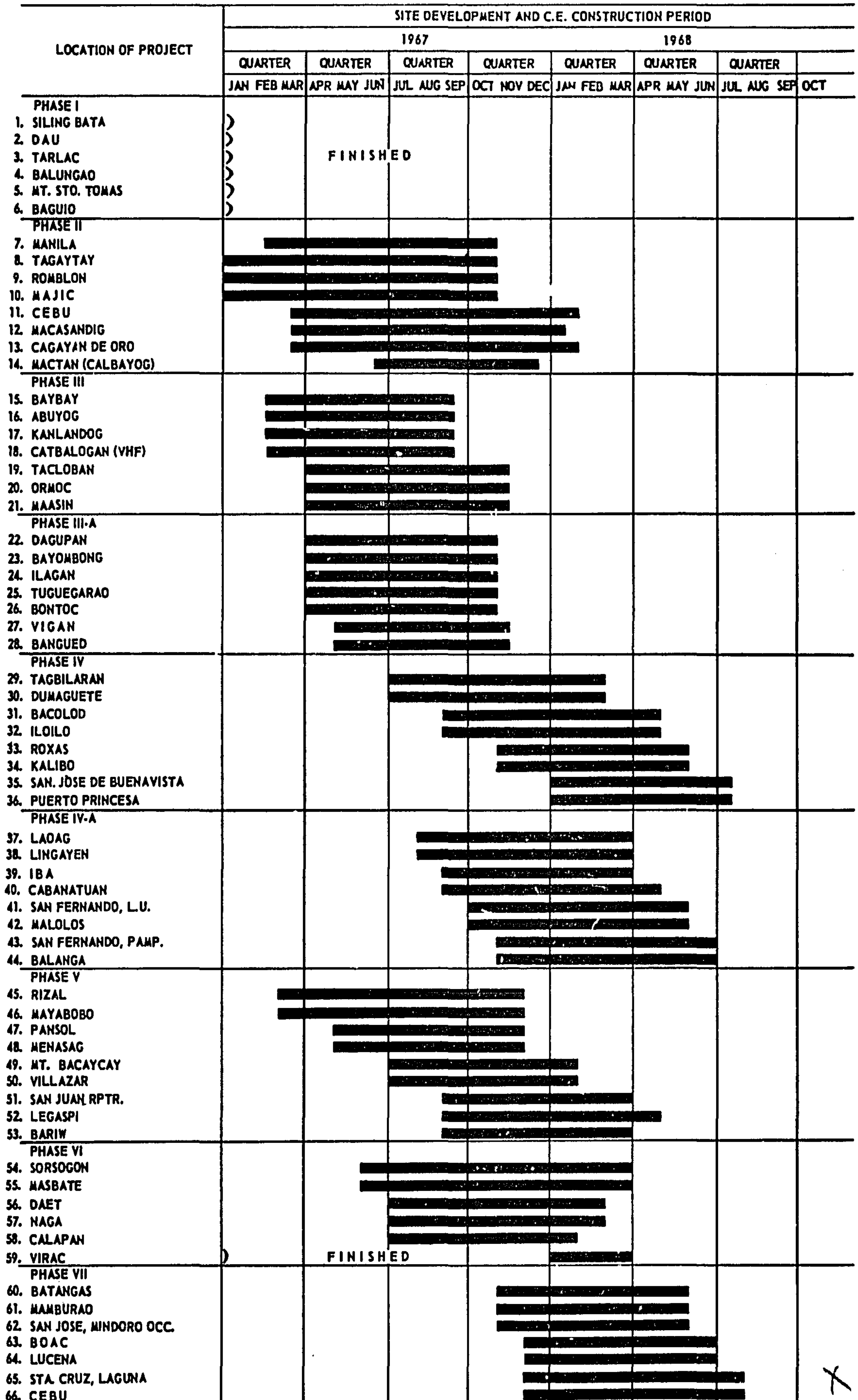
EXHIBIT IV-Q

PROJECT SCHEDULE NATIONWIDE NETWORK

TIME TABLE FOR SITE DEVELOPMENT AND ENGINEERING CONSTRUCTION
BUREAU OF TELECOMMUNICATIONS



Manila-Puerto Princesa
1 voice channel
Cebu-Tacloban-Calbayog
1 voice channel
Cebu-Iloilo-Roxas
1 voice channel
Cebu-Dumaguete
1 voice channel

1/ ACC-ACC

Manila-Cebu
2 voice channels

1/ ACC-APP

Cebu-Bacolod
1 voice channel
Cebu-Cagayan de Oro
1 voice channel

1/ APP-ACS

Bacolod-Iloilo
1 voice channel

2/ ACC-RCAG

Manila-Laoag
2 voice channels
Manila-Mt. Santo Tomas
2 voice channels
Manila-Bacaycay
2 voice channels
Manila-Romblon
2 voice channels
Manila-Majic
1 voice channel
Cebu-Romblon
1 voice channel
Cebu-Negros
2 voice channels
Cebu-Majic
2 voice channels

APP-RCO

Bacolod-Negros
1 voice channel

2/ ACS-RCO

Baguio-Mt. Santo Tomas
1 voice channel

Manila-Romblon
1 voice channel

Cebu-Majic
1 voice channel

3/ ACS-ACS

Manila-Baguio-Laoag-Cauayan-Tuguegarao
2 data channels with 4/ stunt box feature

Manila-Naga-Legaspi-Virac-Masbate
2 data channels with stunt box feature

Manila-San Jose
1 data channel

Manila-Marinduque
1 data channel

Manila-Puerto Princesa
1 data channel

Manila-Cebu
2 data channels, 5/ duplex operation

Cebu-Tacloban-Calbayog
1 data channel with stunt box operation

3/ ACS-ACS (continued)

Cebu-Iloilo-Roxas
1 data channel with stunt box operation

Cebu-Dumaguete
1 data channel

Cebu-Cagayan de Oro
2 data channels, duplex operation

6/ VOR Monitoring

San Fernando-Manila ACS
Cabanatuan-Manila ACS
Mamburao-Manila ACS
Bacaycay-Manila ACS (Jomalig VOR/DME)
Rizal-Manila ACS (Alabat VOR/DME)
Kalibo-Roxas ACS
Ormoc-Cebu ACS
Daet-Naga ACS

1/ These are intended to be conferencing channels wherein the ACC or APP verbally calls a specific ACS. Each ACS, however, would be provided a selective ringing unit for discrete ringing of the ACC or APP. A single send/receive channel will be required for each circuit.

2/ Except for Laoag these circuits will terminate in BUTEL hi-site repeater stations. (At Laoag the terminal shall be at the Laoag ACS and then routed to the Paredes RCAG via a CAA link.) Each channel for this service consists of a separate send and receive channel. Transmitter keying and equipment transfers will be via tones. Therefore, separate signalling channels will not be required.

3/ These data channels are for exchanging information in hard copy form. The second channel is for transmitting weather information. Only one telegraph channel is required for each circuit unless otherwise noted.

4/ A "stunt box" is a selective code reading device which actuates a teleprinter or other data handling equipment when the pre-selected coding for that specific equipment is entered on the message heading from the originating station.

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258

5/ Duplex operation means that separate send and receive channels are required for each aircraft.

6/ The VOR monitoring circuits only require a single make/break signalling channel.

In all cases, the CAA will provide the necessary equipment to effectively utilize the above circuits. For instance, at the Bacaycay Repeater the CAA will provide the VHF link to the Jomalig VOR/DME, and the VHF equipment for the RCAG. BUTEL, however, would then maintain the equipment installed in their facilities.

2. CAA Radio Communication Requirements

Because the BUTEL point-to-point trunk line communications system does not extend into the Mindanao-Sulu area (other than Cagayan de Oro), the CAA will be required to provide this service. Also the CAA will be required to insure adequate backup of the BUTEL circuits to insure communication capability pertinent to the expeditious flow of air traffic. Accordingly, the CAA's point-to-point communication responsibilities are outlined below.

1/ ACC-APP

Cebu-Zamboanga-Davao
1 voice channel

2/ ACC-ACS

Cebu-Dipolog-Jolo-Iligan-Cotabato- Butuan-Buayan
1 voice channel

Cebu-Dipolog-Zamboanga-Jolo-Iligan-Cotabato-Buayan-Davao-Butuan
1 voice channel

4/ Cebu-Surigao
1 voice channel

Cebu-Zamboanga-Manila
5/ 1 continuous wave (CW) circuit

6/ ACS-RCO (guard channel)

Manila-Tagaytay
1 voice channel

7/ ACC-ACC (backup)

Manila-Cebu
1 voice channel

8/ ACC-APP (backup)

Cebu-Bacolod
1 voice channel

9/ APP-ACS (backup)

Bacolod-Iloilo
1 voice channel

10/ ACS-ACS (backup)

Manila-Baguio-Laoag-Cauayan-Tuguegarao-San Jose-Puerto-Princesa-Marinduque-Naga-Legaspi-Virac-Masbate-Calbayog-Tacloban-Roxas-Iloilo-Cebu
1 voice channel

Cebu-Dumaguete-Dipolog-Zamboanga-Jolo-Iligan-Cotabato-Buayan-Davao-Cagayan de Oro-Butuan-Surigao
1 voice channel

11/ Manila-Cebu
2 data channels

1/ On ISB with selective calling system at each end.
2/ On ISB. Selective calling from the ACS to the ACC.
3/ On ISB. All ACS's can communicate with each other.
4/ On HF-AM. 6 mHz and 3 mHz frequencies to be available.
5/ Existing. Nothing further planned.
6/ A separate send and receive channel required over existing CAA microwave link.
7/ On ISB. Selective calling system at each end.
8/ On SSB. Selective calling system at each end.
9/ On HF-AM. Discrete 3 mHz frequency.
10/ On HF-AM. North of, and including Cebu, all ACS's will be on a 6 mHz frequency. South of, and including Cebu, all ACS's will have both 3 mHz and 6 mHz capability. The 6 mHz frequency being different from that north of Cebu.
11/ On ISB.

g. Electronics Equipment

(1) VOR/DME

The Team conducted a personal inspection of the recommended HVOR and DME sites. Three of the TVOR sites were not visited. These were Dumaguete, Misamis, and Surigao. At all locations where new equipment is planned, we recommend a 36 ft. x 36 ft. masonry building to house the VOR equipment, in some cases the collocated DME and in some cases the engine generators. We realize that some equipment manufacturers supply a prefabricated shelter with the equipment. In our opinion, however, the prefabricated shelters may not be compatible with Philippine climatic conditions. Additionally, the prefabricated shelters we have been exposed to do not provide adequate maintenance or storage space and could not accommodate engine generators. The 1296 sq. ft. building we recommend would provide ample maintenance and storage space; would accommodate the engine generators and would allow sufficient room to add DME without building expansion at a later date. An extra, but very tangible benefit realized by the larger building is the size of the counterpoise. With a 52-foot diameter counterpoise, standard VOR ground checks can be performed via a portable VOR field detector from the edge of the counterpoise.

This method of ground checking is vastly superior to the tripod-in-the-field method required with the prefabricated shelter. We cannot over-emphasize the importance of an accurate VOR ground check program. Savings realized in flight inspection time of a satisfactorily adjusted and ground checked facility as opposed to a facility requiring adjustment by direction from the flight inspection crew are, indeed, great and obvious. Accordingly, for each HVOR, DME, or TVOR facility, we recommend a 36 ft. x 36 ft. masonry building which we estimate to cost $7, 290.

Another item common to all new VOR locations (also the existing Zamboanga site) is that of site checking. Although a location can appear to be satisfactory in all aspects from visual observation there are numerous anomalies that will affect the radiated courses from a VOR. Therefore, prior to building a facility an air transportable VOR is required. A team of engineers and technicians are required to erect the test VOR and the location is then flight inspected by a regular flight inspection aircraft. Concurrently with the team that is preparing the portable VOR for flight inspection, a Civil Engineering survey crew prepares a site profile indicating distance and elevation of surrounding obstructions and terrain. This is used by the flight inspection crew in the course of their evaluation.

If the site check satisfies all major requirements, the permanent structure can then be firmly programmed. However, if the site check is unsatisfactory, the portable VOR may have to be moved. Obstructions such as trees, fences, buildings, etc. may have to be removed or screened and another flight check conducted.

Sometimes a particular site completely fails a flight check in which case funds expended do not result in a tangible product. Historically in the USFAA this condition occurs on approximately 10% of the site potentials.

Accordingly, for all new VOR locations, a site check cost of $10, 000 has been developed which is broken down as follows:

1.	Amortization of portable VOR	$ 400
2.	Site failure potential	1,000
3.	Flight check aircraft	5,000
4.	Engineering Team	2,000
5.	Site survey	1,000
6.	Transportation	600
	Total	$10,000

In Phase I we recommended disassembling the Romblon VOR and using the equipment as spare parts for the remaining Collins Type 401 VOR's. The Team visited Romblon (Tablas) on two occasions for the main purpose of attempting to locate a feasible VOR site. We concluded that a site along the coastal shelf would be entirely unsatisfactory because of the proximity of rapidly rising terrain behind the plain which would probably cause severe scalloping. This phenomenon does, indeed, occur from the existing site which results in the facility's ineffectiveness. Because of the relatively constant smooth surface of the surrounding Sibuyan Sea, we are of the opinion that a mountain top site would experience severe vertical nulls due to sea reflections of the radiated signal.

For the above cited reasons we recommend that Romblon (Tablas) not be considered for a VOR. Additionally, the airway requirement will be satisfied with VOR's at Lipa and Roxas thus rendering the Romblon site unnecessary.

Although basic equipment at each location will be identical, the total costs vary to some degree at the majority of the sites. These variances are due to differences in site acquisition and clearing costs, commercial or airport power availability, land line or cable availability, etc. For these reasons a brief description of each recommended VOR or DME site follows in alphabetical order:

Alabat HVOR/DME

The airport location is unsatisfactory for VOR/DME site because of adjacent terrain. Consequently, the Team selected a site on Sangirin point which apparently presents no serious problems. One hectare of land would be required with easement to clear vegetation to a 1,000-foot radius. Cost of land at this location is estimated at $1,250 per hectare. An additional cost would be procurement and removal of coconut trees in the area. A 1,000-foot radius equates to 29 hectares with an average of 140 trees per hectare. The estimated removal cost is ₱10 per tree but the Team was unable to determine the acquisition cost per tree.

X 262

A dual channel VHF link to Bureau of Telecommunications Rizal Repeater required for monitoring purposes, and two 37.5 KVA engine generators with one 3,000-gallon fuel tank will be required. A maintenance vehicle should be assigned to this location.

Total Estimated Cost ------- $216,950

Aparri HVOR/DME

Recommended location is adjacent to and south of the approach end of runway 28 which is on airport property, and requires negligible site clearing. Dual channel VHF link to Tuguegarao ACS will be required for monitoring, also two 37.5 KVA engine generators with one 3,000-gallon fuel tank required, as well as one maintenance vehicle.

Total Estimated Cost ------- $202,562

Bacolod TVOR

Should be located adjacent to and north of the approach end of runway 03 which is on airport property, and calls for minor site clearing. Approximately 4,000 feet of power and control cable (to be buried) as well as step-up, step-down transformers required. Maintenance vehicle requirement is satisfied under the Phase I Program.

Total Estimated Cost ------- $119,400

Buayan TVOR

Should be located on the west side of the runway on airport property requiring minor site clearing. Here as at Bacolod a step-up, step-down transformer will be needed along with 4,000 feet of power and control cable. One maintenance vehicle is also indicated.

Total Estimated Cost ------- $121,900

Butuan HVOR

Terrain in the vicinity of the airport indicates that a VOR would probably not function in an acceptable manner in this area and suggested possible location is across the Agusan River approximately 7-1/2 miles southeast of the airport. In this installation one hectare of ground would be required with land cost estimated at $800 per hectare with site clearing apparently negligible. Dual channel VHF link to Butuan ACS required for monitoring purposes. Two 37.5 KVA engine generators, and 3,000 gallon fuel tank and one maintenance vehicle would be required.

Total Estimated Cost ------- $161,312

Cabanatuan HVOR/DME

Appropriate location adjacent to main road approximately 2 NM southeast of Cabanatuan town. One hectare plot of ground required, and cost is estimated at $2,600 per hectare with negligible site clearing. Dual channel VHF link to Bureau of Telecommunication Switchboard at Cabanatuan City would be needed for monitoring. Additional requirements call for two 37.5 KVA power plants, one 3,000-gallon fuel tank and one maintenance vehicle.

Total Estimated Cost ------- $205,812

Cagayan de Oro HVOR

Located adjacent to existing VOR with no further site development required. Power, control cables, and maintenance vehicle requirements satisfied under the Phase I Program.

Total Estimated Cost ------- $102,250

Cauayan HVOR

Should be located on south side of runway, on airport property with minor site clearing indicated. 4,000 feet of power and control cable and step-up, step-down transformer and one maintenance vehicle required.

Total Estimated Cost ------- $124,400

Cebu (Mactan) HVOR

This facility should be collocated with PAF TACAN in the TACAN building. Costs are estimated at $1500 to modify the TACAN building in order to accommodate the VOR equipment. Existing TACAN power and control cables to be utilized.

Total Estimated Cost ------- $ 96,812

Cotabato HVOR

Should be located at east end of old airport because installation at the

X 264

existing airport would preclude enroute coverage towards Davao and Buayan.

Another possible location which would provide straight-in terminal approach and also enroute coverage is approximately 5 NM directly in line with the 28 approach end of the runway. Land acquisition and an access road would be required at this site whereas this would not be a requirement at the recommended old airport site. With site on old airport property, minor site clearing would be required. A dual channel VHF link to Cotabato ACS is needed for monitoring purposes. Two 37.5 KVA engine generators and one 3,000-gallon fuel tank as well as a maintenance vehicle will be required.

Total Estimated Cost ------- $159,062

Daet TVOR

Located adjacent to and north of the approach end of runway 24 on airport property, with minor site clearing indicated. Monitoring to be via Bureau of Telecommunications circuit to Naga ACS. 4,000 feet of power and control cable and a step-up, step-down transformer will be required. Power and control cable same as Bacolod. Maintenance vehicle also required.

Total Estimated Cost ------- $121,900

Davao HVOR

We recommend retention of the Collins type 401 VOR at this location. The shelter and equipment will be rehabilitated under the Phase I Program, and a maintenance vehicle is also scheduled under the Phase I Program. If later developments dictate the equipment should be replaced, we recommend collocating in the PAF TACAN building. Costs would be comparable to that developed for Cebu (Mactan).

Dipolog HVOR

Recommended location in the vicinity of Barrio Olingan approximately 4 NM southeast of the airport. Dipolog is, at best, a poor area for a VOR because of surrounding terrain. One hectare plot of ground would be required and cost is estimated at $800 per hectare at this location. Site clearing will be negligible. Dual channel VHF link to Dipolog ACS required. Two 37.5 KVA engine generators, one 3,000-gallon fuel tank and one maintenance vehicle will be required.

Total Estimated Cost ------- $161,312

Dumaguete TVOR

We assume the facility can be located on the airport. This location was "low passed" during inclement weather. The most logical site appears to be adjacent to and west of the 09 approach end of the runway, with moderate site clearing required. Power and control cable requirements identical to Bacolod, and one maintenance vehicle will be required.

Total Estimated Cost ------- $126,900

Iligan (Maria Cristina) HVOR

Location indicated on the east side of the runway. Inclement weather in the vicinity during the Team's visit to this area precluded detailed observation of the surrounding terrain. On airport property but considerable site clearing required. Power, control cable, and vehicle requirements similar to Bacolod.

Total Estimated Cost ------- $136,275

Iloilo HVOR/DME

Located adjacent to and north of the 20 approach end of the runway. On airport property with site clearing negligible. Power, control cable and vehicle requirements similar to Bacolod.

Total Estimated Cost ------- $174,650

Jomalig HVOR/DME

Best location adjacent to existing VOR with no further site development needed. Dual channel VHF link to Bureau of Telecommunications Bacaycay Repeater required for monitoring purposes. Two 37.5 KVA engine generators and one 3,000-gallon fuel tank required to supplement and partially replace existing power system.

Total Estimated Cost ------- $191,500

Kalibo TVOR

Located adjacent to and north of the 05 approach end of the runway, on airport property with moderate site clearing required. Monitoring to be via Bureau of Telecommunications circuit to Roxas ACS. Power, control cable, and vehicle requirements similar to Bacolod.

Total Estimated Cost ------- $123,150

Laoag HVOR

The Team recommends retention of the Collins type 401 at this location with shelter and equipment rehabilitation accomplished under the Phase I Program. A maintenance vehicle will also be provided under the Phase I Program. If later developments dictate that the equipment should be replaced the cost estimates developed for Cagayan de Oro will be applicable.

Legaspi HVOR

Terrain in the immediate vicinity of the airport indicates that a VOR would probably not function in an acceptable manner, therefore it should be located 3-1/2 NM from and in line with the 06 approach end of the runway. One hectare plot of ground required and costs are estimated at $5,200 per hectare at this location. Site clearing appears to be minor. Dual channel VHF link to Legaspi ACS required. Two 37.5 KVA engine generators and one 3,000-gallon fuel tank also required. Maintenance vehicle requirement is satisfied under the Phase I Program.

Total Estimated Cost ------- $162,812

Lipa HVOR/DME

Should be located on government property at Fernando Air Base (Philippine Air Force). Site clearing negligible. Dual channel VHF link to Tagaytay CAA Remote Air Ground Communication's outlet required for monitoring purposes. One 37.5 KVA engine generator and one 2,000-gallon fuel tank and one maintenance vehicle would be required.

Total Estimated Cost ------- $193,187

Lubang HVOR

Located adjacent to existing VOR, with no further site development required. Dual channel VHF link to Lubang air defense site required. Two 37.5 KVA engine generators and one 3,000-gallon fuel tank required to supplement and partially replace existing power system.

Total Estimated Cost ------- $147,750

Mamburao TVOR

Proposed location adjacent to and south of the 16 approach end of the runway on airport property with negligible site clearing indicated. Monitoring to be via Bureau of Telecommunications Circuit to the Manila ACS. Power and control cable requirements similar to Bacolod.

Total Estimated Cost ------- $119,400

Manila HVOR (Training)

Located adjacent to existing Airways Engineering Division training school.

Total Estimated Cost ------- $102,250

Masbate HVOR

Located adjacent to and northeast of the 21 approach end of the runway, extensive coconut tree clearing will be required. Although clearing will only be about 1/2 to 3/4 as extensive as at Alabat, we have used the general tree clearing formula developed for Alabat a. the basis for cost estimates. Power, control cable and vehicle requirements similar to Bacolod.

Total Estimated Cost ------- $137,150

Misamis TVOR

Assume the location is on the airport. The Team did not visit this location, however, we would assume airport location with power, control cables, and vehicle requirement similar to Bacolod. A dual channel VHF link to Iligan ACS would also be required for monitoring.

Total Estimated Cost ------- $143,775

Ormoc HVOR/DME

Located adjacent to 18 approach end of runway on airport property with no site clearing required. Monitoring via Bureau of Telecommunications circuit to Cebu ACS. Two 37.5 KVA engine generator, one 3,000-gallon fuel tank, and one maintenance vehicle required.

Total Estimated Cost ------- $205,062

Roxas HVOR

The VOR could possibly be collocated with the PAF TACAN and we

X 268

firmly recommend a site test in that area. However, because of metal roofed buildings in the area of the TACAN site which could derogate VOR signals, we proceeded to develop cost estimates for a separate facility located adjacent to and east of 32 approach end of runway. Site on airport property with minor site clearing required. Power, control cable and vehicle requirements similar to Bacolod.

Total Estimated Cost ------- $130,900

San Fernando HVOR

Should be located atop a relatively flat hill off the southeast side of the 01 approach end of the runway. One hectare plot of ground required and moderately dense vegetation to be cleared for a 1,000-foot radius. A rehabilitated Collins type 401 VOR is recommended. Accordingly, HVOR equipment procurement costs do not exist. Monitoring will be via Bureau of Telecommunications circuit to Manila ACS. One 37.5 KVA engine generator, one 3,000-gallon fuel tank and one maintenance vehicle will be required.

Total Estimated Cost ------- $ 53,250

San Jose TVOR

Located adjacent to 10 approach end of runway on airport property with minor site clearing required. Power, control cable, and vehicle requirements similar to Bacolod.

Total Estimated Cost ------- $121,900

Surigao TVOR

Identical to the Misamis TVOR except a VHF link is not required.

Total Estimated Cost ------- $121,900

Tacloban TVOR

Located adjacent to and west of 18 approach end of runway on airport property with minor site clearing required. Power, control cable, and vehicle requirements similar to Bacolod.

Total Estimated Cost ------- $122,150

Tuguegarao TVOR

Located on the west side of the runway on airport property with minor site clearing required. Power, control cable and vehicle requirements, similar to Bacolod.

Total Estimated Cost ------- $123,150

Zamboanga HVOR

Should be located adjacent to existing VOR. The NDB and transmitter station will be relocated under the Phase I Program. The VOR could possibly be collocated with the PAF TACAN and we firmly recommend a site test in that area. However, because the TACAN is closer to the large metal roofed PAF chapel it is questionable as to whether a VOR would function properly at that location.

If the PAF chapel continues to derogate the VOR courses after the NDB and transmitter station have been relocated, cost figures comparable to those at Butuan would be required. In our opinion the best location for relocating the VOR would be in the vicinity of Muluuan approximately 6 NM due east of the runway; however, for the purposes of this report we assume the present location will be satisfactory. Maintenance vehicle requirements have been satisfied in the Phase I Program.

Total Estimated Cost ------- $117,000

TOTAL Estimated Cost for the Phase II VOR & DME Program--$4,547,783

(2) NDB

A large majority of the NDB equipment for the Phase II Program will either come from equipment in the existing CAA inventory or from decommissioned facilities that were upgraded under the Phase I Program but rendered obsolete by more sophisticated equipment in Phase II. Only one building specifically designed to serve the purpose as an NDB shelter is programmed. At all other locations, the NDB will be housed in a joint remote transmitter, engine generator, NDB building. Because some of the NDB's are scheduled for installation prior to establishing a communication station or airport lighting, the cost estimate for the NDB includes a building large enough to accommodate the remote transmitter equipment and airport power plants. In the case of Calbayog and Naga, engine generators of sufficient capacity to accommodate the communication station are included. At Puerto Princesa, the engine generator included in the NDB program will satisfy the communication station and airport requirements.

All NDB's, with the exception of Jolo, are recommended for location behind the existing airport terminal building. A flat top antenna complete with antenna tuning unit is recommended for each. In all instances. the 250-foot distance from runway centerline and the 7:1 height ratio must be considered in determining antenna height.

A brief description and equipment source of each recommended NDB site follows in alphabetical order:

Baguio

Construct a 500-sq. ft. masonry building behind the existing airport terminal building on airport property with no site clearing required. Relocate the NDB equipment from Cabanatuan (upon completion of the Cabanatuan VOR/DME) to Baguio. Install one 5 KVA engine generator and one 500-gallon fuel tank.

Total Estimated Cost ------- $11,562

Calapan

Construct a 500-sq. ft. masonry building behind the existing airport terminal building. on airport property with no site clearing required. Relocate the NDB equipment from Lipa (upon completion of the Lipa VOR/DME) to Calapan. Install one 5 KVA engine generator and one 500-gallon fuel tank.

