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New York Downtown Manhattan (Wall Street) Heliport - Operations Analysis

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16. Abstract

In response to increasing helicopter demand, the Federal Aviation Administration (FAA) initiated the FAA/ Industry National Prototype Heliport Demonstration and Development Program in 1983. Four cities were selected for the FAA demonstration program. These were: Indianapolis, New Orleans, Los Angeles, and New York.

This study is an analysis of the operational characteristics of the Downtown Manhattan Heliport, commonly known as the Wall Street Heliport, located in New York City. Although selected for the demonstration program in 1983, this heliport has been open since 1960. A general overview of the number of helicopter operations since 1960 and a detailed analysis of operational characteristics between 1987 and 1989, the time frame for which detailed data was available, is provided. Furthermore, the developmental history of the heliport is discussed. The analysis of the operations at the heliport is performed using data collected by the Port Authority of New York and New Jersey (PANYNJ), the owner and operator of the heliport. The parameters examined concentrate on the variations and trends in the number of operations by year, month, week, time of day, mission type, engine type, and number of passengers carried.

A similar study was performed for the Indianapolis Downtown Heliport, titled "Indianapolis Downtown Heliport - Operations Analysis and Marketing History," (DOT/FAA/DS-89/32).

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PREFACE

The author would like to express her sincere appreciation to Ms. Mary Adkinson for her fine effort in this project. Ms. Adkinson spent several months inputting all the operations data and she developed all the graphs and appendices, no small accomplishment. Without her effort, this study would not have been completed in such an efficient manner.

TABLE OF CONTENTS

Page

LIST OF FIGURES

Page

Page

LIST OF TABLES

1.0 INTRODUCTION

In 1983 the Federal Aviation Administration (FAA) initiated the FAA/ Industry National Prototype Heliport Demonstration and Development Program. This program was established to encourage construction of urban public-use heliports in response to the growing demand for such facilities that had developed over the previous 25 years. During this time, as new applications for urban helicopter use evolved and existing uses escalated, the numbers of helicopters operating in metropolitan areas had increased significantly. This effort was also designed to demonstrate, by example, the smooth integration of helicopters into the urban transportation infrastructure. Funds to build full-service heliports in major urban areas were made available through this program. The cities selected for the prototype demonstration heliports were: Indianapolis, New Orleans, Los Angeles, and New York. New York's entrant the Downtown Manhattan Heliport (DMH) shown in figures 1, 2, and 7 was the second demonstration heliport to be completed; it opened in the summer of 1987.

The current New York City Manhattan heliport system represents one of the largest and most complex heliport centers in the world. The current total helicopter activity is estimated to be about 140,000 movements annually, and this number has been forecasted to double within the next 20 years. That activity is conducted at four heliports, each strategically located to serve a particular market. The locations of these heliports are shown in figure 2. The Downtown Manhattan Heliport, commonly referred to as the Wall Street Heliport, is one of these key Manhattan facilities.

The DMH is a publicly-owned and operated, public-use heliport. The heliport consists of a 550 X 85 foot pier with an attached 90 X 300 foot barge for helicopter parking (see appendix C for layout plan). It is situated in the East River near the south western tip of Manhattan Island. This location is adjacent to New York City's financial district, as well as other major business centers. A heliport has been in operation at this location since 1960.

As one of the three heliports funded under the FAA's National Prototype Heliport Demonstration and Development Program, the DMH was designed to demonstrate how a downtown, public-use heliport allows helicopter transportation to be readily integrated into the urban transportation infrastructure. The DMH is a prime example of this type of heliport and has attracted international attention.

The heliport is owned and operated by the Port Authority of New York and New Jersey (PANYNJ). It is open Monday through Friday from 0700 hours to 1930 hours. At night, on weekends, and on holidays, the DMH can be used with prior arrangements. It has 1 touchdown pad at the end of the pier, space for 2 concurrent loading operations near the terminal building, and space on the barge to park 12 helicopters. The terminal building is a permanent two-story structure with a passenger waiting lobby, some office handling area, space for heliport management, office space and sorting rooms for the courier operation, and a pilot's lounge. The only service offered to pilots and operators at the DMH is helicopter parking. An automatic-weather-observing system (AWOS) is planned to be