Total Estimated Cost ------- $11,562

Calbayog

Construct a 1500-sq. ft. masonry building behind the existing airport terminal building, on airport property with no site clearing needed. Install new dual channel 100 W equipment, and install two 37.5 KVA engine generators and one 3,000-gallon fuel tank. One maintenance vehicle will also be required.

Total Estimated Cost ------- $39,375

Jolo

Acquire a 1/2 hectare plot of ground in the vicinity of Candea, approximately 4 NM from the airport on a heading of 250 degrees, and construct a 500-sq. ft. masonry building on the site. Install new dual channel 100 W equipment with flat top antenna and tuning unit, and two 5 KVA engine generators and one 3,000-gallon fuel tank. One maintenance vehicle also required.

Total Estimated Cost ------- $15,740

Marinduque

Construct a 500-sq. ft. masonry building behind the existing terminal building. Install new dual channel 100 W equipment with flat top antenna and tuning unit. One maintenance vehicle will be required.

Total Estimated Cost ------- $11,562

Naga

Identical to Calbayog.

Total Estimated Cost ------- $39,375

Puerto Princesa

Construct a 1500-sq. ft. masonry building approximately 200 yards south of existing terminal building on 1/2-hectare plot. Moderate site clearing will be required. ACS transmitters also to be located in this building. Our cost estimate is based on $600 per hectare at this location.

Relocate the NDB equipment from the Cebu (Mactan) facility, and install two 62.5 KVA engine generators and one 5,000-gallon fuel tank. One maintenance vehicle will be required.

Total Estimated Cost ------- $41,750

Virac

Construct a 500-sq. ft. masonry building behind the existing ACS building on airport property. Minor site clearing required. Relocate the NDB equipment and antenna system from Bacolod (upon completion of the Bacolod VOR) to Virac, also install one 5 KVA engine generator and one 500-gallon fuel tank.

Total Estimated Cost ------- $11,562

X 272

Laoag and Legaspi

Decommission these NDB facilities and use the equipment for spare parts in general.

TOTAL Estimated Cost for Phase II NDB Program -- $182, 588

(3) ILS

The Instrument Landing System (ILS) recommended for Cebu (Mactan) should be similar to the ILS at Manila. The main reason being for the sake of standardization. By standardizing, technicians trained to maintain the Manila ILS could readily maintain the Mactan ILS. Additionally, in an emergency, spare parts and test equipment can be readily interchanged.

The cost estimates are based on a similar installation being undertaken at Manila except the Mactan ILS will not require the special flight inspection console equipment that was included with the Manila package. A maintenance vehicle is included.

Total Estimated Cost ------- $228, 000

(4) ASR/ATCRBS

Airport Surveillance Radar

The Airport Surveillance Radar (ASR) recommended for Manila International Airport should be similar to the ASR-5. The system should also include an Air Traffic Control Radar Beacon System for positive identification of aircraft which are transponder equipped. Accordingly, the cost estimates for the Manila ASR are based on a similar installation at Guam. This includes a complete ASR-5, test equipment, video mappers, cables, spare parts, ATCRBS equipment, a radar simulator, a 62.5 KVA engine generator and building, and a maintenance vehicle. We have also included a second radar simulator to be used by the Manila ACC and/or ATC training center for long-range radar training.

Total Estimated Cost ------- $696, 250

(5) VOR Test

The two VOR Tests (VOT) recommended for Manila and Mactan are devices which enable the user to check the accuracy of his VOR receiver. They require only a small building and are usually collocated with another facility.

Total Estimated Cost ------- $16,250

TOTAL Estimated Cost for Phase II ASR, ILS, and VOT Program -- $940,500

(6) Automatic Terminal Information Service (ATIS)

The Terminal Information Service Recorder recommended for the ATIS at Manila should incorporate the following features:

(a) Produce an output for transmission during both record and playback functions so that a new message will be broadcast as it is dictated.

(b) Having a recording speed of not less than 1.2 inches per second.

(c) Accommodate a message up to 3 minutes in duration.

(d) Include a failure detection circuit to alert controller personnel whenever the output of voice signals fails for a duration of 15 seconds.

The acquisition cost of the recorder is less than $1,000. Ancillary equipment is minor in nature and installation is relatively easy. Accordingly, the total estimated cost to establish the Manila ATIS is $2,000.

(7) Area Control Center (ACC)

Because of the deficiencies of the new Manila Area Control Center and because of the total inadequacy of the Cebu Sub-ACC to handle even today's traffic, we have proceeded to cost estimate one Type 300 switching system capable of accommodating 7 consoles. This switching system could be used at either Manila or Cebu as the situation dictates at the time of implementation. In either case, the Type 102 switching system in the existing Manila ACC should be utilized to the maximum extent. Obviously, if CAA engineers can modify the consoles in the new Manila ACC to satisfy requirements there will not be a need for the Type 300 system. In the event the control panels in the new Manila ACC cannot be satisfactorily modified, we recommend they be installed at relatively low activity ACS's.

X 274

Included in this cost estimate are the VHF equipment and ancillary material necessary for establishment of the recommended remote center air ground communication outlets (RCAG's) and the remote communication outlets (RCO's) described in Sections IV-C-2-d and e.

Basic equipment at the RCAG's and RCO's is as follows:

Site	VHF Transmitter	VHF Receiver	Antenna
Paredes	4	4	8
Santo Tomas	4	4	8
Tagaytay	2	2	4
Bacaycay	4	4	8
Romblon	6	6	12
Negros	6	6	12
Majic	8	8	16

Transmitter keying and equipment transfer would be accomplished via tone channeling utilizing the voice channel allocated to the individual circuit.

Included are the estimated costs for consoles and a multitude of ancillary equipment such as recorders, amplifiers, speakers, racks, frames, power supplies, etc. Engineering and installation will be major factors; therefore, 35% was added to the basic cost estimate. We emphasize that BUTEL circuit charges or prorated construction charges (if any) are not included.

Problems associated with the new Manila ACC must be resolved before definitive plans can be made, therefore, since RCAG's and RCO's are generally collocated and some are recommended for use by both Manila and Mactan ACC's, the cost of these facilities was divided equally between the two locations. It will be further noted that the switching system has been charged to the Manila ACC.

Estimated Costs:

Manila -----	RCAG's and RCO's -----	$ 56,950
	300 switching system ---	781,568
	Total ----------	$838,518
Mactan -----	RCAG's and RCO's -----	$ 56,950

TOTAL Estimated Cost for ACC, RCAG's and RCO's--- $895,468

(8) Aerodrome Control (ADC) Towers

The only aerodrome control towers specifically discussed in this section are the recommended facilities at Bacolod and Mactan. Although Zamboanga is also an ADC and APP facility, we elected to include the Zamboanga ADC in the ACS portion later in the report.

Bacolod--We recommend the Bacolod Tower be a free standing five-story masonry structure with an area of 400-sq. ft. per floor. Atop this structure we recommend a 320-sq. ft. tower cab. Because of heat that would be transferred through the windows, we further recommend this structure be centrally air conditioned. The building must have the five-story height to assure the controllers an unobstructed view of the entire runway. A cost estimate of $23, 000 has been developed for the building.

The existing NDB building should be utilized for the remote transmitters.

Primary approach control frequency equipment should be located at the BUTEL Negros Hi-site to assure coverage in the Iloilo area. In the event the BUTEL link circuit fails, back-up air/ground equipment for approach control should be located in the ADC building.

A single sideband circuit is recommended as back-up for BUTEL voice circuitry between the Bacolod control tower and the Cebu ACC. Additionally, an AM HF voice circuit is recommended as back-up for the BUTEL voice circuit between the Bacolod Control Tower and the Iloilo ACS. This HF equipment has been provided in the Phase I Plan. Accordingly, the following electronic equipment is recommended for the Bacolod facility:

- 5 VHF transmitters (50 W) (2 at Negros Hi-site)
- 5 VHF receivers (Crystal Controlled) (2 at Negros Hi-site)
- 10 VHF antennas (4 at Negros Hi-site)
- 1 SSB transmitter (450 W)
- 1 SSB receiver
- 1 SSB converter
- 2 Selective ringing units
- 2 Altimeters
- 2 Wind direction and velocity indicating systems
- Hardware and supplies
- Power, control, audio, and coaxial cable with connectors

276

1/ Ancillary equipment
2/ Fabrication material
Engineering and installation
Flight check
Transportation

We also recommend one 62.5 KVA engine generator be installed in the existing CAA power house to supplement the standby power capability. Use of the airport power plant is also being recommended to provide service for the TVOR facility in the VOR program.

Total Estimated Cost ------- $111,912

Mactan--The ADC building and equipment at Mactan belong to the Philippine Air Force. The CAA, however, provides the ATC service with maintenance being performed by USAF personnel. With this in mind, the Team emphasizes that the equipment necessary to establish ground control at this location should be requested from the PAF. However, in the event this approach does not prove fruitful, we recommend the following procurement for the Mactan ADC.

2 VHF transmitters
2 VHF receivers
2 VHF antennas
Coaxial, audio and control cables, select keys, etc. necessary for installation

Total Estimated Cost ------- $ 3,400

(9) Airway Communications and Combined Tower/Station (ADC/ACS)

The Team physically visited all of the sites recommended for Airways Communications Stations and combined towers/stations (ADC/ACS) except Dumaguete and Surigao. In all instances, the recommended location of ACS's is on the airport, thus providing the airways communicators with a view of the runway. For sake of standardization, we recommend a 2500-sq. ft. masonry structure complete with electrical wiring, sanitation facilities, windows, etc. for each ACS. For these structures we have developed a cost of $21,250 which includes 12,000 sq. ft. of excavation, grading, and asphalting of the surrounding area.

1/ Includes amplifiers, control and monitoring panels, speakers, interphones, microphones, power supplies, racks, etc.
2/ Includes consoles, jack panels, frames, benches, etc.

Associated with each ACS we recommend a combined remote transmitter, engine generator, and in some cases a Non-Directional Beacon (NDB) building of 1500 sq. ft. which will also be located on the above-mentioned 12,000-sq. ft. macadamized area at an estimated cost of $6,750.

Although some of the ACS's are basically identical they nevertheless do differ to some extent. For this reason we have elected to treat them on either a collective or individual basis in this section. There follows a narrative section on ACS's with individual cost estimates. For sake of simplicity, we refer the reader to Exhibit IV-M located at the end of this section. This exhibit depicts the ACS and ADC/ACS buildings and equipment by location in chart form and is designed to assist the reader in comprehending this section.

The following equipment, hardware, supplies, and services are recommended as a minimum for the Butuan, Buayan, Cotabato, Dipolog, Iligan, and Jolo ACS's:

- 4 VHF transmitters (50 watt)
- 4 VHF receivers (crystal controlled)
- 8 VHF antennas (2 circularly polarized transmitting, 2 coaxial receiving)
- 2 SSB transmitters (1 kilowatt)
- 2 SSB receivers
- 2 Sideband converters with demultiplexers
- 4 HF antennas for SSB (vertical with ground plane)
- 2 Selective ringing units
- 1 HF transmitter (4 channel, 350 watt)
- 2 HF receivers
- 1 HF doublet antenna
- 2 HF tunable whip antenna
- 1 Altimeter
- 1 Wind direction and velocity indicating system
- Hardware and supplies
- Power, control, audio, and coaxial cable with connectors
- Ancillary equipment 1/
- Fabrication material 2/
- Test equipment 3/

1/ Includes amplifiers, control and monitoring panels, speakers, interphones, microphones, power supplies, racks, etc.
2/ Includes consoles, pilot briefing desk, jack panels, frames, etc.
3/ Consists of equipment listed in Section IV-C-1-c-(1)-(m).

278

Engineering installation
Flight check
Transportation

The total estimated cost for each of the ACS's is $151,925 which includes buildings (previously described) and two 62.5 KVA engine generators with a 5,000-gallon fuel tank.

The Calbayog, Tacloban, Roxas, Iloilo, Dumaguete, and San Jose ACS's are all basically identical with minor exceptions as noted. It is recommended that these ACS's receive the same type and amount of equipment as Butuan, Buayan, etc., except single sideband equipment is not required. However, since we recommend these facilities be connected to the Bureau of Telecommunications circuitry, the following teleprinter equipment has been included:

1 Automatic send receive (ASR) page printer
1 Keyboard send receive (KSR) page printer

The individual cost estimates for each of the above ACS's is $120,837 which includes buildings (previously described) and two 62.5 KVA engine generators with a 5,000-gallon fuel tank. At Calbayog, the NDB cost estimate included electrical power generation equipment and the remote transmitter, NDB, and engine generator building. Accordingly, the cost estimate for Calbayog is $95,337.

Although Iloilo is programmed to receive an extra HF transmitter and receiver (for backup to Bacolod) we recommend the new HF equipment provided Romblon in Phase I be transferred to Iloilo--when Romblon ACS is decommissioned.

The Masbate, Naga, Cauayan, and Tuguegarao ACS's are all basically identical to Calbayog, Tacloban, etc., except the locations are recommended for 2 channels of data handling capability. These ACS's should receive the same type and amount of equipment as Calbayog, Tacloban, etc., with the following additions:

1 Receiver only (RO) page printer
1 Transmitter distributor (TD)

The individual cost estimate for each of the above ACS's is $122,337 which includes buildings (previously described) and two 62.5 KVA engine generators with a 5,000-gallon fuel tank.

At Cauayan a four-channel VHF link and carrier system is required from the ACS to the BUTEL outlet at Ilagan. The cost estimate for Cauayan is $149,000.

At Naga, the NDB cost estimate (indicated under NAVAID Section) included electrical power generation equipment and the remote transmitter, NDB engine generator building. The cost estimate for Naga is $96,837.

The Surigao ACS should receive the same equipment as Butuan, Buayan, etc., with the exception of the single sideband equipment. Accordingly, the cost estimate for Surigao is $121,375.

The Marinduque ACS should receive the same equipment as Calbayog, Tacloban, etc. with the exception of the 2 selective ringing units. Additionally, the electrical generation units should be 37.5 KVA in lieu of the 62.5 KVA units. The total estimated cost for Marinduque is $115,775.

The Puerto Princesa ACS should receive the same equipment as Calbayog, Tacloban, etc. However, at Puerto Princesa, the cost of the electrical generation units and the remote transmitter, NDB engine generator building was included in the NDB cost estimate. Accordingly, the total estimated cost for the Puerto Princesa ACS is $95,337.

The remaining ACS's were equipped to varying extent under the Phase I Program. We have therefore elected to cost estimate each on an individual basis in alphabetical order. The costs only reflect commodity procurement and buildings. We envision minor engineering and installation costs at these locations since local manpower should be utilized to the maximum extent. More explicitly, these locations should be implemented by CAA installation crews in lieu of a contractor turnkey project, thus reducing overall costs.

Baguio

Baguio will require 1 ASR and 1 KSR teleprinter in Phase II. The ACS will be located in the new terminal building programmed for the 5th year in the airport section. In the interim, it will continue to be operated in the tower. Total estimated cost--$3,728.

Cagayan de Oro

Cagayan de Oro, being an ADC/ACS in Phase II, has nevertheless been well equipped in Phase I. A new building, however, is recommended for this location, at an estimated cost of $22,750, which meets with the approval of the Airports and Engineering Divisions of CAA. Additional equipment required for the Cagayan de Oro ADC/ACS are:

- 1 ASR page printer
- 1 KSR page printer
- 1 RO page printer
- 1 TD

X 280

4 VHF transmitter (50 watt)
4 VHF receivers (crystal controlled)
8 VHF antennas (transmitting and receiving)
Ancillary equipment, hardware and supplies, fabrication material, and transportation as previously described.

Total Estimated Cost ------- $51,375

Cebu (Mactan)

This location attracted a considerable portion of the Team's attention which is evidenced by the Phase I Program recommendations.

In Phase II we again recommend a rather large package for Mactan because of the influence this aviation hub exerts on the overall domestic airway system. Although our proposals rely heavily on BUTEL circuitry for tributary stations out of Cebu, the Cebu ACS must also be capable of communicating with the Mindanao Air Traffic facilities that are not serviced by BUTEL. Accordingly, not only teleprinting equipment for BUTEL circuitry terminating in other provinces is required but also single sideband (SSB) equipment for communications with Mindanao facilities is essential.

Because the Cebu ACC and ACS must have instantaneous communication capability of a high degree of efficiency to both the Manila ACC, ACS complex and the Bacolod ADC, we recommend SSB equipment as a back-up to BUTEL circuitry. The Team feels that insufficient space has been planned for the ACS portion of the building; however, it would appear logical that CAA should modify structural dimensions to accommodate required expansion.

With the above in mind, we recommended all of the equipment planned for installation at the Butuan, Buayan ACS's and the Calbayog, Tacloban ACS's with the following exceptions or additions:

No AMHF equipment
2 VHF transmitters
2 VHF receivers
4 VHF antennas
1 SSB (1 KW) transmitter
2 SSB receivers
3 HF antennas
2 SSB converters with demultiplexers
1 SSB (450 W) transmitter
1 Teleprinter transmitting group (multiple transmitter-distributor --6 each)

4 ASR teleprinters
6 KSR teleprinters
6 RO teleprinters
Ancillary equipment, hardware and supplies, fabrication material, etc.

Total Estimated Cost ------- $194,475

Davao

Davao is being recommended as an ADC/ACS in Phase II. Accordingly, a building identical to the one at Cagayan de Oro is recommended for Davao. However, BUTEL does not have Davao scheduled for their circuits. Therefore, we recommend SSB communications to and from the Mactan ACC and ACS complex. Accordingly, we recommend the following new equipment for Davao:

2 SSB transmitters (1 KW)
2 SSB receivers
2 SSB converters with demultiplexers
4 HF antennas for SSB
2 Selective ringing units
Ancillary equipment, hardware and supplies, fabrication material, etc.

Total Estimated Cost ------- $85,950

Laoag

At Laoag the remote transmitter, NDB, and engine generator buildings are almost new and in excellent condition. We therefore only recommend a new ACS building for Laoag. The Phase I Program adequately supplies the Laoag ACS with HF, test, working equipment, and vehicles. This facility is recommended for 2 channels of data handling capability which will require the following equipment.

1 ASR teleprinter	1 RO teleprinter
1 KSR teleprinter	1 TD

Additionally, since Paredes Air Station is programmed as a Manila ACC communication outlet, a four-channel VHF link and carrier system is required from the Paredes Air Station to the BUTEL outlet at Laoag.

Total Estimated Cost ------- $78,266

X
282

Legaspi

The CAA has already built new remote transmitter and engine generator buildings at this location which are equipped in either CAA approved plans or Phase I programming. Under BUTEL circuitry recommendations, Legaspi is programmed for 2 channels of data handling capability so will require the same teleprinter package as Masbate, Naga, etc. Legaspi is also recommended to receive a new ACS building, with the inclusion of ancillary equipment, hardware and supplies, fabrication material, etc.

Total Estimated Cost ------- **$56, 978**

Manila

A new Manila ACS is presently in the process of construction. In Phase I we recommended installation of equipment that will accommodate a VHF enroute frequency.

In Phase II we rely entirely on BUTEL circuitry for all tributary stations out of Manila. This requires installation of a relatively large amount of teleprinter equipment in the Manila ACS. Although HF equipment is available in Manila for back-up of most circuits, we do recommend a SSB circuit to back-up the BUTEL trunk between Manila and Cebu.

Accordingly, we recommend the following for the Manila ACS:

- 1 SSB transmitter (1 KW)
- 1 SSB receiver
- 1 SSB converter with demultiplexer
- 2 HF antennas for SSB
- 2 Selective ringing units
- 1 Teleprinter transmitting group
- 1 Teleprinter receiver group
- 4 ASR teleprinters
- 6 KSR teleprinters
- 6 RO teleprinters
- Ancillary equipment, hardware and supplies, fabrication material, etc.

Total Estimated Cost ------- **$85, 490**

Virac

Virac requires 2 channels of data handling capability and a selective ringing circuit in Phase II. VHF guard channel capability is also a requirement. However, we recommend the VHF equipment supplied Tagbilaran in Phase I be transferred to Virac when Tagbilaran is decommissioned.

With ancillary equipment, hardware and supplies, fabrication material included, the total estimated cost is $10,825.

Zamboanga

Because both the ADC and ACS facilities are housed in the same building, we have elected to treat them as combined. The ACS will require the ISB point-to-point communication capability with one sideband serving the ADC. A VHF guard channel has been recommended for the ACS. Basically, the same equipment that has been recommended for the Davao ADC/ACS is applicable to Zamboanga.

In the fourth year, new quarters are recommended for the Zamboanga ACS and ADC facilities in the new terminal building. Although building costs are in the Airports Section of this report, consoles, benches, pilot briefing counters, racks, frames, etc. are included here. A new operating position for the CW circuit is also included.

Therefore, the total estimated cost for the Zamboanga ACS/ADC is $63,200.

A cursory examination of these estimates readily reveals the communication deficiencies in the Mindanao-Sulu area (other than Cagayan de Oro). This is because BUTEL circuitry does not go there. The Team is of the opinion, however, that the SSB equipment will perform the service adequately. Actually, the usage of the term SSB is somewhat a misnomer as we actually envision ISB (Independent Sideband) for the Mindanao-Cebu and the Cebu-Manila back-up circuit. More precisely, the Upper Sideband (USB) would be utilized between the Cebu ACC and the tributary ADC/ACS's or ADC's with selective ringing provided each tributary station. The Lower Sideband (LSB) would be for communication between the Cebu ACS and the tributary ACS's and also the ACS's could communicate with each other on this channel.

The Team questioned the comparatively low building cost figures quoted by local contractors, however, we agreed on $8.50 per sq. ft. for ADC/ACS, ADC buildings which includes basic electrical wiring, sanitation facilities, windows, etc. This figure was confirmed by CAA engineering personnel. Oddly enough, the same figure reputedly applies to tower type structures as well as one story buildings. For the RTR and engine generator buildings, which should only be a plain structure without windows, sanitation facilities, etc., we used a figure of $4.50 per sq. ft.

This figure also meets with the approval of reliable local sources.

Although, in most cases, we elected to leave the actual distribution of the surplus electronic equipment from the Romblon and Tagbilaran ACS's (which are recommended for decommissioning in Phase II) to the discretion of the engineers who implement the plan, we do wish to emphasize that all of the new equipment recommended in Phase I has been absorbed in Phase II.

TOTAL Estimated Cost for the Phase II ADC and ADC/ACS Program is -- $3, 064, 357

3. Estimated Airways Facilities Maintenance Cost

Admittedly, an estimate of maintenance costs is influenced by many factors, one of the most important of which is environment. The problem is compounded when maintenance of an entirely new system is contemplated, and particularly when the development plan calls for a system growing in size and complexity within a certain time frame.

As pointed out elsewhere, the Team does not foresee a significant increase in maintenance cost resulting from the Phase I effort. An increase in fuel costs may result from the need for more electric power generation, and power bills may increase at those few locations where prime power is secured from commercial sources.

In Phase II the increased yearly maintenance cost estimates are predicated on actual costs for maintenance of similar facilities in the FAA's Pacific Region. Tabular read-outs for all facilities are performed by an automatic data processing system on a quarterly basis. Cost items included are: (1) Total direct man-hours, (2) all salaries and benefits, (3) direct material costs, (4) utility and contract charges, and (5) locally purchased low value items required for facility maintenance. It is realized that salaries and benefits are higher in the FAA than in the CAA; however, because a considerable amount of training will be necessary, overall cost figures may be comparable as a result of the increased man-hours required. After the training requirements are satisfied and the technical work force has stabilized, the Team is of the opinion that salaries and benefits should be increased in order to retain stability.

A major item not specifically covered in the maintenance cost estimates is that of electrical power generation. At some locations, e. g., Butuan, Cotabato, Dipolog, etc., this will be an expensive item because of the necessity of generating prime power not only at the airfield but also at the NAVAID facility. A figure of four gallons of fuel consumption per hour for 37.5 KVA engine generators and 6.7 gallons per hour for the 62.5 KVA plants has been used. In both cases, a figure of 7-1/2% was added to cover lubrication material and spare parts. In neither case, however, was electro-mechanical technician salaries included. The Team does not attempt to cover this aspect since electronic technicians may be trained to service and maintain engine generators with supplemental help from a "roving" crew of electro-mechanical technicians. The "roving" crew would perform major maintenance and overhaul of the units on a scheduled or "as needed" basis. Another factor is Plant security which we envision as a major problem at all unattended facilities, and undoubtedly, security guards will be required at numerous locations. However, since this service is not related to technical performance of the airway system, the matter is considered to be internal. There is a possibility, of course, that some security guards could be trained to perform minor adjustments and effect switching from main to standby engine generators. Accordingly, the method for performing maintenance on the electrical generation units has been left to the discretion of the implementing agency.

Another major item not covered is that of contractual services which we recommend be provided by the Bureau of Telecommunications. This includes BUTEL maintenance of air/ground communication outlets at their hi-sites and maintenance of VHF links at their repeaters. However, since BUTEL and CAA are both government agencies, the matter is infrastructural in nature. Accordingly, we elected not to cover such costs in this report. Estimated yearly maintenance cost increases by increments and location can be found in Table IV-10.

D. Summary

This section has reviewed the Team's impressions gained from personal inspection of the Philippine aviation system. Deficiencies have been pinpointed and a system of priorities advanced for use in implementing an airways modernization program. The Team notes that unavoidable delays are often experienced in securing substantial financial assistance in projects of this type and proposes that the improvement program be divided into two phases. The first, with modest funding requirements would attempt to rehabilitate the present airways facilities and provide a limited amount of new equipment. The second phase, requiring a larger amount of money would dovetail with the first effort and be carried out in increments over a five-year period. An orderly course of action is proposed embracing both phases with specific price tags placed on each.

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286

Exhibit IV-R

ACS-ADC/ACS BUILDING AND EQUIPMENT
PHASE II

	ACS Bldg.	RTR Bldg.	Engine Generator	Single Side Band	SEL Call	TTY Circuit	VHF Freqs.	HF Freqs.	VHF Link	Estimated Cost
Baguio		1/				1				$ 3,728
Buayan	1	1	2	2	2		2	1		151,925
Butuan	1	1	2	2	2		2	1		151,925
Cagayan de Oro	CS/T				1	2	2			51,375
Calbayog	1	1/	2/		1	1	2	1		95,337
Cauayan	1	1	2		1	2	2	1	1	149,000
Cotabato	1	1	2	2	2		2	1		151,925
Davao	CS/T	1	1	2	2		1			85,950
Dipolog	1	1	2	2	2		2	[illegible]		151,925
Dumaguete	1	1	2		1	1	2	[illegible]		120,837
Iligan	1	1	2	2	2		2	[illegible]		151,925
Iloilo	1	1	2		1	1	1	[illegible]		120,837
Jolo	1	1	2	2	2		2	[illegible]		151,925
Laoag	1				1	2			1	78,266
Legaspi	1				1	2	1			56,978
Mactan				4	4	6	1			194,475
Manila				1	2	6				85,490
Marinduque	1					1	2	1		115,775
Masbate	1	1	2		1	2	2	1		122,337
Naga	1	1/	2/		1	2	2	1		96,837
P. Princesa	1	1/	2/		1	1	2	1		95,337
Roxas	1	1	2		1	1	2	1		120,837
San Jose	1	1	2		1	1	2	1		120,837
Surigao	1	1	2				2	1		121,375
Tacloban	1	1	2		1	1	2	1		120,837
Tuguegarao	1	1	2		1	2	2	1		122,337
Virac		1/			1	2	1			10,825
Zamboanga	ACS Control Tower		1	2	2		2			63,200
									TOTAL -	$3,064,357

1/ RTR building included in NDB costs.
2/ Engine generator included in NDB costs.

This chart only depicts new equipment that would be required in Phase II. For instance 1 VHF frequency consists of: 2 VHF transmitters
2 VHF receivers
4 VHF antennas
Ancillary equipment, cables, switches, etc.

Obviously, some of the ACS-ADC/ACS facilities require more than 2 VHF frequencies. However, the equipment for these will come from existing equipment or that supplied in Phase I.

A brief narrative on each ACS-ADC/ACS facility can be found in Section IV-C-2-g.

Exhibit IV-S

PHASE II PROGRAM - FACILITY COST BY LOCATION

	VOR	ILS	RADAR 3/	NDB	ACS & ADC/ACS	ADC	ACC 4/	TOTAL
1/ Alabat	216,950							216,950
1/ Aparri	202,562							202,562
Bacolod	119,400					111,912		231,312
Baguio				11,562	3,728			15,290
Buayan	121,900				151,925			273,825
Butuan	161,312				151,925			313,237
1/ Cabanatuan	205,812							205,812
Cagayan de Oro	102,250				51,375			153,625
Calapan				11,562				11,562
Calbayog				39,375	95,337			134,712
Cauayan	124,400				149,000			273,400
Cotabato	159,062				151,925			310,987
Daet	121,900							121,900
Davao					85,950			85,950
Dipolog	161,312				151,925			313,237
Dumaguete	126,900				120,837			247,737
Iligan	136,275				151,925			288,200
1/ Iloilo	174,650				120,837			295,487
Jolo				15,740	151,925			167,665
1/ Jomalig	191,500							191,500
Kalibo	123,150							123,150
Laoag					78,266			78,266
Legaspi	162,812				56,978			219,790
1/ Lipa	193,187							193,187
Lubang	147,750							147,750
2/ Mactan	104,937	228,000			194,475	3,400	56,950	587,762
Mamburao	119,400							119,400
2/ Manila	110,375		696,250		85,490		838,518	1,730,633

Exhibit IV-S, page 2

	VOR	ILS	RADAR 3/	NDB	ACS & ADC/ACS	ADC	ACC 4/	TOTAL
Marinduque				11,562	115,775			127,337
Masbate	137,150				122,337			259,487
Misamis	143,775							143,775
Naga	•			39,375	96,837			136,212
1/ Ormoc	205,062							205,062
P. Princesa				41,750	95,337			137,087
Roxas	130,900				120,837			251,737
S. Fernando	53,250							53,250
San Jose	121,900				120,837			242,737
Surigao	121,900				121,375			243,275
Tacloban	122,150				120,837			242,987
Tuguegarao	123,150				122,337			245,487
Virac				11,562	10,825			22,387
Zamboanga	117,000				63,200			180,200
TOTAL	4,564,033	228,000	696,250	182,488	3,064,357	115,312	895,468	$9,745,908

1/ Includes DME
2/ Includes VOT
3/ Includes ATCRBS and two radar simulators for training
4/ Refer to IV-C-2-g-(7)

TABLE IV-10

PHASE II
ESTIMATED YEARLY FACILITY MAINTENANCE COST INCREASES

First Two Years

	Location	Addition to Existing and/or Additional Facilities	Estimated Maintenance Cost
	Bacolod	ADC/APP/TVOR	$ 19,308
	Baguio	ACS	1,068
1/	Butuan	ACS/VOR/LINK	40,276
	Cagayan de Oro	APP/ACS	3,040
2/	Calapan	NDB	9,096
	Cotabato	ACS/VOR/LINK	40,276
	Davao	CS/T	7,728
3/	Iligan	ACS/VOR	34,268
	Iloilo	ACS/VOR/DME	40,276
3/	Jolo	NDB	15,396
	Laoag	ACS	1,680
	Legaspi	ACS	2,380
	Lipa	VOR/DME/LINK	26,532
	Mactan	ACC/ACS/VOT	88,000
4/	Manila	ACC/ACS/Training School/VOT	28,000
3/	Naga	ACS/NDB	23.248
3/	Roxas	ACS/VOR	34,268
	Virac	ACS/NDB	4,828
	Zamboanga	APP/ACS	7,728
			$427,396

Third Year

	Location	Addition to Existing and/or Additional Facilities	Estimated Maintenance Cost
5/	Alabat	VOR/DME/LINK	$ 30,332
	Baguio	NDB	3,060
	Cabanatuan	VOR/DME/LINK	30,332
3/	Calbayog	ACS/NDB	23,248
3/	Cauayan	ACS/VOR/LINK	37,052
1/	Dipolog	ACS/VOR/LINK	40,468
3/	Dumaguete	ACS/TVOR	34,268
	Jolo	ACS	16,188
5/	Legaspi	VOR/LINK	17,588
	Manila	ASR/ATCRBS/ATIS	40,652
3/	Marinduque	NDB	12,896
3/	Masbate	ACS/VOR	34,268
3/	Puerto Princesa	NDB	15,396
3/	Tacloban	ACS/TVOR	34,268
			$370,016
		Plus first two years costs	427,396
			$797,412

Fourth Year

	Location	Addition to Existing and/or Additional Facilities	Estimated Maintenance Cost
3/	Buayan	ACS/TVOR	$ 34,268
3/	Daet	TVOR	15,650
	Jomalig	DME	12,744
3/	Kalibo	TVOR	15,650
	Laoag	LINK	2,784
5/	Ormoc	VOR/DME	28,124
3/	Surigao	ACS/TVOR	31,768
3/	Tuguegarao	ACS/TVOR	34,268
			$175,256
		Plus first three years costs	797,412
			$972,668

Fifth Year

5/	Aparri	VOR/DME/LINK	$ 30,332
	Mactan	ILS	18,148
3/	Mamburao	TVOR	15,650
	Marinduque	ACS	16,188
5/	Misamis	TVOR/LINK	17,588
	Puerto Princesa	ACS	16,188
2/	San Fernando	VOR	11,580
3/	San Jose	ACS/TVOR	34,268
			$ 159,942
		Plus first four years costs	972,668
			$1,132,610

TOTAL estimated increase in yearly maintenance costs after all of Phase II implemented --------- $1,135,000

1/ Includes separate electrical power generation units for the airport facilities and the VOR.

2/ Due to isolation, Calapan and San Fernando require full time service of one electronic technician.

3/ Includes combined electrical power generation unit for both airport and NAVAIDS.

4/ The training facility portion covers only basic maintenance of equipment and training aids. Equipment damage, breakage, modifications, etc. not included.

5/ Includes electrical power generation for facility.

TABLE IV-11

TOTAL ESTIMATED COSTS IN PHASE II FOR EACH LOCATION
(Airports excluded)

Alabat	$216,950
Aparri	202,562
Bacolod	231,312
Baguio	15,290
Buayan	273,825
Butuan	313,237
Cabanatuan	205,812
Cagayan de Oro	153,625
Calapan	11,562
Calbayog	134,712
Cauayan	273,400
Cotabato	310,987
Daet	121,900
Davao	85,950
Dipolog	313,237
Dumaguete	247,737
Iligan	288,200
Iloilo	295,487
Jolo	167,665
Jomalig	191,500
Kalibo	123,150
Laoag	78,266
Legaspi	219,790
Lipa	193,187
Lubang	147,750
Mactan	975,546
Mamburao	119,400
Manila	1,339,849
Marinduque	127,337
Masbate	259,487
Misamis	143,775
Naga	136,212
Ormoc	205,062
Puerto Princesa	137,087
Roxas	251,737
San Fernando	53,250
San Jose	242,737
Surigao	243,275
Tacloban	242,987
Tuguegarao	245,487
Virac	22,387
Zamboanga	180,200
Total	$9,745,908

SECTION V
SUPPORTING SERVICES

In addition to the provision of navigational aids, communications, traffic control and terminal facilities, the International Civil Aviation Organization (ICAO) of which the Republic of the Philippines is a member state, requires that a number of additional services be provided to support the airways system. These are:

A. Flight Inspection Service (FIS)
B. Meteorological Services (MET)
C. Aeronautical Information Services (AIS)
D. Flight Assistance Service (FAS)
E. Search and Rescue (SAR)
F. Administration

The following portion of this document will be devoted to a brief description of the nature of these services and the manner in which they fit into the organization of the Civil Aeronautics Administration.

A. Flight Inspection Service

The amazing growth of air traffic operations has dictated the establishment of a system of all-weather air navigation to enable large numbers of aircraft to move quickly and safely to destinations. Safety of flight and effective control of aircraft movements necessitates that the components of this air navigation system be accurate, adequate and reliable. This requirement is not restricted to the ground facilities which give directional guidance to the aircraft. It is also essential that the communications equipment used in the system meet the standards of performance intended.

The present high level of aviation safety attained in various parts of the world today is due directly to the establishment and maintenance of standards for air navigation facility operation.

To insure that the Philippines may also offer to aircraft operators a high standard of safety, it is essential that a system of inspecting air navigation aids be established and maintained. Air navigation facilities must provide maximum assistance to the users with uniform quality of information. Careful and accurate flight checks by especially qualified personnel using special aircraft and equipment are necessary for this purpose. The following indicated criteria has been established by international agreement:

1. Aircraft

The general characteristics of aircraft suitable for flight inspection are:

a. Reliable multiengine type capable of safe flight with one engine inoperative and fully equipped and instrumented for night and instrument flight.

b. Sufficient capacity for flight inspection crew, observers, ground and maintenance and/or installation personnel and necessary electronic equipment with required spares.

c. Sufficient range and endurance to permit completion of a normal mission without reservicing.

d. Aerodynamically stable throughout its speed range.

e. Low noise and vibration level.

f. Stable electrical system of adequate capacity to operate the required electronic and recording equipment as well as the aircraft's equipment.

g. Wide speed and altitude range to enable flight inspections to be conducted under the conditions normally encountered by the users.

h. Suitability for future modification to adapt it for flight inspection of new and improved aids that are now in development.

2. Crew Qualifications

Because of the great importance of the flight inspection program, and the influence which competent and resourceful flight inspection personnel have in improving air navigation aids, personnel of the highest caliber available must be assigned to these duties. A background of communications, electronics, air traffic control and/or aircraft operations is desirable. In addition, an interest in flight inspection work, a willingness to exert initiative, tact and discretion will be assets to the performance of the required duties. Special qualifications for the flight inspection air crew positions are:

a. FLIGHT INSPECTOR should be a graduate of a recognized flight inspection school or have experience equivalent thereto, and will have demonstrated proficiency in flight inspection to the satisfaction of the CAA Director.

b. FLIGHT INSPECTION CO-PILOT must be familiar with flight inspection work and possess the potential to ultimately qualify as a Flight Inspector.

c. FLIGHT INSPECTION TECHNICAL SPECIALIST (1. PANEL OPERATOR, 2. THEODOLITE OPERATOR) should be a graduate of a recognized flight inspection school and will have demonstrated proficiency in flight inspection work to the satisfaction of his superiors. When such personnel are not available, Flight Inspection Specialists may be selected from among the best radio technicians available who can demonstrate proficiency in flight inspection work.

3. Electronics Equipment

Special airborne and ground electronic flight inspection equipment must be used in the flight inspection program. The effectiveness of this program requires that reliable information be used to determine the status of an air navigation facility. This necessitates that airborne electronic flight inspection equipment of the highest standard be used, and that this equipment be carefully checked and calibrated. Because the aircraft equipment is used as the standard against which a flight facility is adjusted, the accuracy of calibration of the airborne equipment is of extreme importance. This then means that in addition to the airborne equipment a GROUND CALIBRATION LABORATORY must be maintained and operated by qualified technicians. Calibration intervals vary with different components of the airborne system but every thirty days is considered a good average.

4. Types and Priorities of Flight Inspections

Official flight inspections are of five basic types: (a) Site evaluation, (b) Commissioning, (c) Periodic, (d) Special, and (e) Surveillance.

a. Site Evaluation

A flight inspection to determine the suitability of a proposed site for the permanent installation of an air navigation facility. It may include checks normally made during a commissioning inspection and any additional tests which may be required.

b. Commissioning

A comprehensive flight inspection designed to obtain complete information as to facility performance and establish that the facility will support its operational requirements, and where applicable, general operator performance. A commissioning inspection will be accomplished prior to commissioning any air navigation facility.

c. Periodic

A regularly scheduled flight inspection comprehensive enough to determine that the facility will still meet standards for a commissioned facility and support its operational requirements.

d. Special

A flight inspection required by special circumstances to determine facility performance or characteristics. Such circumstances will include reported equipment malfunctions or deficiencies, aircraft accidents where facilities may be involved, and major maintenance or modification of facilities. Development of new operations requirements and provision of flight inspection assistance in the evaluation of new aids will also be included in this category.

e. Surveillance

An unscheduled flight inspection accomplished on commissioned air navigation facilities for the purpose of determining through continuing in flight evaluations, that the performance of the air navigation system or any component thereof continues to meet applicable standards.

5. Frequency of Recurring Flight Inspections

The following schedule of periodic flight inspection is the internationally established minimum requirement. In some cases, it may be necessary to conduct inspection of some facilities more frequently to provide a reasonable assurance of continuing satisfactory performance.

Facility	Days between Inspections
1. Instrument Landing System (ILS) --All components	60-75
2. VOR	120-150
3. TACAN	120-150
4. Airport Surveillance Radar (ASR)	120-150
5. Approach Lighting System (ALS)	180-210
6. Tower Communications	Surveillance (not announced)
7. Radio Communications	Surveillance (not announced)
8. VORTAC	120-150
9. Low Frequency Marker Beacons (NDB)	330-365
10. Precision Approach Radar	60-75

6. Evaluation of Present Flight Inspection Service

It is true that the CAA has attempted to maintain a program of flight inspection for several years through use of a U. S. excess C-47 fitted out for the purpose. That this program has been largely unsuccessful is evidenced by the fact that few, if any, of the facilities are operating satisfactorily by any standards. The C-47 which was originally transferred to the CAA for flight inspection use has been seldom utilized for this purpose on a scheduled basis. Indeed, the interior was outfitted for executive purposes and for the past few years has been primarily used as such. With rare exception, any flight inspection activity performed was in conjunction with VIP flights. And this is understandable, since the CAA receives no direct appropriation for operation of the aircraft.

An additional aircraft (C-45) was secured from FAA excess sources in 1963 and flown for the first time in December 1965 after extensive rehabilitation. This aircraft was originally used for several years by USFAA Pacific Region (in Hawaii) for flight inspection purposes. Except for the absence of a few components, it could be used by CAA for this purpose. The aircraft was involved in a minor landing accident several months ago and has not been repaired due to lack of funds as well as an apparent lack of interest in using it. Aside from the slight damage mentioned, this plane is in excellent condition. There are indications that only two airmen in the CAA have been checked out in this aircraft, and that no one cares to fly it. Failure of the present flight inspection program is attributed to a number of factors which can be summed up briefly as follows:

a. Lack of budgetary support to keep an effective flight inspection program going.

b. Utilization of the CAA flight inspection aircraft for purposes other than intended.

c. Failure to keep electronic components aboard the flight inspection aircraft ready for use at all times.

d. Lack of an adequate ground-based calibration laboratory.

e. Lack of a sufficient number of trained flight inspection personnel.

The Team does not wish to dwell on the foregoing, since every official of the CAA is completely aware of the existence of these factors which render the flight inspection program ineffective. However, it must be clearly understood by all concerned that benefits to be derived from installation of a communications and navigational aid system as recommended by the Team will be only in direct relation to the CAA's ability to implement and effectively carry out a flight inspection program. When the installation phase of this Team's recommendations has been completed, the following facilities will be in operation and will require flight inspection service in all of the categories outlined in Section IV.

23	Very High Frequency Omnidirectional Ranges (VOR)
11	Terminal VOR's (TVOR)
13	Non-directional Beacons (NDB)
2	Instrument Landing Systems (ILS)
2	Approach Lighting Systems (ALS)
1	Airport Surveillance Radar (ASR)
28	Airway Communications Stations (ACS)
2	Air Route Traffic Control Centers (ARTC)
7	Airport Traffic Control Towers (6 with Approach Control)

Total--89 facilities to be checked. The implications of this problem are more than impressive.

7. Discussion of Possible Solutions

a. Turn the entire project over to Philippine Air Force. PAF already has one completely equipped C-47 flight inspection plane for which they have little or no use. PAF has a calibration laboratory but it is not presently in use due to absence of certain components. Flight crews could be trained under the JUSMAG program.

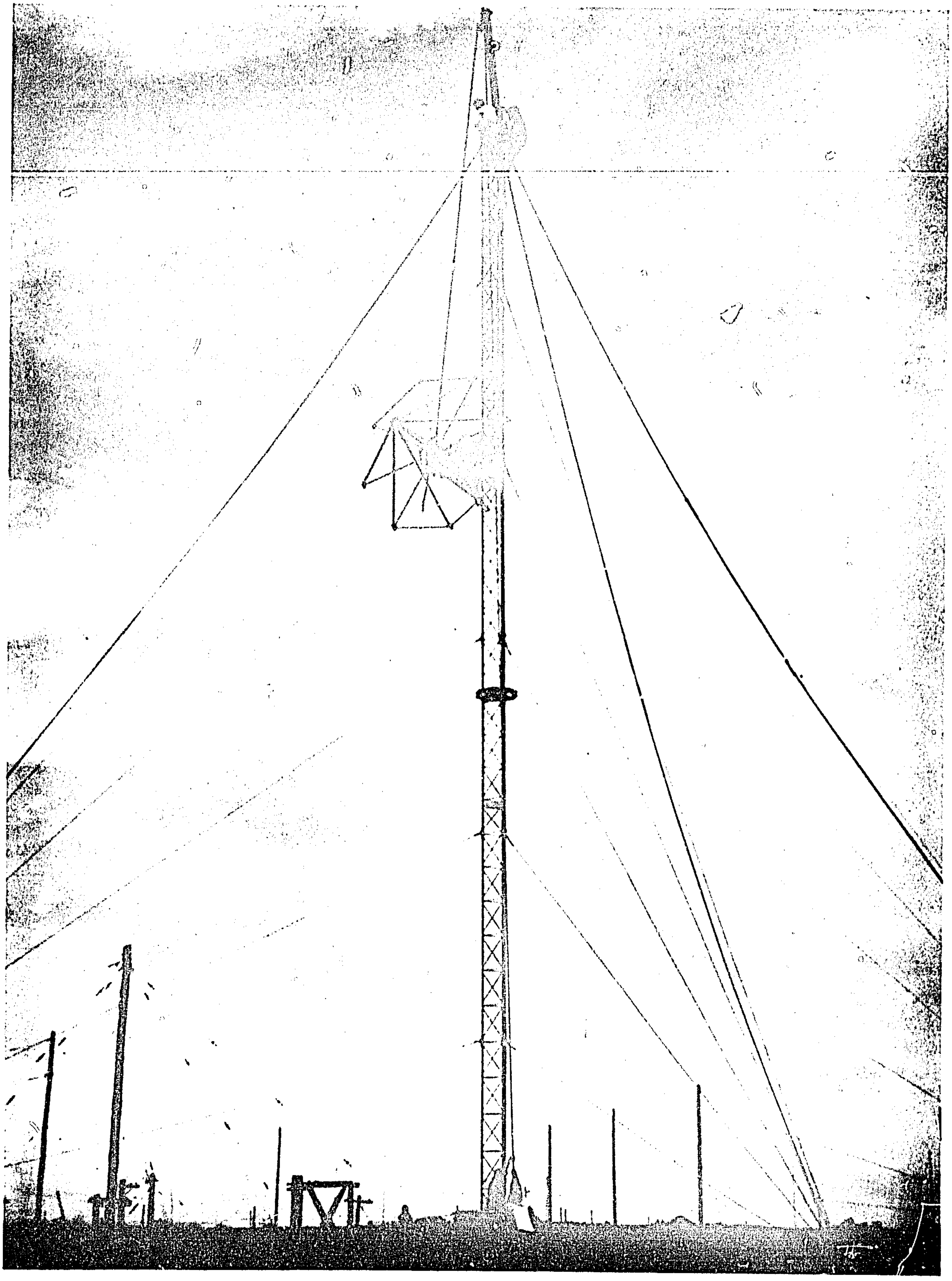
Positive Factors: Flight Inspection duties could be accomplished and at the same time provide flight training for PAF personnel. Cost to the GOP would be relatively small.

Negative Factors: Turnover in PAF personnel would not provide continuity in the program. National emergency might require diversion of aircraft to other activities. CAA might encounter problems in maintaining control over the program.

b. Contract with the USFAA for the service. FAA now provides flight inspection service for the U. S. Military owned and operated facilities in the Philippines and elsewhere in Southeast Asia.

Positive Factor: The work would be done in an effective manner by professional crews and with equipment second to none in the world.

Negative Factors: The FAA does not have the crews nor equipment to perform this additional work at present. To perform this activity X



Conical monopole antenna for WMO weather broadcast service is erected by CAA technicians under SEATO Meteorological Telecommunications Project.

to the degree required in five years would require two full-time aircraft and three crews based in the Philippines. FAA charges vary but might average $300 to $500 per hour for flight inspection work, thus making the cost well-nigh prohibitive.

c. CAA accept full responsibility for performing the flight inspection activity.

Negative Factors: High cost, but not so high as contracting with USFAA. Problem of keeping equipment maintained. Lack of qualified personnel in early phases of program.

Positive Factors: Complete control of the entire program from maintenance and operation of the ground facilities to, and including, the flight inspection process.

8. Proposed Action

The Team recommends that (1) GOP acquire two airplanes, mechanically adequate for the service and completely equipped with appropriate electronics components. In this connection, the Team feels that the type of aircraft acquired will depend on cost factors and availability. Probably, the most economical from an initial acquisition, maintenance and operation standpoint would be the DC-3 (C-47), although this aircraft admittedly lacks high altitude capability. (2) Three complete crews of flight inspection personnel be trained and utilized for this purpose only. (3) Firm restrictions on use of these aircraft for any other purpose that would interfere with the primary mission should be imposed. (4) A completely equipped ground laboratory should be set up in conjunction with the CAA Airways Engineering Division maintenance laboratory. (5) All activities of the Flight Inspection Branch should be carried out with strict adherence to ICAO Document 8071, Manual on Testing Radio Navigational Aids and the U. S. Standard Flight Inspection Manual, May 1963.

B. Meteorological Services

When aircraft are required to operate over large areas, on fixed schedules regardless of most weather conditions, a weather reporting, collecting, and predicting service is required. It must tell the pilot the weather conditions to be faced at the terminus of this flight at his planned arrival time, at possible alternate landing points and during enroute flight.

The collection and dissemination of weather information in the Philippines is primarily the responsibility of the Weather Bureau, a branch of the Department of Commerce and Industry. The Weather Bureau (WB) presently operates 49 stations, 42 of which are equipped with single-sideband radio transceivers. Eight of these stations are located at airports with the remainder in cities at varying distances from the airport. At five of these eight airport locations, the CAA is handling weather communications for the WB. In addition to these 49 observational points the WB operates two radar stations--one at Baras Bato (near Virac) and the other at Manila in the Port Area.

Primarily, the WB system was set up to serve domestic and climatological needs of the Philippines. With the exception of those stations located at airports, observations are made on a three-hourly basis (hourly when a typhoon is in the area) at a point away from the airport and do not serve aviation needs.

The WB, although satisfactory for the purpose intended, does not adequately serve the needs of aviation. The Aviation Weather Service requires hourly weather observations at all airports in the National Aviation System. The communications system serving these locations must be capable of rapid exchange of these observations as well as other supplemental weather information, such as special reports which are required on a priority basis when rapid changes are taking place in weather conditions which might affect the safety of aircraft moving in the immediate area. Weather information is highly perishable and, unless it is timely, the flying public is not being properly served and can be moving in a very unsafe environment.

1. Proposed Action

Weather Bureau Airport Stations (WBAS) should be located at the following airports as the Airway Communications Stations (ACS) recommended in this report are completed. One hundred fifty square feet of space at each station has been allowed for this purpose and is included in the cost estimate.

Mactan
Davao
Zamboanga 1/
Iloilo
Cagayan de Oro 1/
Cotabato
Legaspi 1/
Tacloban
Dumaguete
Jolo 1/
Tuguegarao
Surigao
Laoag 1/
Roxas
Tagbilaran 1/

1/ Indicates those locations where WBAS are already in operation.

Weather observation and reporting facilities should be located at the following recommended Airways Communications Stations:

Butuan	Masbate
Dipolog	Marinduque
Cauayan	Naga
Iligan	Virac
General Santos	Calbayog
San Jose (M)	Puerto Princesa
Baguio	

All CAA Communications personnel working in the Domestic Service would be required to study the principles of weather observing and pass initial and refresher examinations to be administered by the Weather Bureau.

At those airport locations where the WB will not take observations, the CAA Communications personnel should perform this activity.

At those airport locations where WB presently provides or intends to provide service on a part-time basis, CAA should take over the observational activity during periods when WB personnel are not available.

Since the Survey Team does not recommend ACS at the following indicated airports, the WB should plan to provide observer service, or make arrangements with airline personnel to take observations and make them available as required.

Bacolod	Mamburao	Calapan
Daet	Ozamis	Romblon
Kalibo	Aparri	Lubang

It is recommended that the WB provide all weather instrumentation at airport facilities. This should include, but not be restricted to, the following:

- Wind direction and velocity indicator
- Wet and dry bulb thermometer and outdoor shelter
- Aneroid barometer
- Mercurial barometer
- Rain gauge
- Barograph
- Thermograph
- Ceiling light

C. Aeronautical Information Service (AIS)

The operator of any type aircraft must have at his disposal considerable information concerning the air navigation facilities and terminal areas which he may be expected to use. For example, he must know the regulations concerning entry into and transit of the airspace of each country in which he intends to operate; he must know what aerodromes, navigation aids, meteorological services, communication services and air traffic services are available and the procedures and regulations associated with them. He must also be informed, often on very short notice, of any change affecting the operation of these facilities and services, and must know of any hazards likely to affect his flight. While this information can usually be provided before take-off, in some instances it must be provided during flight.

It is the responsibility of the pilot-in-command of any aircraft to acquaint himself with all information pertinent to the safe operation of his flight. In the case of international commercial air transport, ICAO (Aeronautical Information Services Annex 15) lays down some rather stringent requirements which can only be satisfied by the provision of information usually supplied by an aeronautical information service. Flight crews must be familiar with the regulations and procedures of all States overflown, certain specific types of information must be carried on board an aircraft, and no flight may be commenced unless there is adequate assurance that the necessary facilities and services are available and are operating satisfactorily. The ability to comply with these requirements is largely dependent upon the existence of an adequate aeronautical information service. The nature of aviation necessitates the imposition of this obligation on the government rather than on the airline operators, since the safety, efficiency and economy of air navigation rests, in part, on the availability of accurate and timely information which, in most instances, has its origin in an infrastructure under the control of the Civil Aeronautics Administration. Furthermore, the procurement of information by various individual operators independently is not only inefficient and wasteful of human effort, but may be dangerous since obviously only the Civil Aeronautics Administration, which is responsible for the facilities, services, and procedures, is in a position to promulgate bona fide information. It will be noted that both domestic and international aviation have the same need for an aeronautical information service.

Three major responsibilities of the AIS are (1) Establish procedures for origination, collection and dissemination of Notices to Airmen (NOTAMS); (2) Establish and operate an International NOTAM Office and Briefing Center at MIA; (3) Develop, maintain and distribute the Aeronautical Information Publication (AIP).