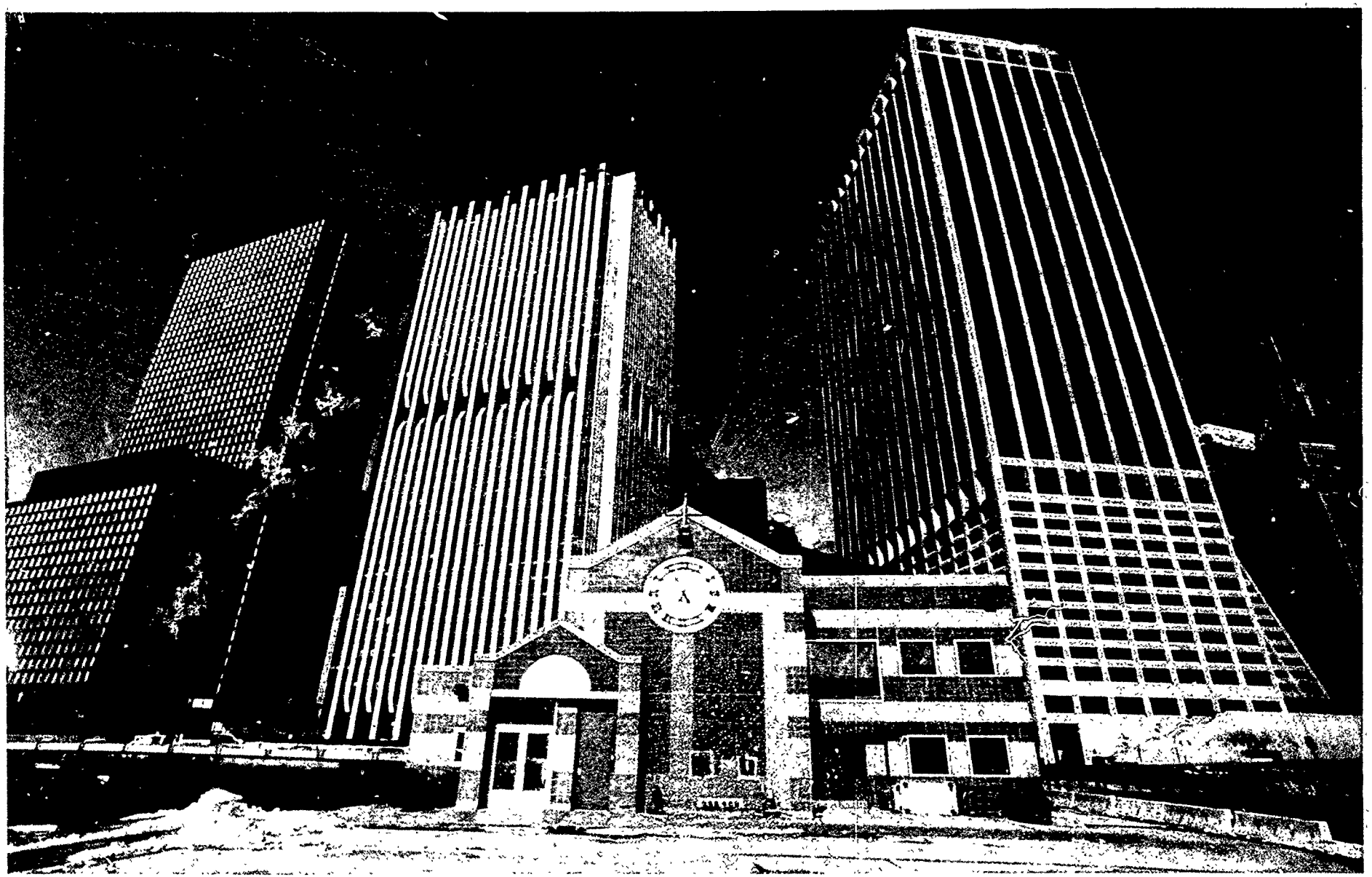


FIGURE 1 DOWNTOWN MANHATTAN HELIPORT

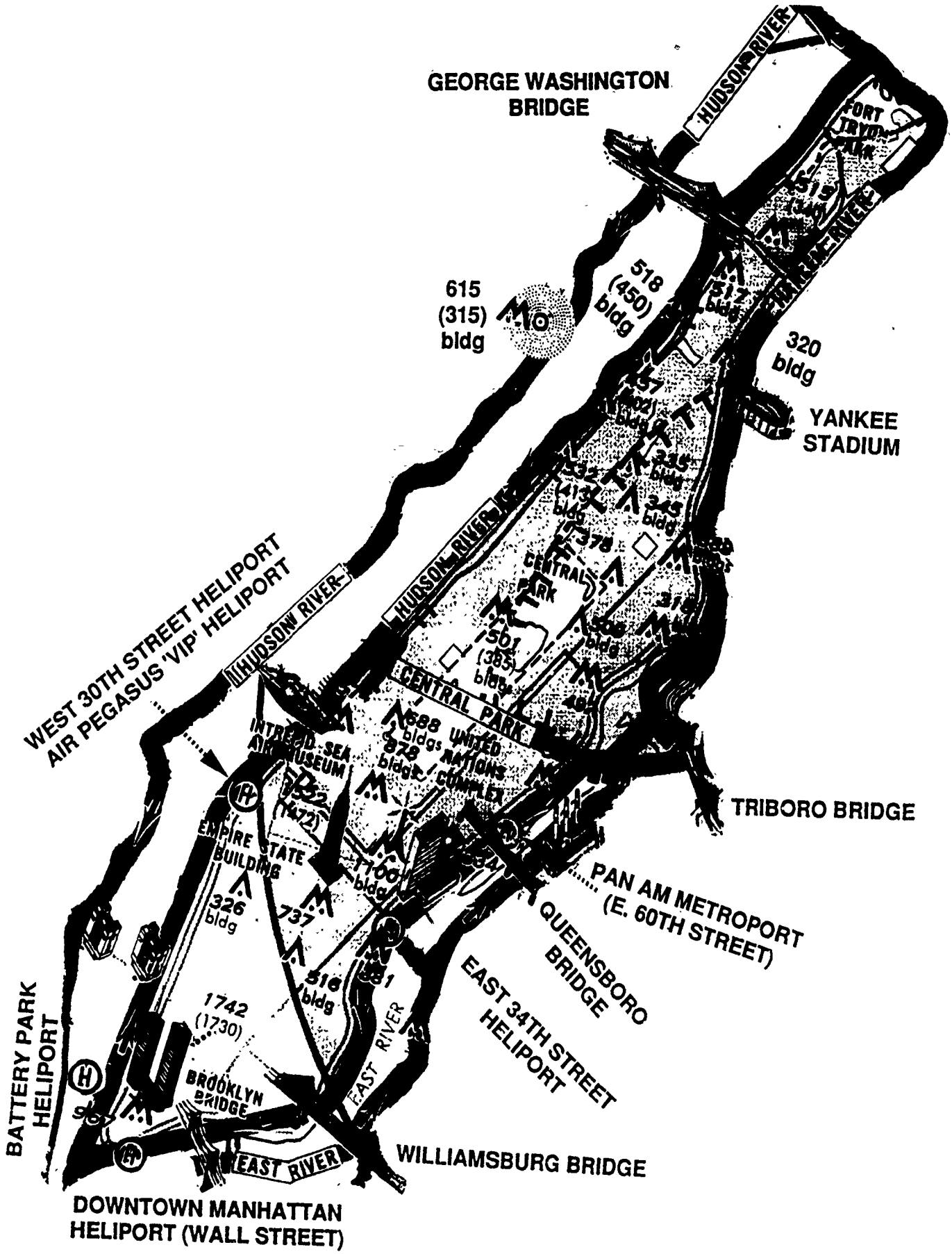


FIGURE 2 MANHATTAN HELIPORTS MAP

installed in 1991, and to make the heliport "all-weather," a microwave landing system (MLS) is planned.

The market service area, the area from which a heliport attracts business, is considered to be less than 100 miles although helicopters from all over the United States, particularly from the Northeast do use the heliport. Such dignitaries as the President of the United States, flying in from Washington, D.C., have used the DMH. The market area is shown in figure 3.

1.1 PURPOSE

This document is part of the FAA's response to a Department of Transportation (DOT) Inspector General's recommendation to assess the results of the investment made at heliports developed under the prototype program. In addition, the study is intended to provide operational data for heliport planning. The study is accomplished through an investigation and evaluation of the heliport's current operations and its history, including why and how it was developed. The investigation includes the environment in which the DMH now operates. A similar study of the first demonstration heliport to open, documented in a report entitled "Indianapolis Downtown Heliport - Operations Analysis and Marketing History," (DOT/FAA/DS-89/32), was completed in March 1990.

1.2 PROJECT ORGANIZATION

This effort was divided into two distinct tasks. The first task investigated the history of the DMH. The history includes both the background of the original heliport, built in 1960, and the processes of planning and operating the new prototype facility, opened in 1987. It further discusses an overview of the current operational environment, the aviation infrastructure in which it now functions, and the role it is expected to fulfill in the future.

The second was the analysis of operational data related to heliport activity from January 1987 through December 1989. The analysis was performed through the use of a database and statistical analyses that were designed to evaluate the parameters considered significant to the overall assessment of heliport operational activity.

This study describes the work accomplished and the findings related to these two tasks.

1.2.1 Historical Analysis

Section 2 investigates the developmental history of the DMH from its beginning as the Wall Street Heliport in 1960 to the present day. It also discusses the processes of planning, developing, and operating the current facility, its managerial structure, and presents an overview of the aviation infrastructure in which the it is located.

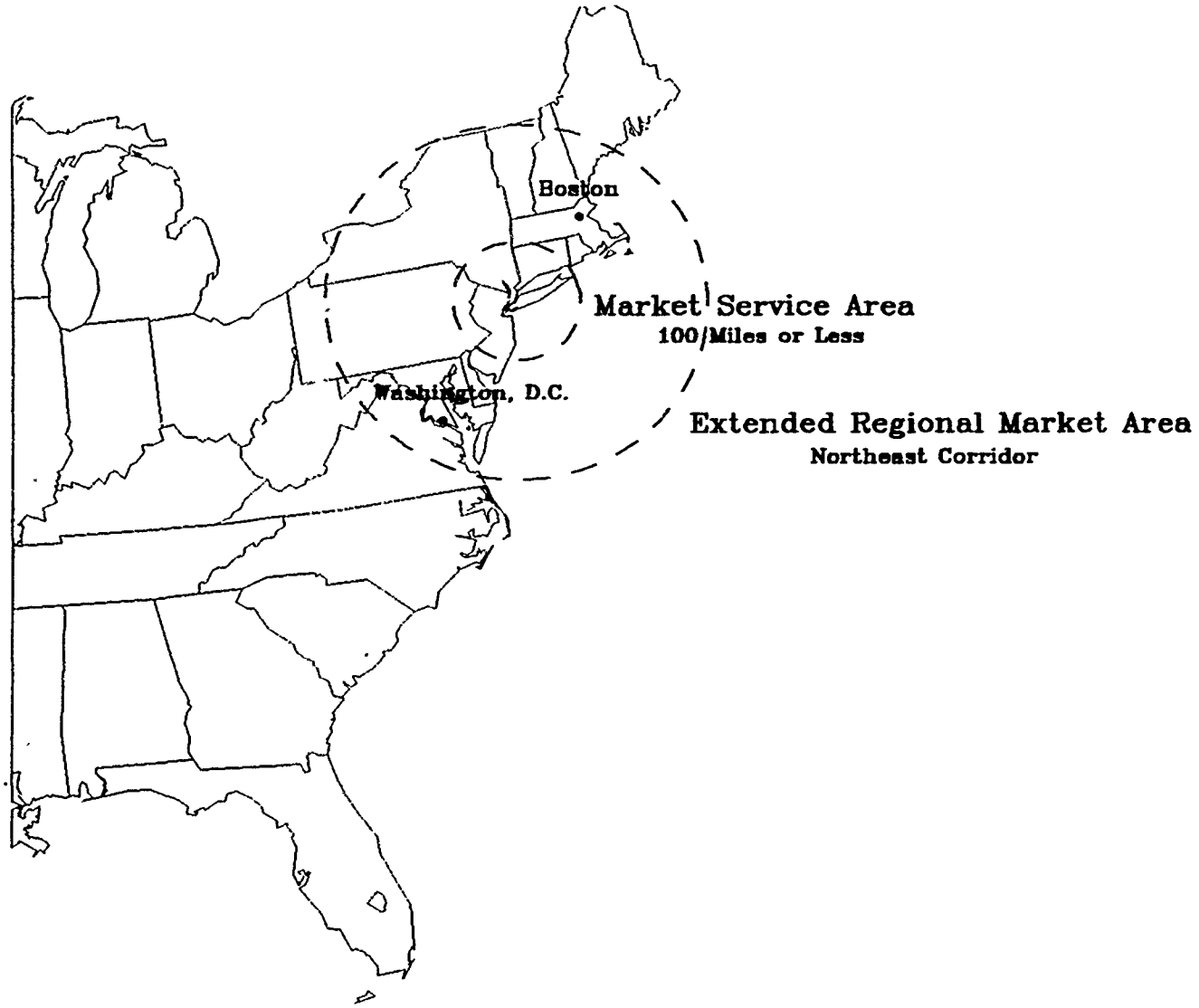


FIGURE 3 MARKET SERVICE AREA DOWNTOWN MANHATTAN HELIPORT (WALL STREET)