1. Notices to Airmen (NOTAMS)

NOTAMS consists of two classes--I and II. Class I NOTAMS are of an immediate nature requiring transmission in message form via any or all of the telecommunications facilities available. A Class II NOTAM is generally not of immediate concern and may be handled by mail. NOTAMS are originated and issued whenever the following information is of direct operational significance:

a. The establishment or withdrawal of electronic and other aids to air navigation and aerodromes;

b. Interruption or return to operation, change of frequencies, change of identification, change of orientation (directional aids), change of location, power increase or decrease amounting to 50 per cent or more, change in broadcast schedules or contents, or irregularity or unreliability of operation of any electronic aid to air navigation, and air/ground communications services;

c. Interruption of or return to operation of aerodrome lighting system;

d. Establishment, withdrawal, or significant changes made to visual aids;

e. Occurrence or removal of temporary obstructions to aircraft operations in the maneuvering area;

f. Presence or removal of hazardous conditions due to snow, ice, or water on the movement area;

g. Establishment, withdrawal or significant changes made to procedures for air navigation services;

h. Presence of airborne hazards to air navigation;

i. Military exercises or maneuvers affecting air navigation;

j. Major changes to search and rescue facilities and services available;

k. Interruption or return to operation of hazard beacons and obstruction lights marking obstruction to air navigation;

l. Changes in entry regulations requiring immediate action;

m. Erection or removal of obstructions to air navigation;

X 304

n. Establishment or discontinuance (including activation or deactivation) as applicable, or changes in the status of prohibited, restricted or danger areas.

The need for origination of a NOTAM shall also be considered in any of the following circumstances:

a. Occurrence or correction of major defects in the movement area;

b. Interruption or return to service of significant units of airport rescue or fire fighting facilities;

c. Interruption or return to service of refueling services;

d. Air display or mass movements of aircraft;

e. Availability of new maps and charts;

f. Changes in legislation requiring immediate notification;

g. Any other significant circumstance.

The basic purpose of any NOTAM is the dissemination of information in advance of the event to which it relates, except in cases of unserviceabilities which cannot be foreseen. A NOTAM must be received by the addressee in sufficient time for him to take any action required by the NOTAM. The value of a NOTAM lies in its "news content" while its residual historical value is quite small.

2. Aeronautical Information Publication (AIP)

The AIP is a document, the development and dissemination of which is not only required by ICAO but which becomes, in essence, the airmen's "bible." Its importance in this respect is directly related to the accuracy and timeliness of information published. In essence, the AIP is a loose-leaf binder consisting of an index of all aviation facilities available to the flying public of the country in which it is published. It is the responsibility of the Aeronautical Information Service not only to publish and distribute this book but also (equally as important) to assure that it is up to date through the timely issuance of additions, deletions, and amendments as they become necessary.

The effectiveness of this Service is directly related to (1) the accuracy and dependability of those responsible for originating the information; (2) the efficiency of the communications media used for transmitting the information to the headquarters of the Service; and (3) the evaluation and distribution of information thus collected to those who have a need to know through use of the AIP, or NOTAM, as appropriate.

3. International NOTAM Office and Briefing Center

It is at this point that NOTAMS are originated, received, collated, and distributed by one means or another to other locations, either domestic or international. This is the nerve center of the AIS and the location must be convenient to airline operators and crew members, since the service provided also includes flight crew briefing and flight planning. This Center is staffed with two categories of Specialists, the NOTAM Officer, and the Briefing Officer. The former generally, but not always, comes from the ranks of the Communicator and the latter from the area of Traffic Control. During periods of light activity, one man often can handle both jobs. The Weather Bureau should also establish weather briefing facilities in conjunction with this office.

4. Evaluation

The AIS section was established in May 1964 on the strength of CAA Official Order No. 24, Series of 1964. The staff consisted of one Acting AIS section chief and five minor employees. It enjoys only a quasi-official status and was created as a temporary infrastructure of the CAA to comply with ICAO commitments and to meet the ever-growing needs of the aviation ground services. Since then, other employees have been added to the staff. A very fine AIP has been published and distributed. The reception and distribution of NOTAMS suffer limitations because of poor communications, and also because of failure at the field level to provide timely and accurate information for AIS use. The AIS office is understaffed and, additionally, no effort has been made to establish a Briefing Center.

5. Proposed Action

a. With exception of the reproduction section, relocate the NOTAM Office to the first floor of the Terminal Building and at the same time establish a Briefing and Flight Planning Center as an integral part of this effort. The office should be in operation 24 hours a day.

b. Personnel and operation of FASCO should be placed under control of the AIS but would continue operation at the Domestic Terminal on its present part-time basis. The terms of reference for both offices would be identical; however, one would serve the domestic carriers and general aviation, while the other would serve the international terminal area. During hours when the Domestic Unit is closed, flight plans would be received at the International Unit (main office) instead of the RCC.

c. The AIS should be recognized and staffed as a separate and distinct ground facility, with personnel assigned on a full-time basis to these duties exclusively.

D. Flight Assistance Service

FAS is usually aimed at the General Aviation segment of the industry. This is so because large scheduled air carriers generally maintain their own dispatching and communications system and it is the responsibility of the airline dispatcher to provide this service to his pilots. However, the smaller carriers as well as the executive, company, and private fliers in the Philippines are "on their own." The Team's statistics have already brought out the fact that General Aviation constitutes a very significant portion of the overall aviation effort in the Philippines, and it is our opinion that this segment presently receives slight consideration.

FAS is provided by the Airways Communicator; however, it should be noted that all employees of the CAA have a direct responsibility to provide either as routine, or on their own initiative, any information which might affect the safety of flight. Indeed, the subject of FAS is now an important portion of the curriculum of the Airways Operations Training Center operated by the CAA at MIA.

FAS falls into the following principal categories:

1. Pre-flight

"Pre-flight" consists of providing a convenient location to examine a display of conditions from the point of take-off to his intended point of landing. This information consists of terminal and enroute weather data, condition of navigational aids, communications facilities, and terminal and alternate airport landing surfaces and servicing capabilities, such as fuel and repairs. The display area is usually located in Airway Communications Stations (ACS), and keeping the data display current and accurate is considered to be one of the responsibilities of communications personnel. The data display must also be supplemented by additional verbal briefing by the communicator on duty.

2. In-flight

In-flight advisory service is provided by the Airways Communicator and this is also referred to as "flight following service."

In short, he now has the airplane in the air and on his own initiative provides the pilot with pertinent information relative to significant weather changes that might affect the safety of flight. He also notifies the pilot of any changes in the status of navigational aids or landing areas involved. If, after the estimated time of landing the pilot does not close out his flight plan (notification of arrival) the communicator sets in motion a series of events with the ultimate goal of locating the airplane. From this point on personnel of the Rescue Coordination Center (RCC) take over. Action taken by the RCC is described in another chapter.

3. Airdrome Advisory Service

This service is rendered by communications personnel to approaching or departing aircraft at airdromes not served by a control tower. It usually consists of current weather information, runway condition, and any hazards which might affect the safety of flight in the area. It should be emphasized that the communicator does not issue control instructions--only advice.

4. Weather Broadcast Service

In addition to transmission of significant weather information directly to individual aircraft being served by the communications facility a weather broadcasting service must be provided. These voice broadcasts consist either of "live" or "recorded" information transmitted at scheduled intervals over the voice facility provided on VOR's and/or NDB's. Broadcasts of a non-scheduled nature are also made under certain weather conditions which call for "special" reports.

5. Evaluation

The Team notes that with the exception of one facility (FASCO) located at Manila Domestic Terminal little action has been taken to place this important function in motion. This can be generally attributed to lack of weather information, poor communications circuitry and space problems. There must also be an educational program carried out among the flying fraternity. Pilots have been flying for so many years in the Philippines with minimal service that they have grown used to it. Once the CAA facilities are moved into adequate quarters conveniently located on airports and equipped with modern efficient electronic aids airmen will become conscious of the service and grow to accept and rely on its efficacy. In short, the CAA must build up the confidence of the airmen in the quality of service which it can and must provide.

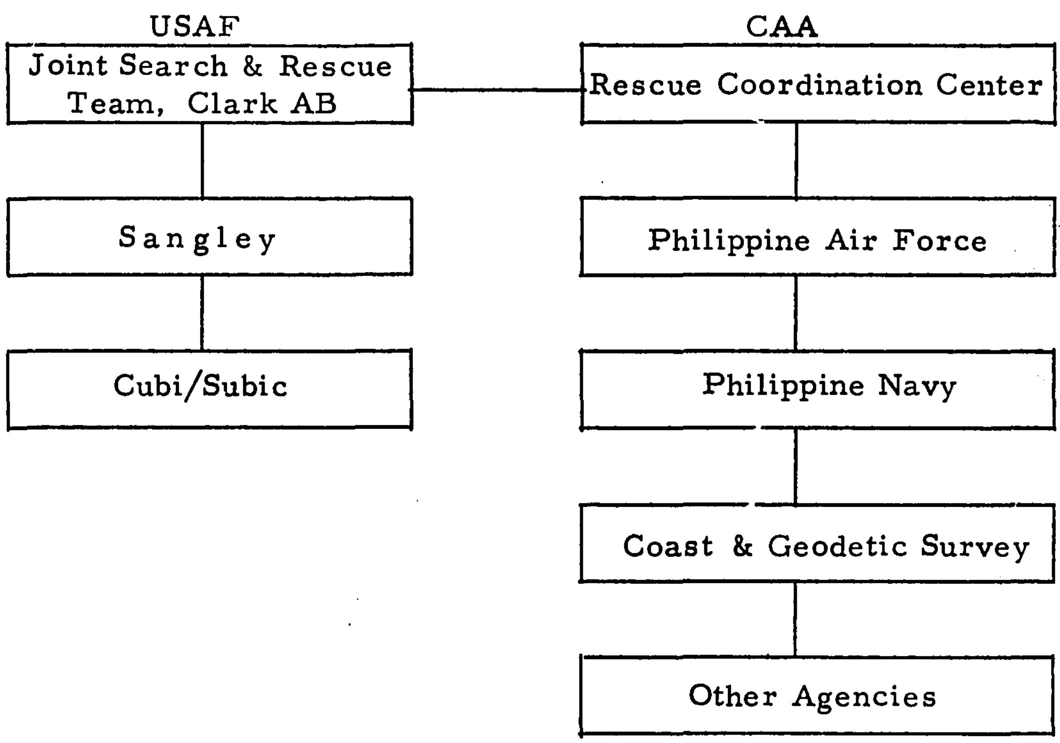
X 308

E. Search and Rescue

In accordance with Article 25 of the International Civil Aviation Organization (ICAO) each Contracting State is required to render assistance to aircraft in distress within its territory. The Standards also extend such obligations to neighboring territories or seas.

The Philippines began to fulfill this ICAO requirement in 1950 with the implementation of a Rescue Coordination Center (RCC) at Manila International Airport. Traditionally, the responsibility for operation of an RCC falls within the organizational structure of one of the governmental agencies designated to carry out physical search and rescue operations, such as the Navy, Coast Guard or Air Force. In the Philippines, the Civil Aeronautics Administration has been designated as the responsible agency, and conducts this work from a room on the fourth floor of the MIA terminal.

Organizational Structure of Search and Rescue Facilities in the Philippines



Following is a brief description of the Search and Rescue process and how the RCC fits into the overall picture. It should be pointed out that procedures followed conform, insofar as possible, to international regulations, both Maritime and ICAO.

1. Uncertainty Phase

Air Traffic Service units operated by the CAA notify the RCC when an aircraft is considered to be in a state of emergency. This condition obtains when no communication has been received from the aircraft within a period of thirty (30) minutes after the time a scheduled position report should have been received or when an aircraft fails to arrive within thirty (30) minutes of the estimated time of arrival last notified to or estimated by air traffic service units, except when no doubt exists as to the safety of the aircraft and its occupants.

During the uncertainty phase RCC alerts the various SAR units at its command as to the possibility of an emergency, and ascertains that the Preliminary Communications (PRECOM) search is taking place.

2. Alert Phase

This phase follows the uncertainty phase when the PRECOM checks have failed to reveal any news of the aircraft, or when an aircraft has been cleared to land by a Control Tower and fails to land within five minutes of the estimated time of landing and communication has not been re-established with the aircraft.

At this time the RCC orders an Extended Communications Search (EXCOM) and within its capability notifies PC commands and other governmental or local agencies in the general area of suspicion.

3. Distress Phase

Following the Alert Phase, the absence of news from widespread communications checks under the circumstances points to the probability that the aircraft is in distress; or when the fuel on board is considered to be exhausted; or when information has been received indicating the presence of mechanical trouble or that the aircraft is about to make or has made a forced landing.

At this time the RCC has the authority to call out any or all of the agencies responsible for the actual search and rescue operation.

4. RCC Facilities

At present RCC maintains communications capability as follows:

a. Clark Rescue Coordination Center

b. Sangley NAS Movement Reporting Office

c. Cubi Operations

d. 505th Air Rescue Squadron (PAF)

e. Air/ground communications on International Aircraft Distress frequency of 121.5 megaHertz

f. Commercial telephone.

5. Additional Responsibilities of RCC

a. Although not customarily considered internationally as a duty attached to the RCC, this unit coordinates search for surface vessels lost or in distress. This is so because there is no other RCC maintained in the Philippines.

b. Aeromedical evacuation activities are also coordinated by the RCC.

c. Establishment of field coordination centers in a specific area where an aircraft is believed down.

d. Accepting flight plans and distributing same by telephone from all categories of aircraft operators when the CAA Flight Assistance and Control Office (FASCO) is closed or when FASCO cannot be reached by telephone.

6. Evaluation

The CAA, through implementation of the RCC in 1950, is adhering to its ICAO commitments. The effectiveness of the organization is hampered by lack of an adequate communications system. However, the procedures followed are in accordance with current international practices and given the proper tools the service would be exceptionally effective.

The Team believes that it would be more appropriate for one of the Armed Services directly involved in Search and Rescue Operation to operate the RCC, and would so recommend. If there are, however, compelling reasons why the CAA should continue this function, the Team submits the following suggestions for improvement of the service.

7. Proposed Action

a. Establish a Rescue Coordination Subcenter at Cebu in conjunction with the ACS.

b. Move the RCC from present quarters to the RCC Console in the new ATC Center.

c. Eliminate the backup 121.5 mHz and 243 mHz terminations from the console keys. (Switching from main to backup equipment should always be done in the equipment room by maintenance technicians).

d. Add outside commercial telephone termination to RCC console position.

e. Terminate on separate keys in RCC Console 121.5 mHz lines from the Laoag, Bacaycay and Romblon hi-sites.

f. Provide direct simplex teletype service with the RCA Maritime radio station at Manila.

g. Provide single channel HF receiver for 2182 kHz (marine distress voice frequency).

h. Upon establishment of Flight Briefing Center under AIS (See V-5) discontinue accepting Flight Plans at night.

i. Provide direct interphone circuit to Philippine Navy Headquarters.

j. Provide adequate equipment for field coordination center as follows:

(1) Two portable (not to exceed 50 pounds) 300 watt 110 volt AC and 12 Volt DC 8 ampere gasoline driven power plants.

(2) Two 5 to 10 watt multichannel VHF portable transceivers.

(3) Two 100 watt portable HF transmitters capable of transmitting on two frequencies in the 3 and 6 megaHertz range.

(4) Two HF tunable receivers (portable).

(5) Suitable portable antennas for the above radio equipment.

F. Administration

It was not the intention of the Team to probe the administrative processes of the CAA. Indeed our only excursion in this area was in Section I and this was restricted to the appropriation and personnel distribution function, since this would be a matter of considerable interest to lending entities who might be attracted to this program. In the course of our studies of the overall airports and airways system, we did come, with alarming frequency, across evidence of serious deficiencies in the field stemming directly from certain administrative practices which if rectified would make for a more efficient operation. The Team wishes to emphasize that unless improvements in these vital areas are effected the entire system will again collapse. In justice to the CAA, we recognize that the deficiencies noted result mainly from a continued lack of financial support from the Government.

1. Logistics

This sub-section deals briefly with the process of supplying specialists in the field with the necessary maintenance and operational materials on a continuing basis in order that they may fulfill the objectives of their mission. The development and maintenance of an effective logistics system is a project of considerable dimension and the Team herein can only point to areas which were in obvious need of attention at the time of our survey.

a. Maintenance Requirements

Any type of facility subject to wear requires spare parts if continued usefulness is expected. This runs the gamut from electronics to transportation to runways and terminal structures. Effective and timely maintenance cannot be performed unless the specialist in the field has either on hand or can speedily requisition replacement parts or materials to effect repairs. As pointed out elsewhere, delays in restoring service can be translated into direct or indirect financial loss to the economy.

(1) Inventory

To determine accurately maintenance and spare parts requirements, an agency must first determine what they have and where it is. An inventory such as this must be kept current. This calls for an accurate notification procedure

313

which will alert the procurement and warehousing authority whenever a new item is installed or a new facility constructed, as well as when a decommissioning takes place.

(2) Spare Parts and Other Supplies

From an accurately maintained inventory, the agency should be able to develop and keep in operation a system of logistics support for engineering and operating groups within the organization.

For instance, each new radio transmitter or other piece of electronics equipment will be normally delivered with a supply of spare parts estimated by the manufacturer as the basic requirement for one year. The procuring authority should never allow the supply to drop below this level. By the same token, the agency should estimate needs in advance and keep on hand the necessary wide variety of maintenance supplies. For some items, particularly those materials generally associated with airports maintenance, space and transportation, considerations might dictate desirability of procurement at the field level, and funds should be available to field personnel for this purpose.

(3) Requisitions

Each field location should be provided with an adequate supply of spare parts of the variety most needed based on experience and recommendations of the manufacturer. Once the level of materials falls below an authorized amount, the responsible field employee would submit a requisition to headquarters. This requisition should be filled immediately and accurately; however, if the item is not in stock, immediate action should be taken to procure it and at the same time the field official should be notified that the item has been "back-ordered," with an indication of the date it can be expected. One of the most common complaints of CAA field personnel is that their requisitions are seldom filled and no explanation is made. The Team gathers that failure to fill requisitions may be due to lack of funds but also submits that field morale would be vastly improved if headquarters would acknowledge correspondence and explain non-shipment of supplies.

b. Warehousing

Of paramount importance in a property management system is the warehouse and its effective operation. Here, the spare parts and other maintenance materials are kept and the warehouse manager is the key to the system. It is here that the requisitions are filled, where records are

X 314

kept and information fed to the property management division when stockpiles need replenishing.

The Team cannot overemphasize the need for adequate maintenance of every item in the CAA inventory. It notes elsewhere that the present state of deterioration of equipment is largely due to lack of maintenance. A warning is issued that regardless of the cost of a new airways and airports system the investment will have been wasted in short order unless the CAA develops it property management division and the Government reacts favorably to budgetary requirements to support the maintenance effort.

G. Summary

In summary, this Section has evaluated physical resources and effectiveness of major support services considered vital to the CAA effort and has presented certain recommendations for needed improvement. For the benefit of those who may be unfamiliar with the nature of these activities, a brief outline of requirements, as set forth in ICAO documents, was included.

It was observed that an organized Flight Inspection program is virtually non-existent, and that this stems from a lack of budgetary support for the activity plus other factors. The Weather Bureau operates a number of stations; however, most are not located at airports and were designed to provide information for farmers, shipping, and for climatological purposes. The Team notes that CAA communicators could be trained and licensed by the Weather Bureau to carry on in the absence of Bureau participation. The Team also notes that Flight Assistance Service is lacking in the field where it is sorely needed, particularly by general aviation interests, and that aside from the busier locations this service could be provided by communications personnel after appropriate training. Uniformity of procedures and delineation of responsibility points to placement of all activities of this nature under control of the AIS, whether the actual service be provided by communicators or others. It is concluded that the AIS should be adequately staffed and moved to a location at MIA convenient to aviation interests and that a Flight Briefing Center be established in conjunction with this move, and that FASCO continue operation at the Domestic Terminal but become a sub-office under the control of AIS. It was observed that the AIS is reasonably effective notwithstanding communications and budgetary limitations and that it suffers from a lack of accurate and timely information from field locations. The Rescue Coordination Center, operated by CAA at Manila, should be handled by another agency of the government. However, for various reasons, it appears that CAA is the best

315

equipped for the activity and that the service could be improved by certain physical changes with a very low investment. A brief summary of deficiencies in the procurement and warehousing area points to a requirement for vast improvement before lasting benefits from an enhanced aviation system can be realized.

SECTION VI
STAFFING AND TRAINING

Basically this document concerns itself with people and things. Almost every legitimate endeavor contains these two ingredients. Given the required finances, things, or facilities as we refer to them in aviation, can generally be procured "off-the-shelf" or otherwise acquired and installed. Assuming the purchase of quality materials and proper installation, immediate full utilization may be expected. People present an entirely different problem. In the aviation field, they are seldom available as "off-the-shelf" items, fully trained and ready to go. Staffing and training of personnel to efficiently operate and maintain the aviation system is one of the more difficult problems facing the Philippine CAA today and will be compounded as the system grows in stature and complexity.

In sections dealing with proposals for an expanded airports and airways system, the Team has been able to develop priority criteria based on factors which, for the most part, are fairly well known and recognized and has thus been able to develop recommendations with a sound base. In this section, and in particular that portion dealing with staffing, we are lacking in criteria and must rely on educated guesswork based on guidelines developed elsewhere. Indeed, in the airports area the problem is so involved that the Team avoids discussion of staffing and devotes its attention to training.

A. Staffing Requirements

Management has three distinct but related areas of responsibility with regard to the use of its financial resources in accomplishing the CAA mission. First, it must render safe and convenient service to the users. Second, it must provide this service at reasonable cost to the user and the taxpayer. Third, it must offer to its employees job satisfaction, opportunity for advancement, and the best working conditions possible commensurate with cost. This latter responsibility includes the assignment of fair amounts of work and equitable distribution of work among employees.

1. Airways Operations

The primary function of each air traffic and communications facility is the provision of services to aircraft. Thus, the end product of a facility is the number and quality of aircraft services rendered. Staffing then should generally be based on the relationship of people to the volume of these services.

Because of the complexity of air traffic facilities, all services cannot be counted, therefore, activity indices must be established that best reflect total workload imposed on the operating personnel. For purposes of determining staffing in air traffic facilities, the United States has for some time used workload indicators with the understanding that many fringe and support duties are performed by the operating personnel and their work output capabilities in terms of the selected indicators are measured accordingly. For ACC facilities they are the volume of IFR aircraft handled; for terminal facilities, the volume of aircraft operations and instrument operations; and, for communications facilities, the volume of flight services performed. Recently, in order to obtain maximum utilization of personnel, performance measures have also been developed to effectively relate workload demands as they occur to personnel scheduling. Through the application of these manpower utilization techniques, facilities are able to forecast their personnel needs and more effectively program available manpower toward the accomplishment of all required activities.

To effectively determine the optimum staffing for any given facility many factors must be considered and a significant period of activity must be recorded and analyzed to form the basis for planning manpower resources. Air traffic and communication facilities in the CAA are now in the early stages of collecting this data. The Team was advised that prior to this time they had not used any specific standard to determine staffing. The justification for additional job positions has generally been based merely on "increased traffic."

Air traffic and ACS facility staffing is required for a level somewhere between AVERAGE and PEAK daily activity in order to meet typically high workload and achieve the best balance between economy and air safety. As the proposed airway system is developed in stages, existing CAA facilities must expand and additional facilities will be established. A very significant increase in staffing will be required.

Factors such as the rate of airport development, addition of runway lighting, etc., will influence the staffing, and in some instances, the hours of operation for several facilities. The amount of traffic flying IFR in the system versus that flying VFR will directly affect staffing since IFR handling of aircraft is the more complex service. Also in the matter of instrument operations, staffing requirements will be greater as the radar feature of ATC is introduced because of the increasing complexity and extent of service rendered. The estimated number of journeymen and supervisory personnel required to staff the domestic ACC, ADC/ACS and ACS field facilities upon completion of the Phase II program is reflected in Table VI-I. Increase from present staffing to the ultimate figure will take place in direct relation to incremental development of the system. An estimate of administrative staffing to meet normal field needs is included. We wish to emphasize again that this figure is based upon a very broad analysis of the factors involved and only includes our estimate of the minimum required number of field personnel at journeyman level and above.

As experience is gained through analysis of the traffic handled by the system, improved operational procedures will result. Staffing requirements will vary according to the procedures established. We must strongly emphasize that maximum effort at all management levels in the CAA will be required to obtain efficient utilization of manpower and provide the necessary aeronautical services at the most reasonable cost.

2. Airways Engineering

The Team finds it less difficult to approach the problem of electronics maintenance staffing, since these specialists have their work cut out for them regardless of the scheduled airways operations activity associated with their post of duty. Basically the maintenance man's work falls into two categories, corrective and preventive. Corrective maintenance is the finding and correction of trouble conditions after they have had a recognizable effect on service. Preventive maintenance, on the other hand, anticipates and corrects potential trouble conditions before they affect service. This latter activity must be a continuing objective of any successful maintenance program. From a numerical standpoint this section considers only staffing recommended for new facilities.

Staffing must be correlated with training because of the basic reasoning that a small trained staff can accomplish immeasurably more than a large untrained staff. In addition to being more costly, a large untrained staff derogates the service. Therefore, in our recommendations for staffing, we assumed that the technicians are all trained journeymen. Although we used FAA sector level staffing criteria and standards data as guidelines, variances were made in some instances because of isolation, accessibility, electrical power instability, etc. Staffing increases for existing facilities are recommended only, when in our opinion, they are fully justified by new and different types of equipment. The majority of present technicians will require training or retraining on the equipment applicable to their location.

Although recommendations for the electronic technicians are firm and valid, the number of electro-mechanical technicians could be changed for reasons outlined in Section IV-C-3, Estimated Yearly Maintenance Cost Increases.

The recommended staffing increases in this presentation (Table VI-2) are for facility maintenance personnel and do not apply to establishment projects which would normally be handled by headquarters installation crews.

We emphasize that a cadre of trained journeymen technicians will be required to provide relief for purposes of training and routine or emergency leave for the regularly assigned personnel. Additionally, the Airways Engineering Division Headquarters Staff should be increased in order to plan for and supervise the overall program. The maintenance inspection staff, especially, should be supplemented with engineers and top journeyman technicians in order to conduct a scheduled, recurrent evaluation program in depth. However, as the latter item is an internal CAA matter, the Team elected to indicate only field staffing requirement increases which we recommend for maintenance of the Phase II Program.

3. Support Services

Of the five categories of support services discussed in Section V only two appear to require additional or new staffing. These are Flight Inspection Service and Aeronautical Information Service.

(a) Flight Inspection Service

In Section V-A we recommend that the CAA acquire and operate on a regular basis two multi-engine flight inspection aircraft in order that they may provide the type of facility inspection required to maintain an adequate airways system. An essential component of this effort is a well equipped ground calibration laboratory. The most important ingredient is, of course, a staff qualified to carry out the mission. To perform this function we recommend the following additional personnel:

Number	Title
3	Flight Inspector
3	Flight Inspection Co-pilot
6	Flight Inspection Technical Specialists a/
5	Electronics Technicians b/

(b) Aeronautical Information Service

In Section V-C we recommend relocation of the AIS to an area more accessible to aviation interests, and creation of a consolidated International Notam Office and Flight Briefing Center, as well as assumption of responsibility for the operation of FASCO at the Domestic Terminal. Twenty-four hour operation and adequate staffing is also recommended.

Following is a tabulation of present and proposed staffing of the AIS and its various units including FASCO:

Category	AIS		NOTAM Office		Briefing		FASCO a/	
	Now	Proposed	Now	Proposed	Now	Proposed	Now	Proposed
Chief	1	1					1	0
Assistant Chief	1	1						
Supervisor			0	1	0	1	1	1
Briefing Officer					0	6	4 e/	4
NOTAM Officer			2	6				
Teletype Operator			1	1 b/			1	1
Cartographer	3	3						
Mimeograph Operator	2	2						
Printer	0	1 c/						
Editorial	1	1						
Clerical	1	1					1	1
TOTALS	9	10	3	8	0	7	8 d/	7

Present total including FASCO ------------ 22
Proposed total including FASCO ---------- 32

a/ FASCO hours of operation presently from 4:30 a.m. to 8:30p.m. daily.
b/ Teletype operator presently supplied by Communications Branch.
c/ To be utilized on Dualith machine (offset process) not now in use.
d/ FASCO staffing now includes in addition to categories indicated one Communicator II and one Computer operator. These personnel not required under proposed rearrangement.
e/ This category includes three Communicators and one Flight Operations Officer. These four specialists are considered to perform the same function.

TABLE VI - 1

AIRWAYS OPERATIONS STAFFING

Facilities	Present ATS	Present COM	Proposed ATS	Proposed COM	Increase
Manila ACC	41		61		20
Manila ADC/APP	27		37		10
Manila RCC	7		7		-
Manila ACS		120		120	-
Bacolod ADC	6		10		4
Baguio ADC	4		5		1
Baguio ACS		2		5	3
Cagayan ADC/APP	6		10		4
Cebu (Lahug) ADC	5		5		-
Cebu ACS		14		30	16
Cebu ACC	10		58		48
Mactan ADC/APP	16		27		11
Davao ADC/APP	8		10		2
Laoag ACS		6		9	3
Legaspi ACS		7		7	0
Romblon ACS		8		Decommission	(-8) 2/
Tagbilaran ACS		2		"	(-2)
Virac ACS		3		6	3
Zamboanga ADC/APP	9		10		1
Zamboanga ACS		7		10	3
1/ Laoag ACS		6		9	3
Tuguegarao ACS				6	6
Cauayan ACS				6	6
Naga ACS				5	5
Masbate ACS				5	5
Marinduque ACS				5	5
San Jose (Mindoro) ACS				5	5
Roxas ACS				6	6
Iloilo ACS				7	7
Calbayog ACS				5	5
Tacloban ACS				5	5
Dumaguete ACS				5	5
Surigao ACS				5	5
Puerto Princesa ACS				6	6
Bancasi (Butuan) ACS				6	6
Iligan ACS				6	6
Dipolog ACS				6	6
General Santos ACS				6	6
Cotabato ACS				6	6
Jolo ACS				5	5
Totals	139	175	240	302	228

1/ All facilities following this one are proposed.
2/ Ten people available for reassignment.

X 322

Table VI-2

PHASE II - RECOMMENDED STAFFING INCREASES

FIRST TWO YEARS

LOCATION	ELECTRONIC TECHNICIANS	ELECTRO-MECHANICAL TECHNICIANS
Bacolod	1	0
Butuan	3	2
Calapan	1	0
Cotabato	3	2
Iligan	2	1
Iloilo	2	1
Lipa	2	1
Mactan a/	2	0
Naga	2	1
Roxas	2	1
Total	20	9

THIRD YEAR

LOCATION	ELECTRONIC TECHNICIANS	ELECTRO-MECHANICAL TECHNICIANS
Alabat b/	1	1
Cabanatuan b/	1	1
Calbayog	2	1
Cauayan	2	1
Dipolog	3	2
Dumaguete	2	1
Jolo	1	2
Legaspi b/	1	1
Manila c/	4	1
Masbate	2	1
Puerto Princesa	1	2
Tacloban	2	1
Total	22	15

a/ The Mactan ACC will require additional technicians during this period. However, because the Tagbilaran and Romblon ACS's are recommended for decommissioning during the same time frame, we recommend the technicians from those locations be transferred to Mactan. One technician should remain at Tagbilaran to maintain the NDB.

b/ The present technicians at these locations should be qualified for VOR/DME maintenance.

c/ Electronic technicians to be radar maintenance trained.

FOURTH YEAR

LOCATION	ELECTRONIC TECHNICIANS	ELECTRO-MECHANICAL TECHNICIANS
Buayan	2	1
Daet	1	1
Jomalig d/	1	0
Kalibo	1	1
Ormoc	2	2
Surigao	2	1
Tuguegarao	2	1
Total	11	7

FIFTH YEAR

LOCATION	ELECTRONIC TECHNICIANS	ELECTRO-MECHANICAL TECHNICIANS
Aparri	2	2
Mactan e/	2	0
Mamburao	1	1
Marinduque	1	1
Misamis	1	1
Puerto Princesa	1	0
San Fernando	1	1
San Jose	2	1
Total	11	7
Grand Total	64	38

d/ The present electronic technicians to be DME trained.

e/ Trained in maintenance of ILS.

324

B. Training

Sections III, IV, and V of this document set forth an aviation development plan of some considerable magnitude encompassing all major facets of an aviation system. The need for trained specialists is emphasized in each section. It is further pointed out that the Administration must adjust salaries commensurate with levels of skill and responsibility or risk the loss of trained people. One of the hazards of a good training program is that successful graduates are wanted in other parts of an expanding economy. Multi-lingual and/or technically trained personnel may be tempted to other posts in public or private enterprise. The system must ensure that salary, social rewards, inner motivation of personnel and perquisites will keep graduates in the agency. The cost of such rewards may be far less than the cost of continually finding and training new people.

The Survey Team has adopted the position that most training should be performed in the Philippines. This calls for expansion of present training facilities and establishment of others which do not now exist. As the CAA grows in stature staffing of headquarters positions will tend to siphon off many employees who have participated in overseas training programs and who are now involved in training or other activities. This points to the need for a modest amount of participant training under AID and/or UN auspices. A significant number of these persons would be selected for courses specifically designed to prepare them for teaching upon their return to the Philippines. Recognizing that attrition will create a continuing need for instructors, the CAA must augment the training cadre from time to time in order to maintain an adequate training staff in all specialties.

1. Airports

Any discussion of training presupposes a staffing pattern with an indication of categories of specialists and the number of people in each category. In the case of Airways Operations and Airways Engineering, the Team has been able to estimate the staffing needs and from this will be able to forecast training requirements. Since most airports in the Philippines are in a caretaker status, there is little of a historical nature to serve as guidelines in this area. Traditionally, airport management has been divided into two categories, administration and maintenance. The top administrator is, of course, the airport manager, and the larger the airport the less he becomes involved in actual operational details and the emphasis becomes greater on business administration - the operational details being left to capable assistants. In some countries, airport managers at the larger locations are often political appointees who may or may not have a background suitable for managing a very demanding business enterprise. Ideally, the airport manager and his assistant should be civil service employees with formal training in business administration and they would come under the jurisdiction of the Chief of the Airport Management Division of CAA, since the CAA operates most airports in the nation. In this connection it would be desirable if the manager had in addition to business training, some familiarity with aviation, particularly at the smaller airports. Additionally, in some countries the airport manager serves as an Area Manager with supervisory responsibility for adjacent facilities.

Following the administrative side comes the airport maintenance chief with his staff of skilled and unskilled labor. Then there are, of course, the firemen and the security guards who quite often come under a special assistant to the airport manager.

From a training standpoint we then see two key men at an airport, the manager and the maintenance chief. These must be high-calibre people, well trained in their responsibilities and capable of organizing their own training program in the field. The Team, therefore, will recommend that the CAA be prepared to select and send abroad two candidates for airport management training and four for airport maintenance during Fiscal Years 68 and 69. These men should be selected for ability in their particular fields and for demonstrated skill in conducting seminars and other types of training. They should be supplemented by other participants to go abroad at intervals on a continuing basis.

A recently held seminar of Asian Airport Managers organized and hosted by the Manager of Manila International Airport is an excellent example of the broadening influence so important to personnel in this particular field. These affairs carried out on a country level have equally beneficial results and are to be encouraged as an inexpensive training mechanism.

2. Airways Operations

The CAA has a very good Airways Operations Training Center staffed with a crew of competent instructors. The Team notes that classes in the past appear rather large making it difficult to apply much time to individuals. It is also noted that the curriculum seems to devote an undue amount of attention to comparatively irrelevant academic subjects. We point to these matters not as criticism but to emphasize that the Center must begin to streamline its activities if the number of trainees required for the expansion envisioned under

X
326

ATC Terminal Control Laboratory — CAA Airways Operations Training Center, MIA

Phase II are to be made available in time.

As pointed out elsewhere, we recommend utilization of the FAA instructors in advanced and refresher training. This is particularly important during the rehabilitation processes recommended in Phase I, since under this phase field personnel will begin to have available new and efficient equipment and operational requirements will rapidly increase. This must take place without appreciable additional staffing; thus, individual ability must improve to meet the challenge.

T training of airways operations specialists requires considerable "lead time." Under an ideal training environment, three years is normally required before a new employee is able to control air traffic without supervision. Table VI-1 indicates 228 additional ATC and Communications personnel required by time Phase II is completed. This means that over the next five years an average of 45 personnel in these categories must be trained annually.

To augment the present Training Center staff and to make up for attrition, the Team recommends the careful selection and assignment of a number of Specialists to participant training courses emphasizing the organization and development of training techniques. Table VI-3, Recommendations for Participant Training under Phase I contains our proposed scheduling in this respect.

3. Airways Engineering

Table VI-2 indicates a requirement for 64 additional electronics technicians and 38 Electro-mechanical Technicians by the end of the Phase II program. We do not anticipate a requirement for additional technicians as a result of Phase I activity; however, it is during this period that personnel training must begin looking forward to later requirements. CAA presently conducts annual classes in Electronics, graduating an average of twenty to twenty-five yearly. No regularly scheduled training is conducted for electro-mechanical technicians.

The Airways Engineering Division has been unsuccessful in securing a suitable number of participant training slots in either AID or UN programs because of the fact that the Philippines abounds in electronics schools ranging from primary to graduate courses. It is an unfortunate fact, however, that none of these schools are qualified to train technicians for the purely aeronautical specialties, such as VOR, ILS, and DME.

As pointed out elsewhere, the Team believes that most training should be conducted by CAA and that a modest number of key personnel should receive training abroad in specialized fields which would qualify them to organize and conduct classroom and advanced and on-the-job training in the Philippines. Because the Engineering Division has very few ex-participants, we are recommending a comparatively larger number for training under Phase I. This includes such categories as "Instructor/Communications", "Instructor/NAVAIDS", "Design/Planning Engineer", "Maintenance, Field Chief", and others specializing in VOR, DME, and ILS. The total number is indicated in Table VI-3. We do not recommend any electro-mechanical technician participants, since adequate training in this specialty is available in the Philippines, as well as the fact that CAA has at least one specialist in this category who has received extensive training in both Australia and the United States and should be available to conduct a training program of this nature.

4. Support Services

(a) Flight Inspection Service

Personnel required for this service are few in number but must be highly skilled in a very specialized type of work. They are divided into two categories--the flight crew and the ground crew. The flight crew consists of the Flight Inspector and the Flight Inspection Co-pilot. Both must be basically skilled airmen qualified on multi-engine aircraft. With this background, they must then be trained as Flight Inspectors. This type of training can only be found in certain countries and is comparatively expensive. Since we are recommending three complete crews, there would be an eventual requirement for three Inspectors (Pilots) and three Co-pilots. In view of the cost and time involved in training, we are recommending that during the Phase I period three Inspectors receive participant training and that upon return they train the three Co-pilots.

An additional category associated with the air crew is the Flight Inspection Technical Specialist. A minimum of two are actually associated with a flight inspection mission. These are the Panel Operator (in the plane) and the Theodolite Operator (on the ground). Training for this group presupposes a good background in electronics with specialization in navigational aids. Participant training is comparatively inexpensive and of short duration; therefore, we recommend a total of six participants during Phase I--again on the assumption that they will conduct training upon their return.

The ground crew staffs the calibration laboratory, which is responsible for condition of the airborne equipment which must be maintained and accurately calibrated at regular intervals. In this area personnel prior to training must be well versed in electronics principles, however, training of this type can be conducted in the Airways Engineering training section by a qualified engineer. Therefore, we are recommending one engineer for participant training in this category and would expect him to establish the calibration laboratory and train the technicians. (See Table VI-3 for schedule).

(b) Meteorological Services

The Team does not anticipate the need for participant training in this area, since the Weather Bureau has a number of competent meteorologists capable of conducting training for those CAA specialists who will be required to take part in the joint CAA/WB weather observation program recommended in this document.

(c) Aeronautical Information Service

As indicated in Table VI-3 the team recommends participant training for two Notam Officers and two Briefing Officers during Phase I. These employees would conduct local training and also assist the Training Center in preparing communicators and others for assumption of this responsibility at field locations. Since personnel selected for these posts have airways operations background, the training is inexpensive and of short duration.

(d) Flight Assistance Service

No participant training is recommended since this type of training would be carried out by participants returning from training in the AIS category outlined in (3) above. This would also be supplemented by related instruction carried out in the Training Center.

(e) Search and Rescue

The Team does not recommend participant training in this category.

(f) Administration

That portion of Section V dealing with Administration concerns itself mostly with inventory control, procurement, warehousing, and facility logistics support.

The FAA Academy at Oklahoma City in the U. S. conducts short training courses in all of these subjects, however, they are tailor-made for FAA employees working with the FAA property management system. The Economic Development Foundation, functioning in the Philippines partially under USAID auspices, conducts seminars and organized training courses in all of the above-mentioned subjects. The Team, therefore, recommends that the CAA approach USAID with a request for assistance from EDF in this important activity area. As a consequence of this recommendation, we do not indicate participants in Table VI-3 nor do we, at this time, feel it appropriate to mention numerically the number required for training.

5. Civil Aeronautics Board (CAB)

Although the CAB cannot be classified as part of the Aviation System, the organization is certainly in a position to influence the development of efficient and economical aviation service through proper exercise of its role as a regulatory agency. To effectively carry out this responsibility, the CAB must be staffed with officials especially trained in the variety of activities involved.

The Team recommends that a number of CAB officials be sent to the United States to participate in training, and general observation of U. S. CAB activities in the following general categories of CAB Administration: General Counsel and Hearing Administration, Enforcement Procedures, Air Operations, Carrier Accounts and Statistical Analysis, and General Office Administration. We would recommend two participants in each category and that the training be of three months' duration.

C. Summary

This section emphasizes the necessity for an aviation system adequately staffed with well-trained personnel. In this section and elsewhere in the report it is brought out that completion of Phase I of the airways system should not call for additional employees--only better trained employees. During this period, however, the CAA is advised to begin an accelerated training program for new employees to staff the expanding system recommended in Phase II. Tables VI-1 and VI-2 indicate the estimated number of additional employees required at the time of completion of Phase II, and Table VI-3 indicates the number of participants recommended for overseas training during the Phase I period in order to provide the necessary cadre of instructors. The Team also points to a need for continued assignment of two FAA ATC instructors to carry out advanced and refresher training.

TABLE VI-3

RECOMMENDATIONS FOR PARTICIPANT TRAINING PHASE I

	First Year	Second Year
Airport Manager	1	1
Airport Maintenance	2	2
Air Traffic Control	6 a/	6
Communications	2	2
Electronics	10 a/	10
Flight Inspection	1 b/	2
Flight Inspection	3 c/	3
Flight Inspection	1 d/	0
Aeronautical Information Service	1 e/	1
Aeronautical Information Service	1 f/	1
General Counsel and Hearing Administration (CAB)	1	1
Enforcement Procedures (CAB)	1	1
Air Operations (CAB)	1	1
Carrier Accounts and Statistical Analysis (CAB)	1	1
General Office Administration (CAB)	1	1
Total -----------	33	33

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a/ Various categories

b/ Flight Inspector

c/ Flight Technicians (AIR)

d/ Engineer (Calibration Lab)

e/ NOTAM Officer

f/ Flight Briefing Officer

PART THREE

Implementation Aspect

SECTION VII
CONCLUSIONS AND RECOMMENDATIONS

This section brings together under one heading a brief resumé of the detailed plans of action contained in preceding sections. It discusses costs and benefit factors and suggests various methods of implementation.

A. Plan

As pointed out in the Preface, this document examines in some detail various activities which constitute the Philippine aviation system. The Team has intentionally avoided discussion of the facilities owned and operated by Philippine Air Lines. These facilities were installed and are being operated by PAL because the CAA does not possess a system capable of handling the needs of a growing aviation industry. The basic purpose of this plan is to establish some guidelines which would permit the CAA to assume their responsibilities in the aviation field i. e., the provision of safe, efficient and non-discriminatory service to all users of the air space.

The first two sections of this study relate to the government role and the aircraft and passenger movement functions. They set the stage, as it were, for the next three sections, airports, airways and support services which are the three major factors of any aviation system.

1. Airports

As a result of statistical studies, the Team has developed a system of priorities for airport development based on a number of factors with safety as the primary concern. Factors considered are as follows:

a. Present surface conditions of the runway

b. Clear zones and approaches

c. Lateral clearances associated with the airport

d. Airport obstructions and the surrounding terrain

e. Aircraft utilization

f. Types of aircraft in use and planned by airlines for the future

g. **Passenger movement**

h. **Present airport capacity**

i. **Availability of other modes of transportation**

Taking all items into consideration, a plan of action was developed which is presented in Exhibit III-A and followed by a set of tables which outline in some detail the work proposed for the five-year period of airport development.

2. Airways

Here, as in the airport plan a system of priorities was evolved based on tables developed from a close study of airway and airport utilization by both aircraft and passengers. An activity level of 10,000 passengers or more annually per terminal was established for planning purposes. Thus it was that thirty-eight terminals in the Philippines qualified for navigational, traffic control, and communications aids. An airway structure has been planned based on priority factors and scheduled for development in increments over a five-year period. The criteria calls for earliest treatment of those route segments serving the largest number of aircraft and passengers and so on down the line. The reader will note that some locations not meeting the established criteria are being programmed for equipment installations. This is because of their location along or adjacent to a busy airway segment and their importance as enroute navigational or communications aids.

The Team takes note of the fact that the overall airways development plan set forth in this document is expensive and will require substantial financing. Recognizing that financing processes are generally time-consuming and that an urgent need for early action exists, the Team has developed a two-phase plan. Phase I attempts to place the present airway structure in a more useable and less unsafe condition through a process of rehabilitation of presently installed equipment and the procurement and installation of additional communications and navigational aids at required locations. These new items will fit into the final or Phase II plan which should dovetail into the completion period of the 1st phase. The Team estimates that it will take two years to complete Phase I, and that the installation of new equipment under Phase II would begin about that time.

The Plan (Phase II) makes full use of the Bureau of Telecommunications (BUTEL) network now in the process of installation and estimated for completion by 1968. This system, when installed, serves all but one location contained in the plan--with the exception of Mindanao. The network terminates at Cagayan de Oro on northern Mindanao; however, plans are being made to encompass Mindanao in the future. Utilization of the BUTEL facilities will save the Philippine Government an estimated five million dollars which would be required to duplicate that portion otherwise required for airways purposes. A detailed list of anticipated channel requirements has been presented to the BUTEL and we have been assured that with minor additional equipment at some locations CAA needs can be met. Indeed, it is planned to collocate CAA remote transmit/receive (RTR) facilities with BUTEL equipment at their mountain-top or "hi-site" locations, thus reducing costs appreciably. It is also envisioned that BUTEL electronics personnel, through a mutual arrangement with CAA, would maintain the CAA equipment at these points.

3. Support Services

The Team recognizes that flight inspection of existing facilities within the CAA system is inadequate and that the requirement will increase rapidly as the new equipment is installed. The plan calls for procurement of two additional aircraft for flight inspection purposes which will be completely outfitted with essential electronics equipment. It will be necessary to establish a ground calibration laboratory to support this effort and a sufficient number of crew members and technicians must be trained to staff the activity. In cost estimating, the Team has not included a price tag for the aircraft or electronics equipment involved in the proposed flight inspection program, since it is felt that excess property sources should be explored. The problem of staffing and training of personnel has been, however, included in Section VI. The Team notes that functions of the Aeronautical Information Service (AIS), Search and Rescue (SAR) and Flight Advisory Service (FAS) sections of the CAA are being efficiently carried out within existing budgetary limitations. The plan proposes expansion of these activities and notes that training is now in progress at the CAA headquarters school. Proposed expansion is comparatively inexpensive and the cost is not considered in this plan.

The Team is deeply concerned over the lack of timely weather information available to the flying public and proposes the move or establishment of a number of Weather Bureau facilities to airport locations. These would be supplemented by active participation of CAA communications personnel in the weather observing and transmission processes. That portion of the report devoted to Meteorology (Section V-B) dwells on this subject at some length and was developed after discussions with Weather Bureau officials.

B. Costs

Sections III and IV contain detailed information regarding the various factors involved in placing a price tag on development of the airports and airways system in the Philippines. At the end of these sections, exhibits and tables are presented allowing the reader, armed with guidelines contained in the text, to break out price elements of almost any feature of the plan in question. This sub-section presents in round figures the total estimated cost of the plan.

1. Airports	1st year	-	$7,147,000
	2nd year	-	8,068,000
	3rd year	-	7,034,000
	4th year	-	5,193,000
	5th year	-	1,376,000
	Airports Total	-	$28,818,000
2. Airways	Phase I	-	$ 614,000
	Phase II	-	9,746,000
	Airways Total	-	$10,360,000
GRAND TOTAL for five-year aviation development program		---------------	$39,178,000

It will be recognized that the development of cost estimates is a difficult process, particularly as it applies to land acquisition and local labor. These factors vary from country to country and within a country from locality to locality. The problem is not so difficult when dealing with commodities, such as electronics equipment, the price of which is fairly well established. The only significant variable here is transportation costs and other factors, such as crating, insurance, and engineering fees. It has been the general experience of the Team that a flat 25% added to the "off-the-shelf" cost of an item is a reasonable figure to cover these additional expenses. Estimated costs set forth in Sections III and IV for airports and airways include this amount and in the case of Phase II of Section IV the figure also includes estimated commodity installation costs.

Statements relating to standards of performance are rather extensive in this report but the basic intent is to give an emphatic warning that satisfactory long-term service from the facilities recommended for installation may not be achieved if the procuring authority goes "bargain hunting." The aeronautical environment is very unforgiving and the highest standards must be maintained at all times. Only high quality equipment can give years of trouble-free service, and equipment of this type always has a high initial cost. There will be a general tendency to view capital expenditures with alarm. This would be a great mistake because operating and maintenance costs will inevitably exceed the original equipment cost by a larger factor, which will vary from 2 to 10 times during the lifetime of the equipment, and it is a time-honored rule that this factor relates directly to the quality of equipment installed.

Further, when considering the purchase of electronics equipment to be used in the National Aviation System, allowance must be made in the maintenance area alone for warehousing of spare parts to an amount ranging from 10 to 50 percent of the original cost of the basic equipment. Guarantees should be obtained that spare parts will continue to be made available during a predetermined equipment lifetime. Such agreements are necessarily fragile during changing political alignments and commercial failure of suppliers. Usually, the basic electronic components can be purchased internationally with reasonable ease, but mechanical parts may be much more difficult to obtain except from the original manufacturer.

It is common practice throughout the world to install two complete sets of ground-based equipment with automatic monitors and emergency power that will interchange the primary and secondary equipment if any failures are detected by the monitoring equipment. While a case can be made for economy by installing only one set of equipment, this may be a false economy. Failure to provide immediate back-up requires that trained technicians must be on instant call at all times. Furthermore, while an equipment is out of commission, aircraft may not be able to take off or land under certain circumstances. Such a loss of aircraft time at the current operating cost of aircraft per hour may amortize the cost of providing spare equipment even if one gives no weight to questions of air safety.

The provision of spare operating equipment is based on the principle of uncorrelated failures occurring in each equipment. Care must be taken not to compromise such arrangements by setting up correlated failure points like a pole line that carries both primary and secondary emergency power so that the loss of one pole assures that the entire system will break down.

A study of Exhibits IV-F, IV-M and IV-N will reveal certain items of likely interest to both the economist and the technician.

The plan contains a large number of electrical generation units, in fact there are 79 units at 46 different locations with a total estimated cost of $878,437. This may seem like an extraordinarily large number of plants but the fact is that commercial power in the Philippines (with exception of Manila, Cebu, Davao and Zamboanga) is either non-existent or generally unreliable. Although a certain amount of power unreliability can be tolerated by an airport, navigational aids, such as the VOR, are extremely unforgiving of power variances.

It will be noted that there are a total of 13 dual channel VHF links programmed plus the Cauayan and Laoag carrier terminals. These links are used for VOR monitoring and control at locations where local facilities do not exist. The price is included in the VOR or ACS justifying the requirement, but has been broken out with a figure of $335,000.

A vehicle is a basic maintenance tool. This is especially true for NAVAID servicing primarily because of their location. The present CAA field maintenance staff is deficient in the transportation area. This results in delays in restoring service when interrupted, poor handling of delicate test equipment because of means of transport resorted to and seriously deficient logistic support of the facilities. In Phase I we recommend procurement and assignment of 8 vehicles and in Phase II an additional 30. In Phase I the vehicles are recommended on an observed "need" basis, however, in Phase II the vehicles are all justified by the NAVAID program. Accordingly, all vehicle costs in Phase II are included with the NAVAIDS that justify them. The estimated cost of these vehicles is $20,000 in Phase I and $75,000 in Phase II.

Because of the deficiencies of the new Manila Area Control Center (ACC) and inadequacy of Cebu Sub-ACC to handle today's traffic, a switching system capable of accommodating 7 consoles has been programmed in Phase II. This switching system could be used at either Manila or Cebu as the situation dictates at the time of implementation. The cost estimates of $895,468 include peripheral VHF "hi-site" equipment. The system indicated is a Western Electric 300-A and was included here because it was the only system on which the Team could secure a firm "landed" price, and this was based on the cost of a similar system being installed in Saigon ACC. The Team feels that less complex and less expensive systems which would adequately serve the needs of the Philippines are available and this area should be subsequently explored if indeed the need develops.

It will be noted that the cost for providing communications in the Mindanao area is higher proportionately than the rest of the Philippines. As previously pointed out, this is due to the fact that BUTEL circuitry does not extend to this area. The other factor is need for extremely reliable air traffic service communications which the Team feels cannot be provided without the use of SSB equipment. In two other instances SSB equipment is provided as backup for BUTEL circuitry where a heavy load of air traffic control information is exchanged. This applies to Cebu-Bacolod and Cebu-Manila.

C. Benefits

Cost-benefit analysis involves simply a comparison of costs with benefits. Insofar as the analysis indicates benefits greater than costs, the results may be classified as a net benefit or net gain. In general, costs are far easier to determine than benefits in monetary terms. The cost of operating a transport aircraft is, or should be, readily known to the carrier, as a matter of routine need. A 45-minute aircraft delay in the air at MIA will cost so much, including crew salaries, fuel expenditures, depreciation, and other cost items. The immediate benefits accruing to the carrier with the elimination of the 45-minute delay are identified with the immediate savings or cost avoidance. Concurrently, a fallout benefit accrues to the airport authorities, insofar as the carriers are in a better position financially to pay airport user charges.