Sources of information on the history of the heliport include data received directly from the PANYNJ, both in writing and from interviews with key personnel; articles from various publications about the heliport; promotional information; investigative material; and telephone discussions with frequent users of the heliport.

1.2.2 Operations Analysis

The operations analysis made use of available data on the heliport's activity from as early as December 1960 when the Wall Street Heliport first opened. However, the only data available for the period between 1960 and 1985 are the total annual operations. Monthly operations are available for 1986, but are incomplete. The operations conducted by helicopters operated by the PANYNJ are not included in the 1986 data. A complete record of individual helicopter operations, by time of day, is available from January 1987 through December 1989. Consequently, a detailed analysis of the operational characteristics is only possible between 1987 and 1989. These data are used to describe the parameters significant to heliport activity and pertain to aircraft categories, mission types, and passenger movements. The data elements are differentiated by annual, monthly, daily, and hourly variations. The data parameters examined and the methodology applied are described in section 3. Section 4 presents the results of the operations analysis.

2.0 HELIPORT HISTORY AND OPERATING CHARACTERISTICS

This section investigates the developmental history of the heliport, the processes of planning and operating the facility, its current managerial structure, and the aviation infrastructure in which it operates.

2.1 DOWNTOWN MANHATTAN HELIPORT

Aviation is an important industry in the New York/New Jersey Metropolitan Region, contributing significantly to the welfare and convenience of its approximately 17 million residents and the many additional millions of travelers who conduct business and tour within its boundaries. Aviation activity generates more than $20 billion of economic activity within that region and provides employment for 300,000 people.

Furthermore, the DMH is located in one of the most complex flying environments in the world. There are three major airports within the New York terminal control area, John F. Kennedy International, LaGuardia, and Newark International, that share portions of one large terminal control area (TCA). The areas along the Hudson and East Rivers, where the Manhattan heliports are located, are well within the boundaries of the New York TCA. Under normal circumstances the floor of the controlled airspace extends to the surface. This would not allow free access of VFR helicopter traffic into the heliports. To alleviate this situation, two VFR exclusions were designed, one along the Hudson River, and one along the East River. These exclusions provide VFR helicopter access to the New York heliports. Specific helicopter routes through the New York City area were developed through FAA and industry cooperation. These routes are depicted on the Helicopter Route Chart for New York City (December 13, 1990) issued by the FAA.

Although the three major airports are the principal contributors to the economy, the city's heliports provide the means for quickly transporting passengers, particularly business people, from the airports and other origins to the city center. Depending on traffic congestion, a helicopter flight from LaGuardia Airport to downtown Manhattan takes only 6 minutes compared to an hour or more by ground transportation. Helicopter air couriers rush important financial documents and bank paper, principally cancelled checks, from the area airports to the DMH to be distributed to downtown banks for immediate deposit. These papers have origins all over the nation.

The importance of helicopters to Manhattan was emphasized in a report entitled "Destination: Manhattan, A study of Heliports, Land Use, and Public Impact," produced by the Office of the President of the Borough of Manhattan in September 1989. The report states "New York City, the business and commercial center of the world, is increasingly dependent upon accessibility by air, not only through the three major airports, but also through heliports located near the central business district." That huge business district is illustrated in the 1986 photograph of Manhattan shown in figure 4.

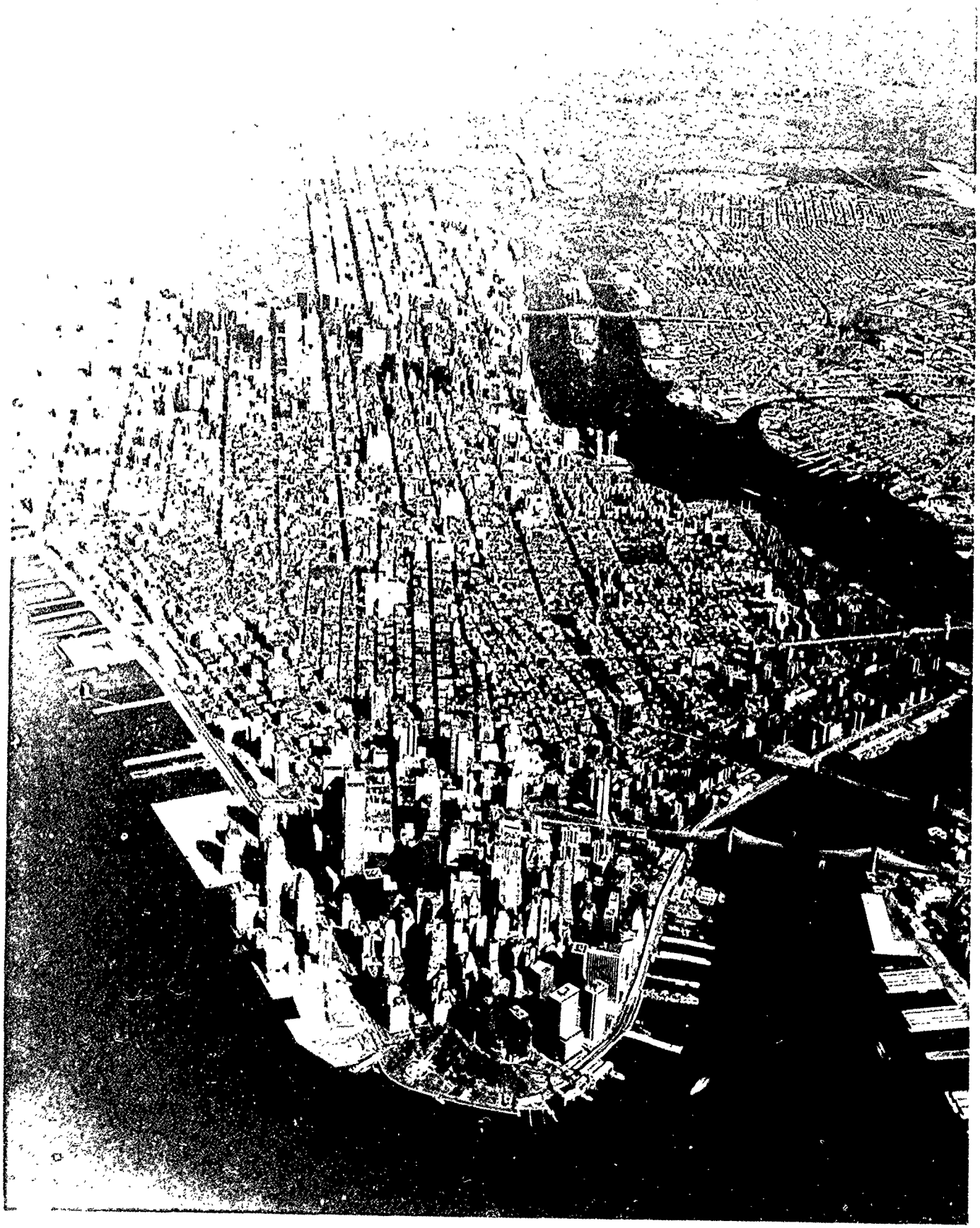


FIGURE 4 PHOTOGRAPH OF MANHATTAN

2.1.1 History of the Downtown Manhattan Heliport

Development of the DMH is an outgrowth of planning in the early 1950's. Following success of the helicopter in World War II, Korea, and in limited commercial uses soon thereafter, transportation agencies began to evaluate its long term role in the commercial sector. The PANYNJ, which was created by the states of New York and New Jersey to develop transportation facilities within the metropolitan region, took the initiative to advance a system of heliports. The PANYNJ, in coordinated effort with the Air Transport Association and the Aircraft Industries Association, developed a basic philosophy to be used in the design of heliports for scheduled passenger use.

In the mid 50's, the PANYNJ announced a heliports master plan for the metropolitan region. The West 30th Street Heliport was opened in 1956 with an investment by the PANYNJ of $355,000 for landing, parking, and fueling facilities. New York Airways, the first operator there, initiated shuttle service to the three major airports. For various reasons, including unreliability of equipment and inability to meet schedules, passenger activity did not develop as expected. It was believed that a heliport in the financial district would generate more passenger demand. As a result, New York Airways urged the PANYNJ to develop a second heliport, the Wall Street Heliport, on Pier 6 at the east shore of lower Manhattan. Because of its proximity to the financial district, it was believed that a greater passenger market existed at that location. The FAA and New York City officials supported that development. There was no community opposition to the Wall Street heliport project, probably because there were few residences near the site and helicopter noise had not yet become a community concern. To this day, there are no known problems from the building tenants nearby. In fact, throughout its history there have been no groups opposing the heliport. Rather, there was strong support for the DMH from many organizations, including the Community Board, during the selection process for the FAA/Industry National Prototype Heliport Demonstration and Development Program in 1983.

On December 8, 1960, the PANYNJ dedicated the original Wall Street Heliport illustrated in figures 5 and 6. The heliport was constructed on Pier 6, a wooden structure originally built in 1888 for use as a general cargo terminal. The PANYNJ provided an 80 X 85 foot landing pad, a 300 X 85 foot helicopter parking area, a small terminal building, and an automobile parking area at a cost of $230,000. Mr. Robert Cummings, Jr., President of New York Airways, who participated in the dedication, made reference to the historic 32 minute helicopter flight just 18 days previously from the city center of Philadelphia to the city center of New York. That flight was hailed as a forerunner of the establishment of scheduled service from city center to city center. New York Airways became the operator of Wall Street Heliport, providing shuttle service to the major airports. Other activities included charter, sightseeing, and corporate.

The wooden pier structure began to exceed its useful life in the early 1980's. Section after section had to be removed or temporarily repaired. Eventually, the entire structure was deemed unsafe for operation. In September 1983, the facility was closed and operations were

FIGURE 5 WALL STREET HELIPORT - 1960

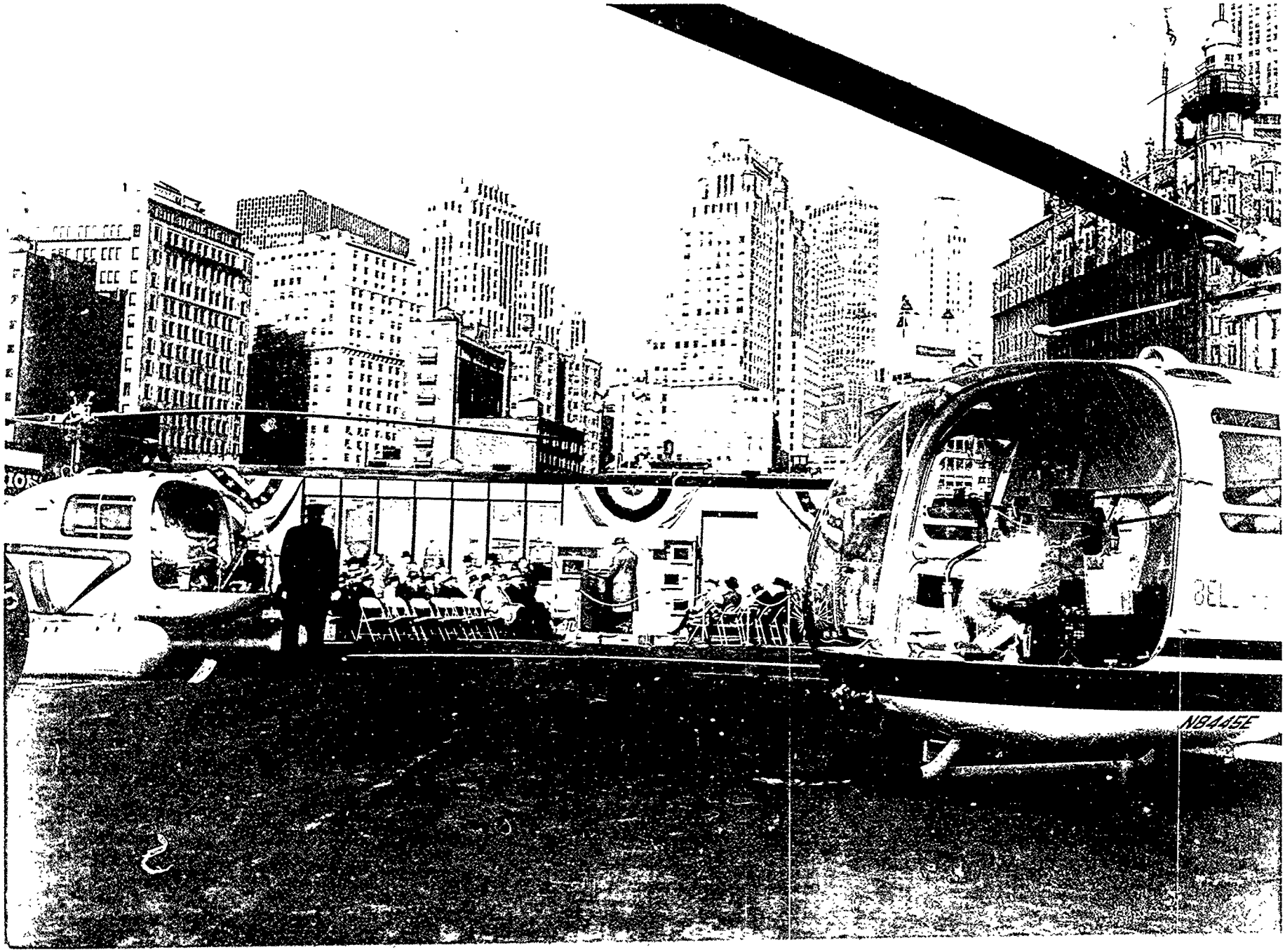


FIGURE 6 WALL STREET HELIPORT TERMINAL BUILDING - 1960

transferred to a temporary private facility created at Battery Park City for PANYNJ use pending an evaluation of alternatives regarding reconstruction of the Wall Street Heliport.

2.1.2 Reconstruction

The cost of reconstruction to provide an adequate modern facility was then estimated to be nearly $7 million. That high cost presented a problem to the PANYNJ because of the limited revenue potential and the self-supporting structure of the organization. Fortunately, in early 1983 the FAA announced its National Prototype Heliport Demonstration and Development Program to fund development of a full-service heliport for eventual all-weather operations.

With the potential of 90 percent Federal funding, the PANYNJ decided to offer the Wall Street Heliport as a candidate for the demonstration program. The heliport was then renamed the Downtown Manhattan Heliport (DMH). A strategy was developed to gain wide support for reconstruction. Letters of support were obtained from New York State, New York City, the Community Board representing the community in which the site is located, the Downtown Lower Manhattan Business Association, Inc., and the Eastern Region Helicopter Council (ERHC).

Mr. H. Peyrebrune, Assistant Commissioner for Public Transportation, New York State, said, "If you can develop criteria and standards for an all-weather heliport for the Wall Street location, then you have no difficulty applying it to any other location in the country." The Chairman of Community Board No. 1, said, "The Downtown Manhattan Heliport is a key link between the Wall Street financial community and the airports. Air courier firms rush critical financial documents, primarily checks, to downtown banks for deposit before the start of the business day. These checks arrive at area airports on overnight flights from all over the country. Courier tenants have been reporting volumes in excess of 80,000 pounds per month. The estimated value of these checks amounts to billions of dollars per day and the float (interest on uncollected checks) is of major importance with today's high interest rates. The provision for precision approach facilities at the Downtown Manhattan Heliport to serve that need is, therefore, important to the commercial activities in lower Manhattan."