Some costs and benefits cannot, on the other hand, always be determined or reduced to monetary values. For example, what is the cost of a 45-minute delay in the air to a passenger en route to see friends or to a business appointment? Conversely, what is the benefit to all passengers on the aircraft with the elimination of the 45-minute delay? Estimates and studies will establish some costs and benefits, but certainly not all. A cost-benefit analysis with respect to all costs and benefits assigned by an investment program covering all Philippine airports and airways is obviously a task which is precluded by magnitude and time. There were also, in the case at hand, some very practical limitations, e.g., lack of statistical data on aircraft delays at different airports. (Sampling might have resolved this deficiency, but at a cost in time and in attention to other subjects).

Notwithstanding, the cost-benefits accruing to the nation from the rehabilitation and follow-on phases of the plan of work and needs set out above for the Philippine airports and airways are manifest and real enough. An improved national system of airports and airways can be expected, among other things, to:

1. Minimize aircraft accidents on the ground and in the air.

2. Increase capability of system to handle more aircraft.

3. Permit the wider use of larger, faster aircraft, viz., jets.

4. Reduce flight and ground delay time for aircraft.

5. Improve aircraft utilization through expanded system capability for all-season, night operations.

6. Eliminate damage to aircraft stemming from poor runway surfaces.

The over-all benefit resulting from implementation of the plan will be reflected in better, safer, and cheaper air transportation with the connected benefits for the nation at large.

Assuming for our purposes the loss of two aircraft and 80 human lives that could have been avoided through improvements and developments in the national system of airports and airways, the cost (and conversely the benefits derived had the accidents been avoided) could easily come to ₱40 million. Modern turbo-powered aircraft of the types presently used in the Philippines are priced in the vicinity of ₱8 million--if not more--off the shelf. Given a worth of ₱400,000 (or $50,000 U.S. Funds) per human life, the total cost in loss of human lives is ₱32 million. In a recent study, three costs per human fatality were cited from as many sources: $421,700 (U.S. Funds) from Fromm, Economic Criteria; $284,000 from E. Bollay Associates, Economic Impact of Weather; and $16,600 based on liability limits, Hague Protocol.

An analysis of aircraft accidents occuring in the Philippine domestic system from 1962 through 1965 indicates an average estimated loss to the economy as a whole of $1.5 million per year for the four-year period, and this does not take into consideration the loss of lives involved.

It is perhaps sufficient to say for our purposes that the cost of air accidents, considering both the direct costs (as represented by the loss of aircraft and human lives) and the indirect costs (as represented, say, by the adverse effect on ticket sales) is very high, and

341

one which does not really permit entertainment of other investment alternatives.

The economics of larger, faster aircraft are well illustrated by the relative capabilities of the DC-8 (pure jet aircraft) and the DC-7 (piston-driven aircraft). The former can travel twice as fast as the latter with twice the seating capacity. In effect, the DC-8 is four times more efficient than its predecessor the DC-7. Wage outlays for the DC-8 are higher than for the DC-7 on an aircraft basis, but they are also much lower on a capacity basis. Apart from wages, speed, and seating capacity, the DC-8 is a much more dependable aircraft from the standpoint of its power plant system. The net result is that the DC-8, along with other jet aircraft types have provided the basis for reduction in fares at a time when prices elsewhere in the market place are going up. The use of the BAC 1-11, a pure jet aircraft, by Philippine Air Lines on some of its domestic routes provides ample demonstration of the applicability of this type of aircraft to the Philippine domestic scene. It also demonstrates the need for an airport and airway system capable of handling, in wider dimension than permitted at this time, high-speed, high capacity aircraft, if the economic benefits of such aircraft are to be spread over the whole of the Philippines. Apart from speed and lift capability, any transport aircraft must be operated for a minimum amount of time per day or other period of time to realize its full economic potential. An aircraft sitting on the ground is not producing. 1/ Maximum utilization of aircraft calls for an airport and airway system which is capable of handling aircraft movement around the clock and in all parts of the year. As now constituted, the national system of airports and airways of the Philippines is essentially limited to daylight operations. And during the wet season, several airports cannot be used because of the surface nature of the runway. As a net result, the utilization rate of aircraft is limited, with the further result that air transportation costs and prices are higher than necessary.

D. Implementation

Essentially, the plan of work proposed in this Document is not bankable. That is, the CAA can't walk into a commercial bank and get a loan based on direct anticipated revenues. Apart from MIA, the present system of airports and airways of the Philippines does not have a demonstrated ability to earn money from user and other

1/ If the load is inadequate, it may be cheaper to keep a plane on the ground, given the particular fixed and variable expenses.

X 342

charges. It depends essentially on what is appropriated and released from the general funds of the government. This is not an unusual situation, as we pointed out in Section I. Few airports in the world earn enough to pay completely, or even near, their costs. As much can be said regarding airways. The trend is towards recovery of full costs, but fulfillment of this objective is a long way off for most airports and airways of the world. The cost of operating airports and airways is recognizably a social cost, one which a government is willing to underwrite or make, given the importance of transportation to the economy.

As noted in Section I, the CAA has prepared an administrative order calling for the application of user charges at airports other than Manila International. The order has not, as yet, been implemented. The CAA would unquestionably generate additional funds from the wider application of user charges. At the same time, we would observe that the application of user charges implies that the user obtain, in return, a certain value for his money. This, the CAA cannot provide now and it will be sometime before it will be possible. We would further observe--if we have not already--that private operators are important users of the national airports and airways, along with commercial operators. An equitable system of user charges would have to apply to all users. In any case, the application of user charges beyond Manila International cannot be expected to underwrite a major improvement and development program for the system of airports and airways at large.

Given the above, several alternatives (or courses of action), and combination thereof, present themselves to the Government of the Philippines for fulfilling the plan of work laid out above. They include: (a) increased appropriations and releases of general funds to the CAA, (b) obtaining a long-term, low-cost Development Loan through USAID, (c) loan from Export-Import or World Bank, (d) securing the assistance of other governments.

1. Proposed Course of Action

As previously pointed out in sub-sections A and B (Plan and Costs) this document concerns itself with three problem areas, each one of which is separate, but at the same time dependent and dovetailing with each other. Phase I and Phase II of the Airway System Program are vitally inter-related and one follows directly upon the other. The Airports program, although treated as more of a separate project, certainly is scheduled to move along with the development of the Airways System, particularly in the airport lighting program.

The following portions of this section contain proposals dealing directly with the three areas previously mentioned, and presented in the order of precedence in time.

a. Airways System, Section IV, Phase I

Financing in this phase amounts to $614, 000 in round figures, and this amount is urgently needed in order to place the present Airway System in some semblance of order. It would be most desirable if the Philippine Government could provide this amount from local resources. This action would establish a favorable climate in which to immediately begin negotiations for the larger Phase II figure of $9. 7 million, preferably in the form of an infrastructure development loan.

If it is determined that the sum needed for Phase I could not be made available within a reasonable length of time, a less desirable but alternate method would be to immediately negotiate with USAID for a development loan.

The Team does not recommend this last course of action except as a last expedient since it might take as long as five months to secure funding and it might also delay negotiations for the Phase II financing since the lending agency might wish to evaluate CAA's capability in carrying out the Phase I program.

Regardless of the mode of financing, the Team feels that CAA will need technical assistance in the procurement, engineering, and training functions associated with this project. In this connection CAA should request assistance from USAID in the form of an extension of the tenure of the USAID Aviation Division. Specifically, this should include the assignment of a minimum of two FAA electronics engineers and two ATC specialists in addition to a chief of group. To gain maximum effectiveness, the CAA should charge these technicians with responsibility for carrying out the objectives of the program and at the same time CAA should guarantee full backing in the form of peso support and CAA technician assistance. CAA should be prepared to field two full-time teams and should have sufficient financial support to employ local labor where needed to perform less technical duties at field locations. It is expected that the FAA technicians would work directly with these teams in the field, and provide technical guidance in rehabilitation and installation activities.

As pointed out in Section VI, Staffing and Training, it is anticipated that a number of CAA employees will be selected for overseas training during Phase I and II, however, the Team feels that a great deal of emphasis should be placed on local training and in this respect would expect CAA personnel to assume most primary training functions, leaving the FAA technicians free to supervise and conduct refresher and advanced training courses both in Manila and at such field locations as deemed necessary.

b. Section IV Airways System, Phase II

In treating this portion of the implementation phase we must proceed on the assumption that financing is assured. Funds may be released in full or in allotments geared to the incremental steps outlined in the Phase II recommendations. If this latter course is followed, further engineering study will be required to break out the cost for each step. Although the Team recognized that this might eventually be necessary, there was insufficient time to go into this item.

Here, as in (a) above, the Team strongly urges the Philippine Government to avail itself of technical assistance in the form of personnel well grounded in all phases of the aviation field. These specialists should have authority to develop engineering specifications, prepare bid proposals, initiate procurement, negotiate either directly or indirectly for contractual services, develop training programs and otherwise work in the best interest of the Philippine Government in the development of an aviation system with the objective of getting the job done as economically and rapidly as possible. In any event, the Team wishes to strongly recommend turnkey contracts including installation, test flight validation, technician-instructor training, provision of maintenance manuals, provisioning of spares, test equipment and the training school. The costs of competent supervision and the means of finding such competence in such a specialized technical area as aviation electronics is often underestimated. Much is to be said for leaving this problem in the hands of those who do such a task repetitively providing the contractor can guarantee a transfer of operating and maintenance skills to the Philippine Government upon completion.

c. Airports

Financing and implementation of the airports program will probably require a different approach since commodities here consist principally of local building materials. This, together with labor costs indicates a proportionately high peso component. This report recommends a National Airports System and points the way towards achieving this goal by following a set of priorities described elsewhere. The Team feels that if financing for airport construction is provided through congressional appropriations entirely, an integrated National System based on safety factors will not be achieved.

The Team would like to see airport development taken out of the political arena and turned over to an autonomous group, i. e. creation of a National Airports Commission or Authority. The President would make the appointments with members selected from the CAB, CAA, Executive and private flying groups and from the commercial airlines, and possibly from the Air Force. This group would have funds to hire engineering consultants, negotiate contracts and arrange for financing. Thus, the only congressional appropriations would be to CAA for airports maintenance. The CAA Airports Engineering Division would be responsible for the performance of contractors and would closely monitor their activities to assure that the end-product will meet standard airport construction criteria.

E. Summary

Sub-sections A and B of Section VII actually consist of a summary and conclusions of this entire document. They present the plan in brief and summarize costs while sub-sections C and D discuss benefits accruing from an improved aviation system and suggested methods of implementation. The Section discusses the basis for establishing implementation priorities in both the Airways and Airports areas and proposes early action in Airways modernization in the form of a first phase to be followed as funds become available by a second phase. Installation work by use of turnkey contracts is urged and the establishment of an autonomous group by the President to handle airports development on a National System basis. The Team also proposed use of U. S. FAA specialists assigned to USAID to supervise the Airways System development program.

APPENDICES

DOMESTIC SCHEDULED AIR SERVICE FOR ONE-WEEK PERIOD IN LATE 1966*

LINE	RANK	FLIGHTS				SEATS				SEAT-MILES			
		Point	Out	In	Total	Point	Out	In	Total	Point	Out	In	Total
Col.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1	1	Cebu	364	364	728	Cebu	17,204	17,564	34,768	Manila	4,677,484	4,609,048	9,286,532
2	2	Manila	363	363	726	Manila	16,178	16,070	32,248	Cebu	3,270,044	3,286,964	6,557,008
3	3	Bacolod	133	133	266	Davao	5,500	5,500	11,000	Davao	1,169,264	1,169,264	2,338,528
4	4	Davao	104	104	208	Bacolod	4,892	4,892	9,784	Zamboanga	896,356	853,876	1,750,232
5	5	Cagayan de Oro	96	96	192	Cagayan de Oro	4,210	4,210	8,420	Bacolod	850,548	850,548	1,701,096
6	6	Zamboanga	92	92	184	Cotabato	4,256	4,076	8,332	Cagayan de Oro	556,552	556,552	1,113,104
7	7	Cotabato	90	90	180	Zamboanga	3,972	3,792	7,764	Cotabato	507,216	531,552	1,038,768
8	8	Iloilo	77	77	154	Dumaguete	2,096	2,096	4,192	Iloilo	310,212	284,184	594,396
9	9	Dumaguete	54	54	108	Legaspi	2,052	2,052	4,104	Legaspi	246,492	241,212	487,704
10	10	Legaspi	51	51	102	Butuan	1,856	1,856	3,712	Tacloban	197,908	197,908	395,816
11	11	Dipolog	49	49	98	Dipolog	1,764	1,764	3,528	Butuan	172,856	172,856	345,712
12	12	Mamburao	42	42	84	Iloilo	1,638	1,746	3,384	Cauayan	168,624	168,624	337,248
13	13	Butuan	40	40	80	Mamburao	1,412	1,412	2,824	Dumaguete	155,132	155,132	310,264
14	14	Cauayan	39	39	78	Jolo	1,368	1,368	2,736	Dipolog	149,688	149,688	299,376
15	15	Jolo	38	38	76	Iligan	1,340	1,340	2,680	Jolo	132,264	132,264	264,528
16	16	Tacloban	36	36	72	General Santos	1,328	1,328	2,656	Iligan	123,892	123,892	247,784
17	17	Surigao	35	35	70	Cauayan	1,274	1,274	2,548	Surigao	115,128	115,128	230,256
18	18	General Santos	34	34	68	Surigao	1,260	1,260	2,520	Roxas	113,304	113,304	226,608
19	19	Tuguegarao	34	34	68	Tuguegarao	1,224	1,224	2,448	Tuguegarao	111,636	111,636	223,272
20	20	Iligan	33	33	66	Tacloban	1,220	1,220	2,440	Tablas	111,456	111,456	222,912
21	21	Ozamis	28	28	56	Tablas	1,008	1,008	2,016	Mamburao	106,236	106,236	212,472
22	22	Tablas	28	28	56	Ozamis	1,008	1,008	2,016	General Santos	102,292	101,212	203,504
23	23	Laoag	21	21	42	Laoag	900	900	1,800	Daet	96,404	98,516	194,920
24	24	Aparri	20	20	40	Daet	836	836	1,672	Baguio	93,024	93,024	186,048
25	25	Baguio	20	20	40	Baguio	768	768	1,536	Calbayog	90,468	90,468	180,936
26	26	Roxas	20	20	40	San Jose	768	768	1,536	Ozamis	82,404	82,404	164,808
27	27	San Jose	20	20	40	Roxas	744	744	1,488	Puerto Princesa	52,416	97,992	150,408
28	28	Daet	19	19	38	Aparri	720	720	1,440	Masbate	72,324	72,324	144,648
29	29	Calbayog	14	14	28	Bislig	704	704	1,408	San Jose	70,368	70,368	140,736
30	30	Kalibo	14	14	28	Kalibo	528	528	1,056	Laoag	64,836	64,836	129,672
31	31	Marinduque	14	14	28	Marinduque	516	516	1,032	Vigan	63,756	63,756	127,512
32	32	Masbate	14	14	28	Calbayog	504	504	1,008	Bislig	60,720	60,720	121,440
33	33	Vigan	14	14	28	Masbate	504	504	1,008	Marinduque	50,052	50,052	100,104
34	34	Tagbilaran	13	13	26	Vigan	504	504	1,008	Kalibo	47,124	47,124	94,248
35	35	Bislig	12	12	24	Tagbilaran	468	468	936	Aparri	45,720	45,720	91,440
36	36	Virac	10	10	20	Virac	416	416	832	Naga	41,580	41,580	83,160
37	37	Lubang	8	8	16	Malabang	288	288	576	Larap	29,304	29,304	58,608
38	38	Malabang	8	8	16	Basco	288	288	576	Tagbilaran	28,548	28,548	57,096
39	39	Mambajao	8	8	16	Mambajao	288	288	576	Basco	26,496	26,496	52,992
40	40	Takurong	7	7	14	Lubang	288	288	576	Del Pilar	6,264	33,804	40,068
41	41	Allah	7	7	14	Larap	264	264	528	Mambajao	19,440	19,440	38,880
42	42	Calapan	7	7	14	Takurong	252	252	504	Lubang	18,864	18,864	37,728
43	43	Naga	7	7	14	Allah	252	252	504	Virac	17,888	17,888	35,776
44	44	Puerto Princesa	7	7	14	Naga	252	252	504	Antique	4,536	29,052	33,588
45	45	Larap	6	6	12	Puerto Princesa	252	252	504	Tawi-Tawi	15,984	15,984	31,968
46	46	Sablayan	6	6	12	Sablayan	216	216	432	Malabang	14,112	14,112	28,224
47	47	Basco	4	4	8	Calapan	152	152	304	Allah	12,708	14,004	26,712
48	48	Catarman	4	4	8	Catarman	144	144	288	Takurong	12,348	13,356	25,704
49	49	Ormoc	4	4	8	Ormoc	144	144	288	Calapan	11,088	11,088	22,176
50	50	Tandag	4	4	8	Tandag	144	144	288	Catarman	11,088	11,088	22,176
51	51	Tawi-Tawi	4	4	8	Tawi-Tawi	144	144	288	Tandag	9,936	9,936	19,872
52	52	Antique	3	3	6	Guiuan	144	144	288	Ormoc	9,648	9,648	19,296
53	53	Del Pilar	3	3	6	Sorsogon	108	108	216	Guiuan	7,344	7,344	14,688
54	54	Guiuan	3	3	6	Del Pilar	108	108	216	Sablayan	7,020	7,020	14,040
55	55	Hilongos	3	3	6	Antique	108	108	216	Hilongos	6,156	6,156	12,312
56	56	Malaybalay	3	3	6	Malaybalay	108	108	216	Malaybalay	3,888	3,888	7,776
57	57	Siargao	3	3	6	Siargao	108	108	216	Siargao	3,888	3,888	7,776
58	58	Sorsogon	3	3	6	Hilongos	108	108	216	Sorsogon	3,024	3,024	6,048
		TOTAL	2,197	2,197	4,394		91,100	91,100	182,200		15,455,352	15,455,352	30,910,704

* Based on nonstop segments operated between all points in the Philippines by domestic air carriers.

Source: Schedules of Air Manila (AM), Filipinas Orient Airways (FOA), and Philippine Air Lines (PAL).

DOMESTIC SCHEDULED AIR SERVICE FOR ONE-WEEK PERIOD IN LATE 1966*

LINE	RANK	FLIGHTS Segment	FLIGHTS →	FLIGHTS ←	FLIGHTS Total	SEATS Segment	SEATS →	SEATS ←	SEATS Total	SEAT-MILES Segment	SEAT-MILES →	SEAT-MILES ←	SEAT-MILES Total
COL.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1	1	Cebu - Manila	75	75	150	Cebu - Manila	4,304	4,304	8,608	Cebu - Manila	1,506,400	1,506,400	3,012,800
2	2	Bacolod - Cebu	52	52	104	Bacolod - Cebu	2,424	2,424	4,848	Bacolod - Manila	623,400	623,400	1,246,800
3	3	Bacolod - Manila	40	40	80	Bacolod - Manila	2,078	2,078	4,156	Davao - Manila	452,704	452,704	905,408
4	4	Bacolod - Iloilo	35	35	70	Cebu - Davao	1,404	1,404	2,808	Manila - Zamboanga	393,948	393,948	787,896
5	5	Jolo - Zamboanga	34	34	68	Cagavan de Oro - Cebu	1,342	1,342	2,684	Cebu - Davao	353,920	353,920	707,840
6	6	Cagayan de Oro - Cebu	27	27	54	Cebu - Cotabato	1,336	1,336	2,672	Cebu - Cotabato	295,256	215,696	510,952
7	7	Cagayan de Oro - Davao	27	27	54	Cagayan de Oro - Davao	1,244	1,244	2,488	Iloilo - Manila	213,948	183,384	397,332
8	3	Cebu - Dumaguete	27	27	54	Jolo - Zamboanga	1,224	1,224	2,448	Cagayan de Oro - Cebu	190,564	190,564	381,128
9	9	Cebu - Cotabato	26	20	46	Cebu - Dumaguete	1,076	1,076	2,152	Legaspi - Manila	177,940	168,920	346,860
10	10	Cauayan - Manila	21	21	42	Legaspi - Manila	868	824	1,692	Bacolod - Cebu	167,256	167,256	334,512
11	11	Cebu - Surigao	21	21	42	Cotabato - Zamboanga	932	752	1,684	Cagayan de Oro - Manila	151,228	151,228	302,456
12	12	Dipolog - Dumaguete	21	21	42	Butuan - Cebu	824	824	1,648	Cebu - Zamboanga	102,376	198,856	301,232
13	13	Legaspi - Manila	21	20	41	Cebu - Tacloban	824	824	1,648	Cagayan de Oro - Davao	140,572	140,572	281,144
14	14	Cebu - Tacloban	20	20	40	Davao - Gen. Santos	824	824	1,648	Cauayan - Manila	131,544	131,544	263,088
15	15	Butuan - Cebu	20	20	40	Cebu - Surigao	756	756	1,512	Butuan - Cebu	119,480	119,480	238,960
16	16	Davao - Gen. Santos	20	20	40	Dipolog - Dumaguete	756	756	1,512	Jolo - Zamboanga	116,280	116,280	232,560
17	17	Iloilo - Manila	21	18	39	Iloilo - Manila	756	756	1,512	Cotabato - Zamboanga	139,800	85,800	225,600
18	18	Cebu - Davao	19	19	38	Davao - Manila	752	752	1,504	Manila - Tacloban	92,928	92,928	185,856
19	19	Manila - Zamboanga	18	18	36	Manila - Zamboanga	738	738	1,476	Manila - Roxas	91,776	91,776	183,552
20	20	Mamburao - Manila	17	17	34	Cauayan - Manila	626	626	1,252	Cebu - Dumaguete	91,460	91,460	182,920
21	21	Cotabato - Zamboanga	19	13	32	Mamburao - Manila	612	612	1,224	Cebu - Surigao	86,940	86,940	173,880
22	22	Cauayan - Tuguegarao	14	14	28	Cotabato - Davao	572	572	1,144	Manila - Tablas	85,176	85,176	170,352
23	23	Cebu - Dipolog	14	14	28	Cebu - Zamboanga	382	742	1,124	Cebu - Tacloban	80,752	80,752	161,504
24	24	Cebu - Iloilo	14	14	28	Daet - Manila	528	572	1,100	Cebu - Iligan	79,980	79,980	159,960
25	25	Manila - Tablas	14	14	28	Baguio - Manila	516	516	1,032	Calbayog - Manila	73,584	73,584	147,168
26	26	Manila - Marinduque	14	14	28	Cebu - Iligan	516	516	1,032	Daet - Manila	70,224	76,076	146,300
27	27	Baguio - Manila	13	13	26	Cotabato - Iligan	516	516	1,032	Manila - P. Princesa	91,728	52,416	144,144
28	28	Cebu - Iligan	13	13	26	Manila - Marinduque	516	516	1,032	Baguio - Manila	68,112	68,112	136,224
29	29	Cotabato - Davao	13	13	26	Cauayan - Tuguegarao	504	504	1,008	Davao - Zamboanga	64,680	64,680	129,360
30	30	Cotabato - Iligan	13	13	26	Cebu - Dipolog	504	504	1,008	Cebu - Dipolog	64,008	64,008	128,016
31	31	Davao - Manila	13	13	26	Manila - Tablas	504	504	1,008	Davao - Gen. Santos	63,448	63,448	126,896
32	32	Daet - Manila	12	13	25	Cebu - Iloilo	504	504	1,008	Manila - Masbate	58,212	58,212	116,424
33	33	Cebu - Zamboanga	8	14	22	Bislig - Davao	440	440	880	Mamburao - Manila	57,528	57,528	115,056
34	34	Kalibo - Tablas	11	11	22	Legaspi - Virac	416	416	832	Manila - Tuguegarao	55,692	55,692	111,384
35	35	Mamburao - San Jose	11	11	22	Kalibo - Tablas	396	396	792	Cotabato - Davao	54,340	54,340	108,680
36	36	Aparri - Laoag	10	10	20	San Jose - Mamburao	396	396	792	Manila - Vigan	52,416	52,416	104,832
37	37	Aparri - Tuguegarao	10	10	20	Manila - Roxas	384	384	768	Manila - Marinduque	50,052	50,052	100,104
38	38	Cebu - Tagbilaran	10	10	20	Aparri - Laoag	360	360	720	Cebu - Iloilo	48,384	48,384	96,768
39	39	Legaspi - Virac	10	10	20	Aparri - Tuguegarao	360	360	720	Manila - Naga	41,580	41,580	83,160
40	40	Manila - Roxas	10	10	20	Cebu - Tagbilaran	360	360	720	Bislig - Davao	39,600	39,600	79,200
41	41	Butuan - Cag. de Oro	7	7	14	Cagayan de Oro - Manila	308	308	616	Manila - San Jose	39,336	39,336	78,672
42	42	Butuan - Surigao	7	7	14	Cagayan de Oro - Iligan	308	308	616	Cebu - Ozamis	38,304	38,304	76,608
43	43	Cagayan de Oro - Iligan	7	7	14	Basco - Laoag	288	288	576	Dipolog - Dumaguete	37,800	37,800	75,600
44	44	Cagayan de Oro - Manila	7	7	14	Daet - Legaspi	308	264	572	Zamboanga - Dipolog	36,792	36,792	73,584
45	45	Cagayan de Oro - Ozamis	7	7	14	Bacolod - Dumaguete	264	264	528	Cotabato - Iligan	34,056	34,056	68,112
46	46	Calapan - Mamburao	7	7	14	Bislig - Butuan	264	264	528	Bacolod - Iloilo	34,020	34,020	68,040
47	47	Calbayog - Manila	7	7	14	Davao - Zamboanga	264	264	528	Larap - Manila	29,304	29,304	58,608
48	48	Calbayog - Tacloban	7	7	14	Larap - Manila	264	264	528	Kalibo - Manila	28,512	28,512	57,024
49	49	Cebu - Ozamis	7	7	14	Manila - San Jose	264	264	528	Aparri - Laoag	27,000	27,000	54,000
50	50	Cotabato - Gen. Santos	7	7	14	Manila - Tacloban	264	264	528	San Jose - Mamburao	26,928	26,928	53,856

(Continued next page.)

COL.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
51	51	Cotabato - Ozamis	7	7	14	Butuan - Cagayan	252	252	504	Basco - Laoag	26,496	26,496	52,992
52	52	Dipolog - Ozamis	7	7	14	Cagayan de Oro - Ozamis	252	252	504	Bacolod - Dumaguete	25,872	25,872	51,744
53	53	Iloilo - Roxas	7	7	14	Calbayog - Manila	252	252	504	Cotabato - Gen. Santos	25,704	25,704	51,408
54	54	Laoag - Vigan	7	7	14	Calbayog - Taclogan	252	252	504	Cauayan - Tuguegarao	24,696	24,696	49,392
55	55	Legaspi - Masbate	7	7	14	Cebu - Ozamis	252	252	504	Daet - Legaspi	26,180	22,440	48,620
56	56	Manila - Masbate	7	7	14	Cotabato - Ozamis	252	252	504	Bislig - Butuan	21,120	21,120	42,240
57	57	Manila - Naga	7	7	14	Dipolog - Ozamis	252	252	504	Aparri - Tuguegarao	18,720	18,720	37,440
58	58	Manila - Tuguegarao	7	7	14	Laoag - Vigan	252	252	504	Cotabato - Ozamis	18,648	18,648	37,296
59	59	Manila - Vigan	7	7	14	Legaspi - Masbate	252	252	504	Kalibo - Tablas	18,612	18,612	37,224
60	60	Dipolog - Zamboanga	7	7	14	Manila - Masbate	252	252	504	Butuan - Cagayan de Oro	17,892	17,892	35,784
61	61	Daet - Legaspi	7	6	13	Manila - Naga	252	252	504	Legaspi - Virac	17,888	17,888	35,776
62	62	Bacolod - Dumaguete	6	6	12	Manila - Tuguegarao	252	252	504	Cebu - Tagbilaran	17,640	17,640	35,280
63	63	Bislig - Butuan	6	6	12	Manila - Vigan	252	252	504	Del Pilar - Manila	-	33,804	33,804
64	64	Bislig - Davao	6	6	12	Roxas - Iloilo	252	252	504	Calbayog - Tacloban	16,884	16,884	33,768
65	65	Davao - Zamboanga	6	6	12	Surigao - Butuan	252	252	504	Jolo - Tawi-Tawi	15,984	15,984	31,968
66	66	Larap - Manila	6	6	12	Cotabato - Gen. Santos	252	252	504	Antique - Manila	-	29,052	29,052
67	67	Manila - San Jose	6	6	12	Zamboanga - Dipolog	252	252	504	Cagayan de Oro - Ozamis	14,364	14,364	28,728
68	68	Manila - Tacloban	6	6	12	Manila - P. Princesa	144	252	396	Surigao - Butuan	14,364	14,364	28,728
69	69	Manila - P. Princesa	4	7	11	Calapan - Mamburao	152	152	304	Legaspi - Masbate	14,112	14,112	28,224
70	70	Basco - Laoag	4	4	8	Baguio - Cauayan	144	144	288	Roxas - Iloilo	13,860	13,860	27,720
71	71	Cagayan de Oro - Malabang	4	4	8	Cagayan de Oro - Mambajao	144	144	288	Baguio - Tuguegarao	12,528	12,528	25,056
72	72	Cagayan de Oro - Mambajao	4	4	8	Cebu - Mambajao	144	144	288	Baguio - Cauayan	12,384	12,384	24,768
73	73	Catarman - Legaspi	4	4	8	Cebu - Ormoc	144	144	288	Cebu - Mambajao	11,520	11,520	23,040
74	74	Cebu - Mambajao	4	4	8	Cotabato - Malabang	144	144	288	Laoag - Vigan	11,340	11,340	22,680
75	75	Cebu - Ormoc	4	4	8	Catarman - Legaspi	144	144	288	Calapan - Mamburao	11,088	11,088	22,176
76	76	Cotabato - Malabang	4	4	8	Guiuan - Tacloban	144	144	288	Catarman - Legaspi	11,088	11,088	22,176
77	77	Baguio - Cauayan	4	4	8	Jolo - Tawi-Tawi	144	144	288	Dipolog - Ozamis	11,088	11,088	22,176
78	78	Jolo - Tawi-Tawi	4	4	8	Lubang - Manila	144	144	288	Lubang - Manila	11,088	11,088	22,176
79	79	Lubang - Mamburao	4	4	8	Lubang - Mamburao	144	144	288	Cagayan de Oro - Tagbilaran	10,908	10,908	21,816
80	80	Lubang - Manila	4	4	8	Surigao - Tandag	144	144	288	Surigao - Tandag	9,936	9,936	19,872
81	81	Surigao - Tandag	4	4	8	Cagayan de Oro - Malabang	144	144	288	Cagayan de Oro - Iligan	9,856	9,856	19,712
82	82	Gen. Santos - Takurong	4	3	7	Kalibo - Manila	132	132	264	Cebu - Ormoc	9,648	9,648	19,296
83	83	Alah - Cotabato	3	4	7	Alah - Cotabato	108	144	252	Cagayan de Oro - Malabang	9,360	9,360	18,720
84	84	Alah - Gen. Santos	4	3	7	Alah - Gen. Santos	144	108	252	Alah - Cotabato	7,668	10,224	17,892
85	85	Cotabato - Takurong	3	4	7	Cotabato - Takurong	108	144	252	Gen. Santos - Takurong	9,360	7,020	16,380
86	86	Baguio - Tuguegarao	3	3	6	Gen. Santos - Takurong	144	108	252	Cagayan de Oro - Mambajao	7,920	7,920	15,840
87	87	Cagayan de Oro - Malaybalay	3	3	6	Bacolod - Iloilo	126	126	252	Lubang - Mamburao	7,776	7,776	15,552
88	88	Cagayan de Oro - Tagbilaran	3	3	6	Cagayan de Oro - Malaybalay	108	108	216	Tablas - Roxas	7,668	7,668	15,336
89	89	Cebu - Hilongos	3	3	6	Cagayan de Oro - Tagbilaran	108	108	216	Guiuan - Tacloban	7,344	7,344	14,688
90	90	Guiuan - Tacloban	3	3	6	Cebu - Hilongos	108	108	216	Cebu - Hilongos	6,156	6,156	12,312
91	91	Kalibo - Manila	3	3	6	Legaspi - Sorsogon	108	108	216	Cotabato - Malabang	4,752	4,752	9,504
92	92	Legaspi - Sorsogon	3	3	6	Sablayan - Mamburao	108	108	216	Cotabato - Takurong	3,996	5,328	9,324
93	93	Mamburao - Sablayan	3	3	6	Sablayan - San Jose	108	108	216	Alah - Gen. Santos	5,040	3,780	8,820
94	94	Roxas - Tablas	3	3	6	Siargao - Surigao	108	108	216	Sablayan - San Jose	4,104	4,104	8,208
95	95	Sablayan - San Jose	3	3	6	Tablas - Roxas	108	108	216	Cagayan de Oro - Malaybalay	3,888	3,888	7,776
96	96	Siargao - Surigao	3	3	6	Baguio - Tuguegarao	108	108	216	Siargao - Surigao	3,888	3,888	7,776
97	97	Antique - Iloilo	3	-	3	Antique - Iloilo	108	-	108	Del Pilar - P. Princesa	6,264	-	6,264
98	98	Antique - Manila	-	3	3	Antique - Manila	-	108	108	Legaspi - Sorsogon	3,024	3,024	6,048
99	99	Del Pilar - Manila	-	3	3	Del Pilar - Manila	-	108	108	Sablayan - Mamburao	2,916	2,916	5,832
100	100	Del Pilar - P. Princesa	3	-	3	Del Pilar - P. Princesa	108	-	108	Antique - Iloilo	4,53[illegible]	-	4,536
		T O T A L	1,102	1,095	2,197		45,428	45,672	91,100		7,[illegible],436	7,[illegible],916	15,455,352

* Based on nonstop service for all points served in the Philippines by domestic air carriers.

Source: Schedules of Air Manila (AM), Filipinas Orient Airways (FOA), and Philippine Air Lines (PAL).

COMPARATIVE ANALYSIS OF DOMESTIC SCHEDULED (NONSTOP) OPERATIONS FOR ONE-WEEK PERIOD IN LATE 1960, 1962, 1964, AND 1966 (FLIGHTS)

Line	POINT	1960		1962		1964		1966		CHANGES						AVERAGE CHANGE	
										(2 & 4)		(4 & 6)		(6 & 8)		Per Year	
		TOTAL	RANK	TOTAL	RANK	TOTAL	RANK	TOTAL	RANK	Number	%	Number	%	Number	%	Number	%
Col.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
1	Allah Valley	14	40	16	38	16	38	14	41	2	14.3	-	-	(2)	(12.5)	-	-
2	Antique	8	57	12	42	16	39	6	52	4	50.0	4	33.3	(10)	(62.5)	-	-
3	Aparri	24	24	34	23	28	29	40	24	10	41.7	(6)	(17.6)	12	42.8	3	11.1
4	Bacolod	162	3	192	3	226	3	266	3	30	18.5	34	17.7	40	17.7	17	9.0
5	Baguio	16	37	26	30	38	23	40	25	10	62.5	12	46.2	2	5.3	4	19.0
6	Baler	2	66	2	64	-	-	-	-	-	-	-	-	-	-	-	-
7	Basco	6	61	6	58	8	52	8	47	-	-	2	33.3	-	-	-	-
8	Basilan	6	62	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	Bislig	24	25	12	43	28	30	24	35	(12)	(50.0)	16	133.3	(4)	(14.3)	-	-
10	Butuan	58	10	58	10	62	13	80	13	-	-	4	6.9	18	29.0	4	6.0
11	Cabadbaran	6	63	6	59	6	55	-	-	-	-	-	-	-	-	-	-
12	Cagayan de Oro	132	4	114	5	104	6	192	5	(18)	(13.6)	(10)	(8.8)	88	84.6	10	10.4
13	Calapan	8	58	22	35	22	34	14	42	14	175.0	-	-	(8)	(36.4)	1	3.1
14	Calbayog	44	13	30	26	32	27	28	29	(14)	(31.8)	2	6.7	(4)	(12.5)	(3)	(6.3)
15	Catarman	20	32	-	-	-	-	8	48	-	-	-	-	12	6.0	(2)	(10.0)
16	Cauayan	28	33	52	13	78	11	78	14	24	85.7	26	50.0	-	-	8	22.6
17	Cebu	302	2	276	2	368	2	728	1	(26)	(8.6)	92	33.3	360	97.8	71	20.4
18	Cotabato	78	7	106	7	94	8	180	7	28	35.9	(12)	(11.3)	86	91.5	17	19.4
19	Cubi	6	64	8	55	4	60	-	-	2	33.3	(4)	(50.0)	-	-	-	-
20	Daet	32	22	34	24	42	19	38	28	2	6.2	8	23.5	(4)	(9.5)	1	3.4
21	Davao	108	6	110	6	98	7	208	4	2	1.8	(12)	(10.9)	110	112.2	33	34.4
22	Del Pilar	14	41	8	56	8	53	6	53	(6)	(42.9)	-	-	(2)	(25.0)	(1)	(11.3)
23	Dipolog	34	19	52	14	90	9	98	11	18	52.9	38	73.1	8	8.9	11	22.5
24	Dumaguete	34	20	46	8	48	17	108	9	12	35.3	2	4.3	60	125.0	12	27.4
25	General Santos	40	16	40	19	34	25	68	18	-	-	(6)	(15.0)	34	100.0	5	14.2
26	Gingoog	12	45	6	60	6	56	-	-	(6)	(50.0)	-	-	-	-	-	-
27	Guiuan	12	46	6	61	6	57	6	53	(6)	(50.0)	-	-	-	-	(1)	(8.3)
28	Hilongos	24	26	12	44	12	44	6	55	(12)	(50.0)	-	-	(6)	(50.0)	(3)	(16.7)
29	Iligan	42	14	48	16	56	15	66	20	6	14.3	8	16.7	10	17.8	4	8.1
30	Iloilo	110	5	134	4	128	5	154	8	24	21.8	(6)	(4.5)	26	20.3	7	6.3
31	Ipil	12	47	24	34	-	-	-	-	12	100.0	-	-	-	-	-	-
32	Jolo	18	34	32	25	28	31	76	15	14	77.8	(4)	(12.5)	48	171.4	10	39.5
33	Kalaong	-	-	12	53	-	-	-	-	-	-	-	-	-	-	-	-
34	Kalibo	42	15	28	27	34	26	28	30	(14)	33.3	6	21.4	(6)	(17.6)	(2)	(5.0)
35	Kiamba	12	48	12	45	12	45	-	-	-	-	-	-	-	-	-	-
36	Labason	12	49	-	-	-	-	-	-	(12)	(100.0)	-	-	-	-	-	-
37	Laoag	24	27	26	31	30	28	42	23	2	8.3	4	15.4	12	40.0	3	10.6
38	Larap	20	33	24	32	40	22	12	45	4	20.0	16	66.7	(28)	(70.0)	(1)	(2.8)
39	Lebak	12	50	12	46	12	46	-	-	-	-	-	-	-	-	-	-
40	Legaspi	58	11	60	9	80	10	102	10	2	3.4	20	33.3	22	27.5	7	10.7
41	Lianga	24	28	-	-	-	-	-	-	-	-	-	-	-	-	-	-
42	Liloy	12	51	12	47	12	47	-	-	-	-	-	-	-	-	-	-
43	Lubang	-	-	-	-	12	48	16	38	-	-	-	-	-	-	1	8.3
44	Malabang	40	17	48	17	42	20	16	39	8	20.0	(6)	(12.5)	(26)	(61.9)	(4)	(9.0)
45	Malaybalay	10	55	12	48	-	-	6	56	2	20.0	-	-	-	-	(1)	(10.0)
46	Kambajao	-	-	-	-	-	-	16	39	-	-	-	-	-	-	-	-
47	Mamburao	24	29	36	22	42	21	84	12	12	50.0	6	16.7	42	100.0	10	27.8
48	Manila	442	1	490	1	588	1	726	2	48	10.9	98	20.0	138	23.5	47	9.1
49	Marinduque	8	59	20	36	20	36	28	31	12	150.0	-	-	8	40.0	3	31.6
50	Masbate	24	30	28	28	28	32	28	32	4	16.7	-	-	-	-	1	2.0

Col.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
51	Mati	12	52	6	62	-	-	-	-	(6)	(50.0)	-	-	-	-	-	-
52	Milbuk	-	-	12	49	12	49	-	-	-	-	-	-	-	-	-	-
53	Naga	14	42	14	39	14	42	14	43	-	-	-	-	-	-	-	-
54	Ormoc	-	-	-	-	-	-	8	49	-	-	-	-	-	-	-	-
55	Ozamis	48	12	58	11	58	14	56	21	10	20.8	-	-	(2)	(3.4)	1	2.9
56	Pagadian	18	35	24	33	24	33	-	-	6	33.3	-	-	-	-	-	-
57	Puerto Princesa	8	60	12	50	12	50	14	44	4	50.0	-	-	2	16.7	1	11.1
58	Roxas	14	43	8	57	22	35	40	26	(6)	(42.9)	14	17.5	18	81.8	4	9.4
59	Sablayan	-	-	-	-	-	-	12	46	-	-	-	-	-	-	-	-
60	San Carlos	15	39	12	53	-	-	-	-	(3)	(20.0)	-	-	-	-	-	-
61	San Jose	24	31	38	21	38	24	40	27	14	58.3	-	-	2	5.3	3	10.6
62	Siargao	-	-	-	-	8	54	6	57	-	-	-	-	(2)	(25.0)	-	-
63	Siocon	12	53	12	51	18	37	-	-	-	-	6	50.0	-	-	-	-
64	Sorsogon	-	-	14	40	6	58	6	58	-	-	(8)	(57.1)	-	-	(1)	(10.0)
65	Surigao	40	18	40	29	68	12	70	17	-	-	28	70.0	2	2.9	5	21.4
66	Tablas	16	38	28	29	16	40	56	22	12	75.0	(12)	(42.8)	40	25.0	7	12.2
67	Tacloban	70	8	54	12	52	16	72	16	(16)	(22.8)	(2)	(3.7)	20	38.5	-	-
68	Tagbilaran	18	36	20	37	14	43	26	34	2	11.1	(6)	(30.0)	12	85.7	1	11.1
69	Takurong	14	44	12	52	12	51	14	40	(2)	(11.1)	-	-	2	16.7	-	-
70	Tandag	-	-	-	-	-	-	8	50	-	-	-	-	-	-	-	-
71	Tawi-Tawi	4	65	4	63	6	59	8	51	-	-	2	50.0	2	33.3	1	13.9
72	Toledo	9	56	-	-	-	-	-	-	-	-	-	-	-	-	-	-
73	Tuguegarao	34	21	52	15	46	18	68	19	18	52.9	(6)	(11.5)	22	47.8	6	14.9
74	Vigan	-	-	-	-	-	-	28	33	-	-	-	-	-	-	-	-
75	Virac	12	54	14	41	16	41	20	36	2	16.7	2	14.3	4	25.0	1	9.3
76	Zamboanga	70	9	94	8	144	4	184	6	24	34.3	50	53.2	40	27.8	19	19.2
	T O T A L	2,652		2,872		3,224		4,394		241		400		1,198		320	

__Source:__ Carrier schedules.

COMPARATIVE ANALYSIS OF DOMESTIC SCHEDULED (NONSTOP) OPERATIONS FOR ONE-WEEK PERIOD IN LATE 1960, 1962, 1964, AND 1966 (SEATS) APPENDIX A - ITEM IV

Line	POINT	1960		1962		1964		1966		CHANGES						AVERAGE CHANGE	
										(2 & 4)		(4 & 6)		(6 & 8)		Per Year	
		TOTAL	RANK	TOTAL	RANK	TOTAL	RANK	TOTAL	RANK	Number	%	Number	%	Number	%	Number	%
Col.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
1	Allah Valley	504	35	576	36	576	36	504	43	72	21.6	-	-	(72)	(12.5)	-	-
2	Antique	288	45	432	40	576	37	216	45	144	50.0	144	33.3	(360)	(62.5)	(12)	(3.5)
3	Aparri	864	25	1,224	23	1,008	29	1,440	28	360	41.7	(216)	(17.6)	432	42.9	96	11.2
4	Bacolod	5,996	3	7,188	3	8,712	3	9,784	4	1,192	19.9	1,524	21.2	1,072	12.3	632	8.9
5	Baguio	576	32	936	30	1,480	22	1,536	25	360	62.5	544	58.1	56	3.8	160	20.7
6	Baler	72	65	72	63	-	-	-	-	-	-	-	-	-	-	-	-
7	Basco	216	52	216	51	288	46	576	38	-	-	72	33.3	288	100.0	60	22.2
8	Basilan	60	66	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	Bislig	240	49	432	41	1,008	30	1,408	29	192	80.0	576	133.3	400	39.7	195	42.2
10	Butuan	1,620	11	2,200	12	2,280	13	3,712	10	580	35.8	80	3.6	1,432	62.8	349	17.0
11	Cabadbaran	216	53	216	52	216	50	-	-	-	-	-	-	-	-	-	-
12	Cagayan de Oro	4,708	4	4,000	6	3,812	7	8,420	5	(708)	(15.0)	(188)	(4.7)	4,608	120.9	619	16.9
13	Calapan	288	46	492	33	792	34	304	47	504	175.0	-	-	(488)	(61.6)	3	18.9
14	Calbayog	1,272	15	1,080	26	1,152	25	1,008	32	(192)	(15.1)	72	6.7	(144)	(12.5)	(44)	(3.5)
15	Catarman	408	40	-	-	-	-	288	48	-	-	-	-	(120)	(29.4)	(20)	(4.9)
16	Cauayan	1,040	23	1,872	14	2,808	11	2,548	17	832	80.0	936	50.0	(260)	(9.3)	251	20.1
17	Cebu	10,836	2	10,724	2	14,480	2	34,768	1	(112)	(1.0)	3,756	35.0	20,288	14.0	3,986	8.0
18	Cotabato	2,340	7	3,348	7	2,916	10	8,332	6	1,008	43.1	(432)	(12.9)	5,416	185.7	999	36.0
19	Cubi	216	54	288	46	144	59	-	-	72	33.3	(144)	(50.0)	-	-	-	-
20	Daet	1,152	20	1,224	24	1,512	19	1,672	24	72	6.3	288	23.5	160	10.6	87	6.7
21	Davao	3,112	6	4,296	5	3,864	6	11,000	3	1,184	38.0	(432)	(10.1)	7,136	184.7	1,315	35.4
22	Del Pilar	348	42	288	47	288	47	216	54	(60)	(17.2)	-	-	(72)	(25.0)	(22)	(7.0)
23	Dipolog	1,224	17	1,716	16	3,688	8	3,528	11	492	40.2	1,972	11.5	(160)	(4.3)	384	7.9
24	Dumaguete	1,224	18	1,656½	17	1,792	16	4,192	8	432	35.3	136	.8	2,400	133.9	495	28.3
25	General Santos	1,128	21	1,284	22	1,068	27	2,656	16	156	13.8	(216)	(16.8)	1,588	148.7	255	24.3
26	Gingoog	120	57	60	64	60	60	-	-	(60)	(5.0)	-	-	-	-	-	-
27	Guiuan	276	48	216	53	216	51	288	52	(60)	(21.7)	-	-	72	33.3	2	1.9
28	Hilongos	552	34	432	42	432	42	216	58	(120)	(21.7)	-	-	(216)	(50.0)	(56)	(11.9)
29	Iligan	1,356	14	2,448	9	2,016	14	2,680	15	1,092	80.5	(432)	(17.6)	664	32.9	221	16.0
30	Iloilo	4,056	5	5,048	4	4,720	5	3,384	12	992	24.5	(328)	(6.5)	(336)	(28.3)	112	1.7
31	Ipil	240	50	240	50	-	-	-	-	-	-	-	-	-	-	-	-
32	Jolo	648	30	1,152	25	1,008	31	2,736	14	504	77.8	(144)	(12.5)	1,728	171.4	348	39.5
33	Kalaong	-	-	120	62	-	-	-	-	-	-	-	-	-	-	-	-
34	Kalibo	1,200	19	1,040	27	1,024	28	1,076	30	(160)	(13.3)	(16)	(1.5)	32	3.1	(24)	(1.9)
35	Kiamba	120	58	120	56	120	55	-	-	-	-	-	-	-	-	-	-
36	Labason	20	59	-	-	-	-	-	-	-	-	-	-	-	-	-	-
37	Laoag	864	26	936	31	1,080	26	1,800	23	72	8.3	144	15.4	720	66.7	156	15.1
38	Larap	720	29	864	32	1,440	23	528	41	144	20.0	576	66.7	(912)	(63.3)	(32)	(3.9)
39	Lebak	120	60	120	57	120	56	-	-	-	-	-	-	-	-	-	-
40	Legaspi	1,932	10	2,272	11	2,992	9	4,104	9	340	17.6	720	31.7	1,112	37.1	362	14.4
41	Lianga	240	51	-	-	-	-	-	-	-	-	-	-	-	-	-	-
42	Liloy	120	61	120	58	120	57	-	-	-	-	-	-	-	-	-	-
43	Lubang	-	-	-	-	432	43	576	40	-	-	-	-	144	33.3	31	8.3
44	Malabang	1,128	22	2,448	10	1,512	20	576	37	1,320	117.0	(936)	(38.2)	(936)	(61.9)	92	2.8
45	Malaybalay	360	41	432	43	-	-	216	56	72	20.0	-	-	(216)	(50.0)	(24)	(5.0)

Col.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
46	Mambajao	-	-	-	-	-	-	576	39	-	-	-	-	-	-	-	-
47	Mamburao	864	27	1,296	21	1,512	21	2,824	13	432	50.0	216	16.7	1,312	86.8	327	25.6
48	Manila	16,776	1	19,800	1	24,080	1	32,248	2	3,024	18.0	4,280	216.2	8,168	33.9	2,579	44.7
49	Marinduque	288	47	720	34	720	35	1,032	31	432	150.0	-	-	312	43.3	124	32.2
50	Masbate	864	28	1,008	28	1,008	32	1,008	33	144	16.7	-	-	-	-	24	2.8
51	Mati	120	62	216	54	-	-	-	-	96	80.0	-	-	-	-	-	-
52	Milbuk	-	-	120	59	120	58	-	-	-	-	-	-	-	-	-	-
53	Naga	503	36	504	37	504	40	504	44	-	-	-	-	-	-	-	-
54	Ormoc	-	-	-	-	-	-	288	49	-	-	-	-	-	-	-	-
55	Ozamiz	1,416	13	1,620	18	1,620	18	2,016	22	204	14.4	-	-	396	24.4	80	6.5
56	Pagadian	300	44	240	49	240	49	-	-	(60)	(20.0)	-	-	-	-	-	-
57	Puerto Princesa	320	43	432	44	432	44	504	45	112	35.0	-	-	72	16.7	307	8.6
58	Roxas	504	37	288	48	904	33	1,488	27	(216)	42.8	616	213.9	584	64.6	104	53.5
59	Sablayan	-	-	-	-	-	-	432	46	-	-	-	-	-	-	-	-
60	San Carlos	150	55	120	60	-	-	-	-	(30)	(2.0)	-	-	-	-	-	-
61	San Jose (Mindoro)	928	24	1,368	20	1,368	24	1,536	26	440	47.4	-	-	168	12.3	101	10.0
62	Siargao	-	-	-	-	288	48	216	57	-	-	-	-	(72)	(25.0)	(18)	(6.3)
63	Siocon	120	63	120	61	180	54	-	-	-	-	60	50.0	-	-	-	-
64	Sorsogon	-	-	504	38	216	52	216	53	-	-	(288)	(57.1)	-	-	(36)	(14.5)
65	Surigao	1,440	12	1,440	19	2,544	12	2,520	18	-	-	1,104	76.7	(24)	(.9)	180	12.6
66	Tablas	576	33	1,008	29	576	38	2,016	21	432	75.0	(432)	(42.9)	1,440	250.0	234	41.7
67	Tacloban	2,100	8	1,992	13	1,872	15	2,440	20	(108)	(5.1)	(120)	(6.0)	568	30.3	57	3.2
68	Tagbilaran	648	31	720	35	504	41	936	35	72	11.1	(216)	(30.0)	432	85.7	48	11.1
69	Takurong	504	38	432	45	432	45	504	42	(72)	(14.3)	-	-	72	16.6	-	-
70	Tandag	-	-	-	-	-	-	288	50	-	-	-	-	-	-	-	-
71	Tawi-Tawi	144	56	144	55	216	53	288	51	-	-	72	50.0	72	33.3	24	13.9
72	Toledo	90	64	-	-	-	-	-	-	-	-	-	-	-	-	-	-
73	Tuguegarao	1,256	16	1,872	15	1,656	17	2,448	19	616	49.0	(216)	(11.5)	792	47.8	197	14.2
74	Vigan	-	-	-	-	-	-	1,008	34	-	-	-	-	-	-	-	-
75	Virac	432	29	504	39	576	39	832	36	72	16.7	72	14.3	256	44.4	667	12.6
76	Zamboanga	2,100	9	3,076	8	5,232	4	7,764	7	976	46.7	2,156	70.0	2,532	48.4	944	27.5
	T O T A L	86,564		103,672		118,552		182,200		17,282		15,360		62,148		16,559	

Source: Carrier schedules.