The President of the Downtown Lower Manhattan Business Association, Inc., stressed, "The current concentration of our expanding service industries and the ongoing growth of our area support our need for a heliport facility which will be larger, safer, and more representative of the quality of our area."

The FAA selected the DMH as one of the four heliports for prototype program funding.

2.1.3 Description of the New Facility

The heliport is located on the East River. The PANYNJ's lease with New York City encompasses an area of approximately 8 acres extending to the U.S. Pierhead Line as shown in appendix C, thereby allowing expansion

to almost double the existing operational area if desired. The term of 20 years commenced on March 1, 1986. That lease allows development for air terminal purposes only. Protection of heliport operations is provided by a lease provision requiring the City to use reasonable efforts to prevent waterborne activity or erection of structures in adjacent approach areas that would inhibit such operations.

The land use of the neighborhood, situated in the financial district, is predominantly offices for banks, insurance companies, law firms, and investment firms. There are some commercial/retail buildings and tourist/recreational activities scattered throughout the area. There are very few residential buildings. The 1980 census data showed a residential population of only 529 people within the 2 census tracts which comprise the surrounding neighborhood. By comparison, the 1980 population within the 4 tracts near the East 34th Street Heliport was 25,431 and the 4 tracts near East 60th Street was 25,752. There are virtually no complaints of helicopter noise at the DMH. Although noise is discernible, it is insignificant because of the relatively high background noise from heavy vehicular traffic. Further, there are very few weekend and nighttime operations.

The heliport was built as a replacement for Pier 6 using the same measurements, thus avoiding a protracted environmental assessment (EA). The adjacent barge was added but it did not require an EA because it was considered a floating structure anchored in place. The relatively long length of the narrow pier with a landing pad outboard and a terminal near the shoreline imposes some limitations. Taxiing to the terminal becomes somewhat lengthy and only two gates can be accommodated at the terminal. An optimum layout would include wider frontage to allow more gates and shorter taxiing distance. The area leased by the PANYNJ allows for potential expansion either by structural improvements to the pier or by additional anchored barges to provide more close-in gates.

The heliport shown in the photograph in figure 7 consists of an 85 X 550 foot concrete pier that accommodates a large landing pad, a terminal building, an auto parking area, and a barge 90 X 300 foot, rigidly anchored in place adjacent to the pier providing parking for up to 12 helicopters.

The deck was designed and built to accommodate a 50,000 pound rotorcraft, which should make the deck sufficiently strong to handle potential tiltrotor aircraft that would provide service from downtown New York to downtown Washington, D.C., Boston, Massachusetts, and other regional locations.

The modern terminal building is an architectural design typical of the waterfront, as was shown in figure 1. The terminal building offers a comfortable and attractive passenger lounge shown in figure 8, ticket counters, separate courier operations space, administrative offices, a heliport operations center, and a pilots' lounge.

There is a semiautomatic, foam fire fighting system with remote operation at the terminal providing complete coverage of the pier. The

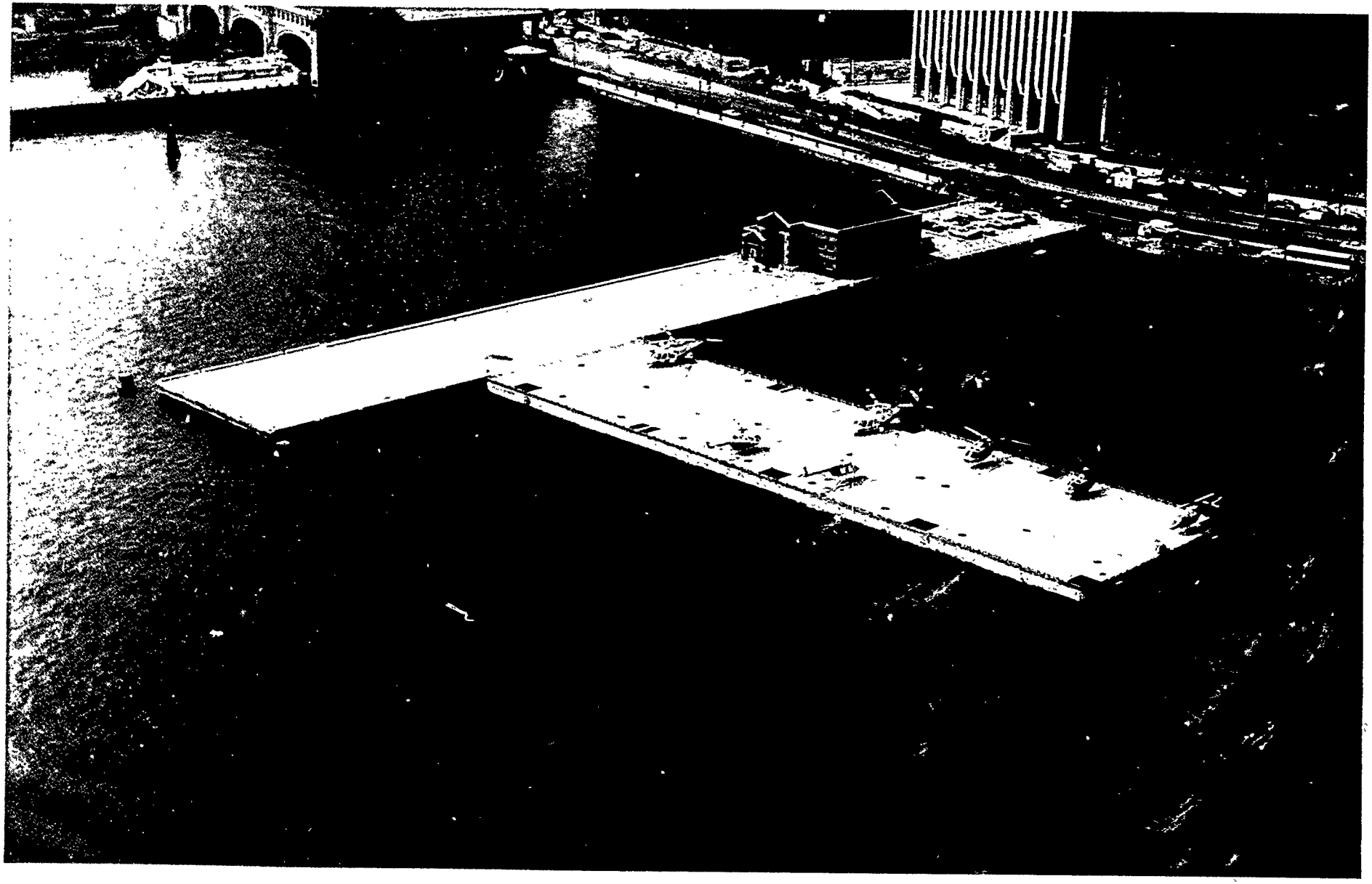


FIGURE 7 LAYOUT OF DOWNTOWN MANHATTAN HELIPORT

FIGURE 8 PASSENGER LOUNGE IN TERMINAL BUILDING

heliport is equipped with a pulsating light approach system indicator (PLASI) with a second unit ready to be installed for additional direction capability. Radio communication is provided by two frequencies to assure reliable communication with pilots approaching the facility. An automated weather observing system (AWOS) is expected to be installed by the end of 1991.

Access from the road, FDR Drive, presents some problems. Driving south, one must go past the heliport to the exit that leads to the ferry terminal and then drive north to the heliport. Traffic going north and exiting from the bypass tunnel must veer quickly to the right, crossing other traffic that is going straight on South Street. There are no current plans to improve these conditions. However, the problems are not considered major.

Various modes of ground transportation are available at the heliport. A car rental facility is located to the north of the heliport within short walking distance. There are subway and bus stops, also nearby. Taxis frequently pass the front of the heliport, allowing one to readily hail a cab.

The approach and departure paths to the heliport were established by a coordinated effort among pilots, the PANYNJ as operator of the heliport, and the FAA. These are shown on the helicopter route chart of the NY terminal area, an excerpt of which was shown in figure 2. To provide all-weather capability for the heliport, plans were made to install a microwave landing system (MLS).

The IFR approach was planned as a point-in-space procedure. The MLS was to be located at a waterfront site at Fishport in the Red Hook area of Brooklyn to transmit a signal to the southwest. This configuration was expected to have allowed a precision approach to a point-in-space with a decision height (DH) of 450 feet and minimums of a 500 foot ceiling and 3/4 mile visibility. This provided adequate obstacle clearance above the masts of ships using the harbor. Flight operations from the point-in-space to the heliport would have used VFR procedures. This project had to be abandoned when the PANYNJ, the owner of the waterfront facility on which the MLS site was to be located, placed the facility up for sale and did not want to encumber the deed by allowing the MLS. Other MLS sites in Manhattan were considered but rejected because structures would have become obstructions in violation of FAA approach criteria in the transitional zones and missed approach areas. In addition, MLS equipment was not available. At this time, the FAA is investigating alternate sites.

2.1.4 Other Manhattan Heliports

The role of the DMH is best discussed within the context of the Manhattan Heliport system.

2.1.4.1 West 30th Street

The West 30th Street Heliport is located at the intersection of West 30th Street and the Hudson River. It has been in operation since 1956.

The property was originally owned by New York City but is now owned by New York State as part of the Westway land transfer and is leased to the PANYNJ on a month-to-month basis. The PANYNJ has jurisdiction over this heliport as far as setting the basic operating rules and the fees charged, but it is operated by Air Pegasus, a private company. Manhattan Helicopter also operate from this heliport, as did Trump Air when it was in operation. The facility occupies an area of about 34,000 square feet and contains two landing pads, five parking positions, and a small temporary terminal. The heliport has refueling facilities that are now under renovation. Its hours of operation are 0730 hours to 1930 hours, Monday through Friday, and 1100 hours to 1900 hours on Saturday, but it is considered a 24-hour "on demand" heliport. The helicopter missions flown a this heliport are principally corporate/executive and sightseeing.

2.1.4.2 East 60th Street

The East 60th Street Heliport, also called the Pan Am Metroport, is located along FDR Drive on the East River shore. It is owned by New York City and is operated by Johnson Controls. Johnson Controls is the new owner of Pan Am World Services, Inc., a subsidiary of Pan American World Airways that had previously operated the heliport. The East 60th Street Heliport has been in operation since 1968. It occupies an area of 38,500 square feet and has five landing pads, but there is only room for three helicopters to park at one time. There is a small trailer building that provides a minimal area for offices and a lounge. It operates between 0800 and 2000 hours, Monday through Saturday and 1100 to 2000 hours on Sunday. This heliport provides Jet A fuel and is the only heliport to currently offer hangar service. The primary mission at this heliport is transporting business executives who travel to offices in the city.

Another important function the East 60th Street Heliport provides the city is emergency medical service (EMS) to Manhattan hospitals. The New York City Bureau of Statistics estimates that there are 20 hospitals on Manhattan Island. The majority of EMS helicopter transfers are performed from the E. 60th Street Heliport, and a few from the East 34th Street Heliport.

2.1.4.3 East 34th Street

The East 34th Street Heliport is located at E. 34th Street and the East River. This heliport is owned by the City of New York and is leased to and operated by Island Heliport Corporation. It has been open since 1972. It occupies an area of 40,000 square feet, has seven helicopter parking positions. Two trailers are used, one for a terminal and one for offices. This heliport is open between 0900 to 1930 hours. The missions accommodated by this heliport are charter, sightseeing, commuter, and corporate/executive. The East 34th Street Heliport also support a limited number of EMS operations.

2.1.4.4 World Trade Center/Battery Park City Heliport

For 4 years between September 1983 and September 1987 while the DMH was being reconstructed, the Battery Park Heliport was open to the public as a replacement for the DMH. Although it opened in 1978, it was strictly used by the PANYNJ prior to 1983.

2.1.4.5 Private and Restricted Use Heliports in Manhattan

Limited permits can be issued by the Department of Transportation for a private helistop. These helistops are considered temporary because no improvements to the location other than minimal markings can be made, and because the permit must be renewed annually. Another restriction is that helicopter use at these facilities must be directly related to the use of the property on which it is located. For instance, a business-owned helicopter is only allowed to perform corporate/executive transport or transport of material and equipment relating to that company's operation. In Manhattan, as of 1989, the only such helistop was the Consolidated Edison Helistop located at the East River Plan on Fourteenth Street.

At the present time, there is a ban on rooftop heliports in Manhattan. There is, however, a rooftop heliport on top of the World Trade Center. This heliport is available exclusively to the PANYNJ in cases of emergency.

2.1.5 DMH Economics

Although initially estimated at under $7 million, the final project for the reconstruction of the DMH cost approximately $13 million. The increase was attributed principally to an increase in the size of the terminal building, other design changes, and unanticipated construction delays. The cost of the construction alone was approximately $10 million.

The total capital investment at the heliport was covered by the FAA through Airport Improvement Program (AIP) grants and by the PANYNJ. Federal funding consisted of $6,025,000, $5,495,000 of which was provided under the demonstration program and $530,000 from the sponsor's entitlement apportionment. The rest was paid by the PANYNJ. There were no city or state funding contributions.

Operating revenues are derived principally from takeo.f fees, parking fees, and building rentals. Those revenues are insufficient to cover the operating and maintenance costs. The PANYNJ operates under a pooled revenue concept whereby revenues from all facilities are combined. Thus, revenues from profitable facilities are used to make up deficits at locations where revenues do not support the facility.

2.1.6 DMH Heliport Use

The DMH supports several missions. The primary mission that uses the heliport is corporate/executive. The corporate/executive mission transports executives and other employees for company or individual business. The helicopters used for this mission range from the Sikorsky S-76 to the Schweizer/Hughes 300. Courier operations are the second most common use. Some couriers are also tenants of the heliport. They handle high value paper and other important, small size freight. The facility is also used by high-level government officials, including the President of the United States and the governor of New York, when they conduct business

in Manhattan. Important officials from foreign countries and industry are given aerial tours originating from this heliport to promote international business activity with the region. Air taxi operations also use the heliport.

In addition, the heliport serves as a base of operations for PANYNJ staff, headquartered in the World Trade Center, to travel to and from its other facilities throughout the region via two PANYNJ-owned and operated helicopters. For a short time, from December 1989 to March 1990, Trump Air provided scheduled passenger service to LaGuardia Airport using the Sikorsky S-61 helicopter.

2.1.7 Tenants of Office Space in Terminal Building

Office space in the DMH terminal building is rented to tenants who pay monthly rates that are comparable to office rates in the area. These monies contribute to the revenues of the heliport. One restriction placed on the rental of this space is that the business must be related to the helicopter industry. At the present time the office space is not fully rented. The current tenants in the terminal building include:

commuter service	- Paramount Aviation
	- Reacom
	- Wall Street Helicopters
couriers	- DHL
	- Federal Express
	- ABA

2.1.8 Heliport Management

The PANYNJ's Manager of Heliports oversees the operation of the DMH and West 30th Street Heliport, as well as supervising PANYNJ helicopter operations. That manager has line responsibility reporting directly to the Office of the Director of Aviation, similar to the managers of John F. Kennedy, LaGuardia, and Newark International Airports. The staff who operate the heliport includes a supervisor and 8 operations agents.

2.1.9 Heliport Noise

There are no formal written noise agreements with ATC for the four major Manhattan heliports, although there are agreements for some airports. The ERHC is very sensitive to noise complaints. They promote "Fly Neighborly" techniques and monitor their members. They also publish a brochure, "Helicopter Landing Facility Guide for the New York City Area," that not only provides all of the physical and operational details of helicopter landing sites, including pictures, but noise abatement procedures for the New York City heliports as well.

2.1.10 Telephone Interview Results

Telephone interviews with users of the heliport were conducted as a part of this analysis of the DMH. Those interviewed were selected from

the list of operators on the daily log sheets. General questions were asked about why these operators used the heliport, what their overall impressions were, what they liked and disliked, and what they would improve. The helicopters used included the Bell 206 (Jet Ranger), Aerospatiale 355E, Bell 206L (Long Ranger), Bell 412, Agusta 109, and Sikorsky S76. The frequency of use of the DMH ranged from "rarely" to three times per day. The mission flown most often, by far, by those interviewed was corporate/executive, with some charter and personal business.