COMPARATIVE ANALYSIS OF DOMESTIC SCHEDULED (NONSTOP) OPERATIONS FOR ONE-WEEK PERIOD IN LATE 1960, 1962, 1964, AND 1966 (SEAT MILES) — APPENDIX A - ITEM V

Line	POINT	1960 TOTAL	1960 RANK	1962 TOTAL	1962 RANK	1964 TOTAL	1964 RANK	1966 TOTAL	1966 RANK	CHANGES (2 & 4) Number	(2 & 4) %	(4 & 6) Number	(4 & 6) %	(6 & 8) Number	(6 & 8) %	AVERAGE CHANGE Per Year Number	Per Year %
Col.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
1	Allah Valley	26,712	41	30,528	42	30,528	42	26,712	47	3,816	14.3	-	-	(3,816)	(12.5)	-	-
2	Antique	45,504	34	67,176	33	89,568	44	33,588	44	21,672	47.6	22,392	33.3	(55,980)	(62.5)	(1,986)	(3.1)
3	Aparri	54,864	30	74,440	31	64,008	35	91,440	35	19,576	35.7	(10,432)	(14.0)	27,432	42.8	6,096	10.7
4	Bacolod	831,204	4	943,056	4	1,155,992	4	1,701,096	5	111,852	13.5	212,936	22.6	545,104	47.2	144,976	13.9
5	Baguio	66,096	28	113,616	19	195,360	14	186,048	24	47,520	71.9	81,744	71.9	(9,312)	(4.8)	19,991	23.2
6	Baler	6,624	56	6,624	57	-	-	-	-	-	-	-	-	-	-	-	-
7	Basco	39,744	36	39,744	39	52,992	37	52,992	39	-	-	13,248	33.3	-	-	2,208	5.5
8	Basilan	1,140	66	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	Bislig	14,400	51	36,720	40	85,680	30	121,440	32	22,320	155.0	48,960	133.3	35,760	41.7	17,836	55.0
10	Butuan	222,036	10	461,480	8	193,692	15	345,712	11	239,444	107.8	(267,788)	(58.0)	152,020	78.5	20,612	13.1
11	Cabadbaran	9,288	55	9,288	55	9,288	53	-	-	-	-	-	-	-	-	-	-
12	Cagayan de Oro	882,920	3	626,348	7	837,304	6	1,113,104	6	(256,572)	(29.1)	210,956	33.7	257,800	32.9	38,362	6.2
13	Calapan	51,408	31	44,208	38	44,208	38	22,176	40	(7,200)	(14.0)	-	-	(22,032)	(49.8)	(4,872)	(10.6)
14	Calbayog	126,192	16	136,872	16	131,328	21	180,936	25	10,680	8.5	(5,544)	(4.0)	49,608	37.8	9,124	7.0
15	Catarman	22,032	45	-	-	-	-	22,176	54	-	-	-	-	-	-	24	.1
16	Cauayan	96,952	20	189,720	13	323,080	10	337,248	12	92,768	95.7	133,360	70.3	14,168	4.4	40,048	28.4
17	Cebu	2,078,872	2	2,218,360	2	2,786,808	2	6,557,008	2	139,488	6.7	568,448	25.6	3,770,200	135.3	745,326	27.9
18	Cotabato	184,884	12	201,576	12	228,720	13	1,039,768	7	16,692	9.0	27,144	13.5	810,048	354.2	142,308	62.8
19	Cubi	11,664	53	15,552	51	7,776	55	-	-	3,888	33.3	(7,776)	50.0	-	-	-	-
20	Daet	69,624	25	65,352	34	78,264	31	194,920	23	(4,272)	(6.1)	12,912	19.8	116,656	149.0	20,882	27.1
21	Davao	632,008	5	1,044,012	3	1,085,584	5	2,338,528	3	411,004	64.9	41,572	4.0	1,252,944	115.4	284,242	30.7
22	Del Pilar	38,184	38	34,704	41	34,704	40	40,068	40	(3,480)	(9.1)	-	-	5,364	15.4	314	1.0
23	Dipolog	96,840	21	120,624	18	394,512	8	299,376	14	23,784	24.6	273,888	227.0	(95,136)	(24.1)	33,755	37.8
24	Dumaguete	89,208	22	131,976	17	131,696	20	302,264	13	42,768	47.9	(280)	(.2)	178,568	135.6	36,841	30.5
25	General Santos	71,028	24	81,960	29	65,328	34	203,504	22	10,932	15.4	(16,632)	(20.3)	138,176	211.5	22,078	34.4
26	Gingoog	4,260	61	2,880	63	2,880	60	-	-	(1,380)	(3.2)	-	-	-	-	-	-
27	Guiuan	14,076	52	11,016	53	11,016	50	14,688	53	(3,060)	(21.7)	-	-	3,672	33.3	102	1.9
28	Hilongos	33,120	39	26,568	43	25,920	44	12,312	55	(6,552)	(19.8)	(648)	(2.4)	(13,608)	(52.5)	(3,468)	(12.4)
29	Iligan	112,164	18	84,456	28	141,120	19	247,784	16	(27,708)	(24.7)	56,664	67.1	106,664	75.6	20,936	19.7
30	Iloilo	597,840	6	721,832	5	557,440	7	594,396	8	123,992	20.7	(164,392)	(22.8)	36,956	6.6	(574)	(.7)
31	Ipil	15,180	50	15,840	50	-	-	-	-	660	4.3	-	-	-	-	-	-
32	Jolo	63,864	29	111,744	20	98,424	27	264,528	15	47,880	75.0	(13,320)	(11.9)	116,104	168.7	33,443	38.6
33	Kalaong	-	-		64	-	-	-	-	-	-	-	-	-	-	-	-
34	Kalibo	145,752	14	156,168	14	150,576	17	94,248	34	10,416	7.1	(5,592)	(3.6)	(56,328)	(37.4)	(8,584)	(5.6)
35	Kiamba	3,360	63	3,360	62	6,000	58	-	-	-	-	-	-	-	-	-	-
36	Labason	2,700	64	-	-	-	-	-	-	-	-	-	-	-	-	-	-
37	Laoag	72,662	23	96,400	26	117,000	22	129,672	30	23,738	32.7	20,600	21.4	12,672	10.8	9,501	10.8
38	Larap	48,680	33	52,320	36	97,200	28	58,608	37	3,720	7.7	44,880	85.8	(38,592)	(39.7)	1,668	9.0
39	Lebak	5,340	58	4,920	60	4,920	59	-	-	(420)	(7.9)	-	-	-	-	-	-
40	Legaspi	257,052	9	268,808	10	393,472	9	487,704	9	11,756	4.6	124,664	46.4	94,232	23.9	39,330	12.5
41	Lianga	9,840	54	-	-	-	-	-	-	-	-	-	-	-	-	-	-
42	Liloy	4,200	62	6,180	58	7,380	56	-	-	1,980	47.1	1,200	19.4	-	-	-	-
43	Lubang	-	-	-	-	28,296	43	37,728	42	-	-	-	-	9,432	33.3	-	-
44	Malabang	39,480	37	85,680	27	74,844	33	28,224	46	46,200	117.0	(10,836)	(12.6)	(46,620)	(62.3)	(1,876)	7.0
45	Malaybalay	16,128	47	25,056	44	-	-	7,776	56	8,928	55.4	-	-	(17,280)	(69.0)	(1,392)	(2.3)

Col.	(1)	(2)	(3)	(4	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
46	Mambajao	-	-	-	-	-	-	38,880	41	-	-	-	-	-	-	-	-
47	Mamburao	66,528	27	103,896	24	105,984	26	212,472	21	37,368	56.2	2,088	2.0	106,488	100.5	24,415	26.5
48	Manila	4,846,726	1	5,893,152	1	7,481,056	1	9,286,532	1	1,046,426	21.6	1,58 ,904	26.9	1,805,476	24.1	739,938	12.1
49	Marinduque	27,936	40	57,960	35	57,960	36	100,104	33	30,024	107.5	-	-	42,144	72.7	9,028	30.0
50	Masbate	,01,664	19	109,728	21	109,728	24	144,648	28	8,06	7.9	-	-	34,920	31.8	7,164	6.6
51	Mati	5,640	57	10,140	54	-	-	-	-	4,500	79.8	-	-	-	-	-	-
52	Milbuk	-	-	6,840	56	8,640	54	-	-	6,840	6840.0	1,800	26.3	(8,640)	(100.0)	-	(100.0)
53	Naga	22,680	44	22,680	45	22,680	47	83,160	36	-	-	-	-	60,480	100.0	-	100.0
54	Ormoc	-	-	-	-	-	-	19,296	52	-	-	-	-	-	-	-	-
55	Ozamis	155,016	13	107,100	22	107,448	25	164,808	26	(47,916)	(30.9)	348	3.2	57,360	53.4	1,632	4.3
56	Pagadian	15,840	49	11,880	52	17,880	49	-	-	(3,960)	(25.0)	6,000	50.5	-	-	-	-
57	Puerto Princesa	50,592	32	77,472	30	33,408	41	150,408	27	26,880	53.1	(44,064)	56.9	117,000	350.2	16,635	57.7
58	Roxas	23,400	43	44,640	37	177,464	16	226,608	18	21,240	90.8	132,824	297.5	49,144	27.7	33,867	69.3
59	Sablayan	-	-	-	-	-	-	14.040	54	-	-	-	-	-	-	-	-
60	San Carlos	4,710	60	4,200	61	-	-	-	-	(510)	(10.8)	-	-	-	-	-	-
61	San Jose	135,856	15	203,688	11	149,976	18	140,736	29	67,832	49.9	(53,712)	(26.4)	(9,240)	(6.2)	813	2.9
62	Siargao	-	-	-	-	10,368	51	7,776	57	-	-	-	-	(2,592)	(25.0)	(648)	(6.2)
63	Siocon	5,280	59	6,000	59	9,300	52	-	-	720	13.6	3,300	55.0	-	-	-	-
64	Sorsogon	-	-	15,880	49	6,048	57	6,448	58	-	-	(9,832)	(61.9)	-	-	(2,458)	(15.5)
65	Surigao	192,960	11	105,696	23	298,608	11	230,256	17	(87,264)	45.2	192,912	182.5	(68,352)	(22.9)	6,216	19.1
66	Tablas	67,392	26	139,968	15	77,760	32	222,912	20	72,576	107.7	(62,208)	(44.4)	145,152	186.6	25,919	41.7
67	Tacloban	287,604	8	345,456	9	280,368	12	395,816	10	57,852	20.1	(65,088)	(18.0)	115,448	41.2	18,035	7.1
68	Tagbilaran	42,984	35	67,824	32	37,800	39	57,096	38	24,840	57.8	(30,024)	(44.3)	19,296	51.0	2,352	10.8
69	Takurong	25,704	42	22,032	46	22,032	48	25,704	48	(3,672)	(14.3)	-	-	3,672	16.7	-	-
70	Tandag	-	-	-	-	-	-	19,872	51	-	-	-	-	-	-	-	-
71	Tawi-Tawi	15,984	48	15,984	48	23,976	46	31,968	45	-	-	7,992	50.0	7,992	33.3	2,664	13.9
72	Toledo	1,530	65	-	-	-	-	-	-	-	-	-	-	-	-	-	-
73	Tuguegarao	115,128	17	102,960	25	114,352	23	223,272	19	(12,168)	(10.6)	11,392	11.1	108,920	95.2	18,023	15.9
74	Vigan	-	-	-	-	-	-	127,512	31	-	-	-	-	-	-	-	-
75	Virac	18,576	46	21,672	47	24,768	45	35,776	43	3,096	16.7	3,096	14.3	11,008	44.4	2,876	12.6
76	Zamboanga	447,912	7	703,404	6	1,666,216	3	1,750,232	4	255,492	57.0	962,812	136.9	84,016	5.0	217,045	33.2
	T O T A L	13,893,688		16,569,216		20,586,728		30,910,704		2,725,090		4,039,868		10122,712		2,815,865	

Source: Carrier schedules.

AIRCRAFT MOVEMENTS BY AIRPORT, ACTIVITY, AND RANK (1965)

Line	Rank	Airport	Aircraft Movements (Absolute)					Aircraft Movements (Percentage)				
			Commercial		Private/Civil	Military	Total	Commercial		Private/Civil	Military	Total
			ALL	PAL				ALL	PAL			
Col.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1	1	Manila	57,226	-	52,624	21,938	131,788	43.4	-	39.9	16.7	100.0
2	2	Cebu (Lahug only)	30,090		11,558	3,088	44,736	67.3	-	25.8	6.9	100.0
3	3	Bacolod	13,668	11,172	5,806	390	19,864	68.8	56.2	29.2	2.0	100.0
4	4	Davao	9,258	7,446	5,130	428	14,816	62.5	50.4	34.6	2.9	100.0
5	5	Zamboanga	5,815		6,218	884	12,917	45.0	-	48.1	6.9	100.0
6	6	Cagayan de Oro	8,372	6,278	1,072	731	10,175	82.3	61.7	10.5	7.2	100.0
7	7	Iloilo	6,714	3,700	2,956	360	10,030	66.9	36.9	29.5	3.6	100.0
8	8	Cotabato	5,728	4,154	1,260	290	7,278	78.7	57.1	17.3	4.0	100.0
9	9	Baguio	1,982	1,964	2,372	1,964	6,318	31.4	31.1	37.5	31.1	100.0
10	10	Legaspi	5,536	4,308	426	282	6,244	88.7	69.0	6.8	4.5	100.0
11	11	Cauayan	4,854	3,986	1,090	158	6,102	79.5	65.3	17.9	2.6	100.0
12	12	Plaridel	118	118	5,884	4	6,006	1.9	1.9	98.0	0.1	100.0
13	13	Bancasi	3,682	3,258	1,092	58	4,832	76.2	67.4	22.6	1.2	100.0
14	14	Dipolog	4,098	2,754	264	122	4,484	91.4	61.4	5.9	2.7	100.0
15	15	Dumaguete	3,508	2,896	616	160	4,284	81.9	67.6	14.4	3.7	100.0
16	16	Tuguegarao	3,604	2,852	176	228	4,008	89.9	71.2	4.4	5.7	100.0
17	17	Maria Cristina	3,446	2,398	390	142	3,978	86.6	60.3	9.8	3.6	100.0
18	18	Surigao	3,686	3,366	160	68	3,914	94.2	86.0	4.1	1.7	100.0
19	19	San Jose (Mindoro)	3,048	2,188	300	250	3,598	84.7	60.8	8.3	7.0	100.0
20	20	Mamburao	3,306	2,086	126	56	3,488	94.8	59.8	3.6	1.6	100.0
21	21	Tacloban	2,882	2,736	400	186	3,468	83.1	78.9	11.5	5.4	100.0
22	22	Roxas	2,970	1,068	230	230	3,430	86.6	31.1	6.7	6.7	100.0
23	23	Kalibo	2,502	1,006	220	410	3,132	79.9	32.1	7.0	13.1	100.0
24	24	Misamis	2,112	1,966	912	102	3,126	67.6	62.9	29.2	3.2	100.0
25	25	Laoag	2,488	2,290	254	318	3,060	81.3	74.8	8.3	10.4	100.0
26	26	Jolo	2,114	1,748	504	130	2,748	76.9	63.6	18.3	4.8	100.0
27	27	Daet	2,560	2,008	54	68	2,682	95.4	74.9	2.0	2.6	100.0
28	28	Buayan	1,938	1,594	566	138	2,642	73.4	60.3	21.4	5.2	100.0
29	29	Aparri	1,720	1,428	278	124	2,122	81.0	67.3	13.1	5.9	100.0
30	30	Masbate	1,484	1,288	294	92	1,870	79.4	68.9	15.7	4.9	100.0
31	31	Calapan	1,152	1,152	364	210	1,726	66.7	66.7	21.1	12.2	100.0
32	32	Tagbilaran	904	720	732	86	1,722	52.5	41.8	42.5	5.0	100.0
33	33	Calbayog	1,430	1,426	152	108	1,690	84.6	84.4	9.0	6.4	
34	34	Bagabag	-	-	1,572	52	1,624	-	-	96.8	3.2	100.0
35	35	Lubang	894	592	56	598	1,548	57.8	38.2	3.6	38.6	100.0
36	36	Malabang	1,454	1,454	28	44	1,526	95.3	95.3	1.8	2.9	100.0
37	37	Vigan	1,226	1,224	98	144	1,468	83.5	83.4	6.7	9.8	100.0
38	38	Naga	898	494	402	162	1,462	61.4	33.8	27.5	1.1	100.0
39	39	Marinduque	1,226	1,076	98	126	1,450	84.6	74.2	6.8	8.6	100.0
40	40	Romblon	1,226	826	90	112	1,428	85.8	57.8	6.3	7.9	100.0
41	41	San Fernando	90	90	582	718	1,390	6.5	6.5	41.9	51.6	100.0
42	42	Tandag	482	386	600	38	1,120	43.0	34.5	53.6	3.4	100.0
43	43	Puerto Princesa	862	626	206	46	1,114	77.4	56.2	18.5	4.1	100.0
44	44	Rosales	138	138	668	120	926	14.9	14.9	72.1	13.0	100.0
45	45	Allah Valley	806	806	76	40	922	87.4	87.4	8.2	4.4	100.0
46	46	Malaybalay	500	500	192	210	902	55.4	21.3	21.3	23.3	100.0
47	47	Virac	736	734	18	144	898	82.0	81.7	2.0	16.0	100.0
48	48	San Jose de Buenavista	682	682	66	102	850	80.2	80.2	7.8	12.0	100.0
49	49	Hilongos	584	584	192	60	836	69.9	69.9	23.0	7.1	100.0
50	50	Sanga-Sanga (Tawi-Tawi)	332	332	144	96	572	58.0	58.0	25.2	16.8	100.0

Line	Rank	Airport	Aircraft Movement (Absolute)					Aircraft Movements (Percentage)				
			Commercial		Private/Civil	Military	Total	Commercial		Private/Civil	Military	Total
			ALL	PAL				ALL	PAL			
Col.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
51	51	Basco	384	384	26	108	518	74.1	74.1	5.0	20.9	100.0
52	52	Baler	2	-	344	150	496	.4	-	69.4	30.2	100.0
53	53	Palanan	16	16	374	44	434	3.7	3.7	86.2	10.1	100.0
54	54	Guiuan	288	282	12	82	382	75.4	75.4	3.1	21.5	100.0
55	55	Sorsogon	292	292	40	36	368	79.3	79.3	10.9	9.8	100.0
56	56	Castillejos	-	-	274	78	352	-	-	77.8	22.2	100.0
57	57	Siargao	324	324	8	-	332	97.6	97.6	2.4	-	100.0
58	58	Iba	-	-	146	58	204	-	-	71.6	28.4	100.0
59	59	Rosario (Cabadbaran)	122	122	80	-	202	60.4	60.4	39.6	-	100.0
60	60	Lucena	-	-	162	22	184	-	-	88.0	12.0	100.0
61	61	Ormoc	78	78	70	2	150	52.0	52.0	46.7	1.3	100.0
62	62	Lingayen	-	-	110	22	132	-	-	83.3	16.7	100.0
63	63	Ubay	-	-	84	6	90	-	-	93.3	6.7	100.0
64	64	Alabat	-	-	66	-	66	-	-	100.0	-	100.0
65	65	Liloy	-	-	18	30	48	-	-	37.5	62.5	100.0
66	66	Bulan	-	-	30	16	46	-	-	65.2	34.8	100.0
67	67	Corregidor	-	-	44	2	46	-	-	95.6	4.4	100.0
68	68	Catarman	-	-	42	2	44	-	-	95.5	4.5	100.0
69	69	Jomalig	-	-	24	14	38	-	-	63.2	36.8	100.0
70	70	Siocon	-	-	28	-	28	-	-	100.0	-	100.0
71	71	Barobo	-	-	24	-	24	-	-	100.0	-	100.0
72	72	Wasig	-	-	12	4	16	-	-	75.0	25.0	100.0
73	73	Kiamba	-	-	4	-	4	-	-	100.0	-	100.0
74	74	Caticlan	-	-	2	-	2	-	-	100.0	-	100.0
75	75	Camiguin	-	-	-	-	-	-	-	-	-	-
		T O T A L	217,637	97,396	111,592	37,291	366,520	59.4	26.6	30.4	10.2	100.0

Source: Civil Aeronautics Administration.

AIRCRAFT MOVEMENTS BY AIRPORT, ACTIVITY, AND RANK (1966)

Seq.	Rank	Airport	Aircraft Movements (Absolute)					Aircraft Movements (Percentage)				
			Commercial		Private/Civil	Military	Total	Commercial		Private/Civil	Military	Total
			ALL	PAL				ALL	PAL			
Col.:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1	1	Manila	55,578	-	57,688	23,023	136,289	40.7	-	42.4	16.9	100.0
2	2	Cebu (Mactan, Lahug)	32,763		14,794	35,354	82,912	39.5	39.5	17.8	42.7	100.0
3	3	Bacolod	11,824	7,724	6,026	380	18,230	64.9	42.4	33.1	2.0	100.0
4	4	Davao	7,626	5,648	8,780	246	16,651	45.8	33.9	52.7	1.5	100.0
5	5	Zamboanga	6,180	-	7,735	1,147	15,062	41.0		51.4	7.6	100.0
6	6	Iloilo	4,956	1,718	4,000	442	9,398	52.7	18.2	42.6	4.7	100.0
7	7	Cagayan de Oro	7,876	5,984	856	622	9,354	84.2	64.0	9.2	6.6	100.0
8	8	Cotabato	6,986	5,028	1,370	114	8,470	82.5	59.4	16.2	1.3	100.0
9	9	Baguio	1,818	1,818	2,976	2,288	7,082	25.7	25.7	42.0	32.3	100.0
10	10	Legaspi	4,390	3,710	344	232	4,966	88.4	74.7	6.9	4.7	100.0
11	11	Cauayan	3,718	3,516	1,040	174	4,932	75.4	71.3	21.1	3.5	100.0
12	12	Bancasi	3,464	2,972	924	106	4,494	77.1	66.1	20.6	2.3	100.0
13	13	Dumaguete	4,038	2,436	332	80	4,450	90.7	54.7	7.5	1.8	100.0
14	14	Plaridel	2	2	4,434	12	4,448	0.4	.04	99.7	0.26	100.0
15	15	Tacloban	3,256	2,654	344	244	3,844	84.7	69.0	8.9	6.4	100.0
16	16	Maria Cristina	3,376	2,278	342	58	3,776	89.4	60.3	9.1	1.5	100.0
17	17	Dipolog	3,518	1,634	116	60	3,694	95.2	44.2	3.1	1.7	100.0
18	18	Jolo	2,210	1,744	586	332	3,128	70.6	55.7	18.7	10.7	100.0
19	19	Misamis	2,388	2,388	674	50	3,112	76.7	76.7	21.7	1.6	100.0
20	20	Surigao	2,786	2,786	120	40	2,946	94.6	94.6	4.1	1.3	100.0
21	21	Tuguegarao	2,646	2,530	108	156	2,910	90.9	86.9	3.7	5.4	100.0
22	22	San Fernando	88	65	1,930	788	2,806	3.1	2.4	68.8	28.1	100.0
23	23	Roxas	2,274	894	198	126	2,598	87.5	34.4	7.6	4.9	100.0
24	24	Mamburao	2,374	2,126	154	34	2,562	92.7	82.9	6.0	1.3	100.0
25	25	Laoag	1,900	1,878	228	290	2,418	78.6	77.6	9.4	12.0	100.0
26	26	Buayan	1,828	1,490	368	88	2,284	80.0	65.2	16.1	3.9	100.0
27	27	San Jose (Mindoro)	1,614	1,452	138	392	2,144	75.3	67.7	6.4	18.3	100.0
28	28	Kalibo	1,896	872	146	84	2,126	89.2	41.0	6.9	3.9	100.0
29	29	Daet	1,748	1,736	30	42	1,820	96.0	95.4	1.6	2.4	100.0
30	30	Romblon	1,668	866	44	82	1,794	93.0	48.3	2.5	4.5	100.0
31	31	Masbate	1,200	1,190	466	72	1,738	69.0	68.5	26.8	4.2	100.0
32	32	Vigan	1,170	1,170	222	160	1,552	75.4	75.4	14.3	10.4	100.0
33	33	Tagbilaran	1,180	678	266	84	1,530	77.1	44.3	17.4	5.5	100.0
34	34	Rosales	40	40	1,308	90	1,438	2.8	2.8	91.0	6.2	100.0
35	35	Lubang	554	554	174	662	1,390	39.9	39.9	12.5	47.6	100.0
36	36	Calapan	970	970	222	118	1,310	74.0	74.0	16.9	9.1	100.0
37	37	Marinduque	1,066	922	90	148	1,304	81.7	70.7	6.9	11.4	100.0
38	38	Bagabag	164	164	1,036	78	1,278	12.8	12.8	81.0	6.2	100.0
39	39	Aparri	1,008	1,008	122	60	1,190	84.7	84.7	10.2	5.1	100.0
40	40	Calbayog	1,050	1,050	94	20	1,164	90.2	90.2	8.1	1.7	100.0
41	41	Naga	646	640	340	142	1,128	57.3	56.7	30.1	12.6	100.0
42	42	Puerto Princesa	644	614	232	108	984	65.4	62.3	23.6	11.0	100.0
43	43	Malabang	968	968	14	-	982	98.6	98.6	1.4	-	100.0
44	44	Tandag	254	254	662	4	920	27.6	27.6	72.0	.4	100.0
45	45	Virac	736	736	10	154	900	81.8	81.8	1.1	17.1	100.0
46	46	Allah Valley	712	712	44	18	774	92.0	92.0	5.7	2.3	100.0
47	47	Hilongos	534	534	104	32	670	79.7	79.7	15.5	4.8	100.0
48	48	San Jose de Buenavista	596	596	18	36	650	91.7	91.7	2.8	5.5	100.0
49	49	Sanga-Sanga (Tawi-tawi)	306	306	158	146	610	50.2	50.2	25.9	23.9	100.0
50	50	Malaybalay	312	312	126	136	574	54.4	54.4	22.0	23.6	100.0

Line	Rank	Airport	Aircraft Movements (Absolute)					Aircraft Movements (Percentage)				
			Commercial		Private/Civil	Military	Total	Commercial		Private/Civil	Military	Total
			ALL	PAL				ALL	PAL			
Col.:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
51	51	Ormoc	390	390	104	50	544	71.7	71.7	19.1	9.2	100.0
52	52	Lingayen	20	20	506	12	538	3.7	3.7	94.1	2.2	100.0
53	53	Baler	-	-	350	134	484	-	-	72.3	27.7	100.0
54	54	Basco	356	356	8	84	448	79.5	79.5	1.8	18.7	100.0
55	55	Iba	-	-	280	94	374	-	-	74.9	25.1	100.0
56	56	Sorsogon	250	250	70	52	372	67.2	67.2	18.8	14.0	100.0
57	57	Catarman	268	268	40	26	334	80.2	80.2	12.0	7.8	100.0
58	58	Kiamba	186	186	48	80	314	59.2	59.2	15.3	25.5	100.0
59	59	Palanan	-	-	298	4	302	-	-	98.7	1.3	100.0
60	60	Guiuan	256	256	36	8	300	85.3	85.3	12.0	2.7	100.0
61	61	Lucena	-	-	198	90	288	-	-	68.8	31.2	100.0
62	62	Siargao	244	244	2	-	246	99.2	99.2	.8	-	100.0
63	63	Castillejos	12	12	58	146	216	5.6	5.6	26.8	67.6	100.0
64	64	Bulan	116	116	42	8	166	69.9	69.9	25.3	4.8	100.0
65	65	Barobo	-	-	114	8	122	-	-	93.4	6.6	100.0
66	66	Caticlan	-	-	104	18	122	-	-	85.2	14.8	100.0
67	67	Alabat	-	-	32	22	54	-	-	59.3	40.7	100.0
68	68	Rosario	-	-	18	16	34	-	-	52.9	47.1	100.0
69	69	Ubay	-	-	26	-	26	-	-	100.0	-	100.0
70	70	Camiguin	24	24	-	-	24	100.0	100.0	-	-	100.0
71	71	Corregidor	-	-	-	18	18	-	-	-	100.0	100.0
72	72	Siocon	-	-	4	6	10	-	-	40.0	60.0	100.0
73	73	Wasig	-	-	-	4	4	-	-	-	100.0	100.0
74	74	Liloy	-	-	4	-	4	-	-	100.0	-	100.0
75	75	Jomalig	-	-	-	-	0	-	-	-	-	100.0
		TOTAL	203,020	83,490	124,875	70,234	398,130	51.0	29.2	31.4	17.6	100.0

Source: Civil Aeronautics Administration.

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X 361

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362