With one or two exceptions, the overall attitude about the heliport was favorable. In general, those who used the heliport the most liked it better than those who did not use it very often. This could mean one of two things: the more operators use it, the more comfortable they are, or those operators who do not like it avoid landing there.

Pilots use visual flight rules (VFR) or special visual flight rules (SVFR) to fly to the heliport, some using LORAN-C to navigate. The air traffic congestion in the area was considered very heavy by some. Others were more philosophical and felt that the congestion was just part of flying within New York City.

There were no complaints about air traffic control's (ATC's) handling of aircraft. However, two communications problems dealing with frequency congestion were mentioned. First, because of the high volume of air traffic in the New York terminal area, coordination with ATC is extremely difficult at critical times of the day when pilots have difficulty contacting ATC. The second problem deals with the unicom radio at the heliport. The assignment of a common unicom frequency (123.05 mhz) to the DMH and other area heliports reduces the overall effectiveness of its intended purpose because of usage saturation.

In addition, the unicom operator does not have an unrestricted view of the arrival and departure routes along the river. The restricted view from the terminal building limits the DMH radio operator's ability to provide timely traffic advisories. Others stated specifically that the approach and departure paths to the DMH are too congested with other helicopters and that these routes should be increased in size to accommodate them. One operator said that "hot spot departures," those from near the terminal building, were a problem because other helicopters, aircraft, and boats then became obstacles.

There was only one reason given for using the heliport by both those who liked and disliked it--its location. Every person interviewed said the DMH was close to the destinations of their passengers. The answers regarding what they liked about the heliport fell into many categories, including: the staff, the dedication to passenger services, the vast improvement over the old facility with regard to increased space and the layout of the heliport, the good approach paths, the easy access, not having to worry about noise, the overall layout for arrivals and departures, the available parking, and the pilot's lounge.

The criticism expressed by the majority of those interviewed concerned helicopter parking. The problems with parking included: not enough space for large aircraft to taxi and park, the need for additional parking spaces, and not enough room to maneuver among the rotors. The next most common complaint was that the low barrier around the pier, the raised fire equipment, and the wind sock all create a hazard to tail rotors and limit maneuvering space. Another complaint was that the layout of the pier and the barge inhibits ease of taxiing and forces helicopters to wait for other aircraft to leave before they can drop off passengers near the terminal building. The lack of an instrument approach was considered a problem by some. Finally, the need for more automobile parking and ground access was mentioned.

Suggested additional services to the DMH included an instrument approach, fuel, additional helicopter parking, a better location for the radio operator, and a coffee shop.

2.2 PROMOTION AND MARKETING

The dedication of the opening of the reconstructed heliport on October 27, 1987 was planned to attract wide interest. Dignitaries including then New York City Mayor Edward Koch; Manhattan Borough President, now New York City Mayor, David Dinkins; and FAA Eastern Region Director Joseph Del Balzo participated in the ceremonies. In a message read at the ceremony, Governor Mario Cuomo said, "Helicopters and heliports will play a central role in the future of transportation in New York State." Vincent Tese, Director of the New York State Department of Economic Development, said, "The importance of helicopters in serving the public, corporate, and financial interests of New York State cannot be overemphasized."

Concurrent with announcing the dedication ceremonies, the PANYNJ issued a press release advertising the opening to a large sector of the news media, including the newspapers, television, and radio.

An attractive color brochure was prepared for the PANYNJ describing the heliport facilities and accommodations with illustrative photos. Most of the 5,000 copies have already been distributed throughout the helicopter industry as part of its promotional program.

The PANYNJ also produced a pamphlet entitled "Touch Down in the World's Most Dynamic Port," which provides an introduction to the PANYNJ's helicopter services. It includes a description and artist rendering of the DMH, not yet constructed when the pamphlet was prepared. This pamphlet is included with other printed material distributed by the PANYNJ at its airports to advertise its aviation facilities.

The PANYNJ also promotes its heliport through its membership in the American Helicopter Society (AHS), Helicopter Association International (HAI), National Business Aircraft Association (NBAA), and the ERHC. A PANYNJ staff member is an officer in the ERHC, which promotes interest in helicopter usage within the region and keeps helicopter pilots informed on

heliports and related activities. Presentations and speeches discussing the heliport are made by PANYNJ staff at meetings, conventions, and related functions.

Indirect promotion was provided by the Trump Shuttle when it was in operation. Advertising posters were placed throughout the region on New York City subways and the Port Authority Trans Hudson rail system (PATH) connecting midtown and downtown New York City with Hoboken, Jersey City, and Newark in New Jersey. The poster read, "Wall Street to LaGuardia in 6 minutes." Only the Trump Shuttle connection flies between LaGuardia and the Wall Street Heliport.

Perhaps the greatest advertisement among helicopter pilots is by word of mouth from its users who experience the convenience and accommodations designed into the facility.

2.3 THE FUTURE

Despite the importance of heliports to the economy of the New York/ New Jersey metropolitan region, there are factors that limit the ability of city heliports to handle projected growth in activity. Community opposition to helicopter activity at the East 60th Street and East 34th Street heliports continues unabated. One example of organized opposition to these heliports was an effort by nearby residents to prove them a health hazard due to air pollution. This effort was unsuccessful, but is likely to increase and become more influential as the number of high-rise luxury apartments in the neighborhood increases. Therefore, the principal obstacle to expansion is expected to be the continuing opposition of well-organized communities. Unless a way to overcome this type of opposition is discovered, this type of effort is likely to prevent significant expansion. The future of the West 30th Street Heliport is uncertain pending final plans for development of the Westside Highway and adjoining waterfront development.

The continuing development of Battery Park City for offices, condos, etc. should not affect operations at DMH because it is far removed from the heliport. There have been no complaints from the tenants and none are anticipated. In addition, as was stated in section 2.1.1, there has not been organized opposition to the DMH since it was first constructed in 1960.

Of all the Manhattan heliports, the DMH offers the greatest long-term potential because of the PANYNJ's 25 year lease of the area, allowing physical expansion, and because of the absence of a substantial neighboring residential population. Moreover, the heliport has been slated by the PANYNJ for potential civil tiltrotor operations to allow downtown service to other key cities in the Northeast, such as Washington, D.C., and Boston.

3.0 OPERATIONAL DATA PROCESSING

The operational parameters examined in this study are based on data elements available from the PANYNJ pertaining to the types of missions, numbers of operations, numbers of passengers, services available, and fees collected. An operation as defined by the FAA is a landing or a takeoff. The operational parameters and analytical methodologies used in this study are discussed in this section.

3.1 DATA SOURCE FOR HELIPORT ACTIVITY

All data on helicopter activity at the DMH were obtained from the PANYNJ; however, the quantity and level of detail varied. A record of annual operations was available from 1960 through 1989, a record of the number of monthly operations was available for 1986, and a complete record of hourly operations was available after January 1987. Unfortunately, the pre-1987 data had no information on helicopter types, mission performed, or passengers carried, and were therefore not directly comparable to the complete detailed record of operations available after January 1987.

The detailed record of operations encompassed the operations from January to September 1987 during the time the DMH was closed for renovation when all operations were temporarily diverted to the Battery Park Heliport (see figure 2). Data collected for this period were considered valid DMH operations because the Battery Park Heliport had been a private heliport, for PANYNJ use only, before the DMH was closed. The Battery Park Heliport was itself closed after the DMH reopened. In other words, there were no additional operations strictly intended for the Battery Park Heliport that would skew analysis of DMH activity. In addition, both heliports are readily accessible to the southern Manhattan business district and there are not any other heliports serving this area of Manhattan.

The data permitted a general analysis of heliport activity between 1960 and 1989 and a detailed analysis of operational characteristics between January 1987 and December 1989. December 1989 was selected as the cutoff date for data collection to allow time for data input and analysis.

An example of the daily log used to record operations at the heliport is shown in figure 9. The daily log is used by the PANYNJ at both heliports for which they are responsible, the DMH and the West 30th Street Heliport. Each row on the daily log provides room to record the aircraft registration number; type (model) of aircraft; operator; pilot's name; time in, with the number of passengers carried; time out, with the number of passengers carried; any services the aircraft used (where available); fees charged; and, method of payment for those operators who do not have bulk rate accounts with the PANYNJ. Because it is used for both heliports, there is space to record fuel and storage services provided by the West 30th Street Heliport. At the DMH, that space is used to record the length of time that helicopters park. Since both "time in" and "time out" are recorded on the same line, each row documents two operations; a landing and a takeoff.

PA 540-A

HELIPORT TRAFFIC LOG

DATE _____ PAGE NO. _____

CLEARANCE NO.	REGISTRATION NO.	TYPE	OWNER / OPERATOR	PILOT	IN		OUT		STORAGE				AVIATION FUEL					STICK INVENTORY		FEES				ACCEPT NO. OR CHAR
													SUPPLIES			METER								
					TAKE ON	PAX	TAKE OFF	PAX	IN	OUT	ELAPSED TIME	CHARGE	OTHER	GALS	CHARGE	80 OCTANE	100 OCTANE	80 OCTANE	100 OCTANE	TAKE OFF	PARKING FEE	OTHER	TOTAL	

24

FIGURE 9 HELIPORT LOG SHEET

The data elements recorded on the daily logs defined the possible parameters available to describe the operational characteristics for this study. The data elements selected for analysis from the daily log were: helicopter model, operator, time in, number of passengers, time out, number of passengers, and fees charged.

The number of operations by PANYNJ helicopters are not recorded on the daily log. PANYNJ flights are reported in daily cumulative totals that show only the number of flights per day with no additional information. However, these daily summaries were only available for 1988 and 1989. In 1987 PANYNJ activity data was provided by monthly summaries. Averages for 1987 weekly and daily PANYNJ helicopter operations were developed from the monthly summaries and used in the analysis where applicable.

An estimate of PANYNJ operations by time of day was judged to be impractical and likely inaccurate, and was therefore not attempted. Information on the number of passengers carried per PANYNJ operation and the number of PANYNJ helicopters parking at the heliport was also unavailable. Consequently, PANYNJ operations were not used for analyses of operations by time of day, number of passengers, or for the number of PANYNJ helicopters that parked at the heliport.

3.2 METHODOLOGIES

The collected data contained on the log sheets were entered into a database. These data were then sorted using programs written to extract statistical information on the selected parameters. This type of analysis was possible because complete data sets were available. All analytical results in this report are reported numerically and in graphic form. Each data parameter is discussed in the following paragraphs, as are any individualized calculations or idiosyncrasies of data for certain parameters. The results of the data analysis are presented in section 4.

3.2.1 Total Annual Operations

The number of annual operations was developed in four ways. First, to investigate the overall use of the heliport for the last 29 years, the number of operations per year from 1960 to 1989 was graphed using the data provided by the PANYNJ for total annual operations during this time period. These numbers do not include helicopter operations conducted by the PANYNJ itself, since this information was not available between 1960 and 1986. Adding PANYNJ operations numbers into the years 1987 through 1989 would prohibit direct comparison of annual heliport activity during those years to the pre-1987 data.

Next, the number of operations for the years 1987, 1988, and 1989 was determined from the daily heliport traffic logs input into a database. So that these numbers can be directly compared to the PANYNJ totals for these same years, the totals do not include operations by PANYNJ helicopters.

To assess the total activity at the DMH, the next task was to determine the number of operations by PANYNJ helicopters conducted between

1987 and 1989 from the daily cumulative totals. The number of daily operations by PANYNJ helicopters for 1987 was determined by dividing the total number of monthly operations by the number of days that the heliport was open each month. Holidays, weekends, and "snow days," etc., were not counted, since the DMH is not open during these times. From these calculations the total number of annual operations from 1987 to 1989, including PANYNJ flights, was calculated.

To ensure a relevant investigation of total activity at the DMH, all further analyses for the years 1987 through 1989 included PANYNJ helicopter operations except for those evaluating time of day, passengers operations, and parked helicopters, because this information was not available as explained in section 3.1.

3.2.2 Operations per Month

The analysis of monthly operations was performed by sorting the database by the number of operations per month for each study year, 1987 to 1989. From these data, the number of operations per month for each year and the total number of operations by month for all 3 years was computed. Then, the percentage of total operations by month for all 3 years was computed.

3.2.3 Operations by Day of Week

The number of operations by day of week was determined by sorting the database by each day of the week, i.e., Monday, Tuesday, etc., for each study year, 1987 to 1989. Then, the total number of operations by day of week for all 3 years was determined. The percentage of total operations for each day of the week for all 3 years was calculated to determine the overall distribution. Since the data on PANYNJ operations for 1987 were available only in monthly summaries, the daily distribution of PANYNJ helicopter operations was estimated by dividing the total monthly number by the number of days that the heliport was open in that month.

3.2.4 Operations by Time of Day

A detailed analysis of operations by time of day was performed by first sorting operations by arrival and departure. The number of arrival and departure operations was then sorted separately by time of day for each year. Then, the total numbers of arrival operations by time of day and the total number of departure operations by time of day for all 3 years was determined. From these numbers, the percentage of total arrival and total departure operations by time of day for all 3 years were calculated. Finally, the number of arriving and departing operations were added together to determine the total hourly distribution of heliport use. Hourly use percentages were computed for total operations. PANYNJ helicopter operations were not included in this analysis, because there was no way of assigning the time of day to individual PANYNJ operations.

3.2.5 Operations by Mission Type

To understand the operational characteristics of a heliport, it is essential to know the types of missions that operate there. The PANYNJ's

operations record worksheet does not provide space to list the type of mission performed by each individual helicopter, but it does show the name of the operator of each helicopter. During this analysis, the PANYNJ provided data on the mission(s) each operator performed and which mission was the primary use -- the one performed most often by each operator.

A list of helicopter operators was compiled from the data log sheets and sent to the DMH to have the mission(s) each operator performed verified. When the list was returned, mission assignments indicated that most operators perform only one mission, a few performed two missions, but none performed more than two. Since there was no way to determine which mission was being conducted on any given operation for those operators where two missions were indicated, the primary use was assigned to that operator. Before data entry, the mission category assigned to each operator was again verified by the heliport.

The database was then sorted for the number of operations by mission type for each of the study years, 1987 through 1989, and then for the total number of missions for all 3 years. The percentage of operations by mission type was calculated for both each study year individually and for the total number of operations during all 3 years. This same analysis was performed for operations by mission type by month, day of week, and time of day. The only difference was that the percentages were calculated only for the total number of operations in these parameters, not for each year.

3.2.6 Operations by Engine Type

A significant element of heliport operations analysis is to determine the type of helicopters that used the facility. The various models of helicopters using the DMH were classified during the data entry process by engine type: piston-engine, single-engine turbine, and twin-engine turbine. Table 1 shows the helicopter models that use the DMH and the classification to which each was assigned. These classifications were verified by the DMH management and assigned to each operation during data entry. The data were then sorted using this parameter. For the purpose of this study piston-engine helicopters will be referred to as "pistons," single-engine turbines as "singles," and twin-engine turbines as "twins."

The number of operations by engine type for each study year, 1987 through 1989, and the total number of operations by engine type for all 3 years were calculated. The percentage of operations by engine type for each year, and the percentage of the total number of operations for all 3 years were also calculated.

The number of operations by engine type, per month, for each year, and for all 3 years was determined, and the percentage of operations by month and engine type for all 3 years was calculated. The data were also sorted for the numbers and percentages of operations by engine type for day of week, and for time of day.

3.2.7 Operations by Mission and Engine Type

The data were sorted for the number of operations by mission and engine type. The number of operations by mission and engine type per year

TABLE 1
HELICOPTER MODELS BY ENGINE CATEGORY

Model	Engine Type
Aerospatiale A-Star	Single
Aerospatiale Dauphin SA-365	Twin
Aerospatiale AS-342 Gazelle	Single
Aerospatiale Super Puma	Twin
Aerospatiale AS-355 Twin Star	Twin
Agusta 109	Twin
Bell AH1 Cobra*	Single
Bell 47	Piston
Bell 205 Huey*	Single
Bell 204	Single
Bell 206 Jet Ranger	Single
Bell 206L Long Ranger	Single
Bell 206L Long Ranger II	Single
Bell 212	Twin
Bell 222	Twin
Bell 412	Twin
Boeing Vertol CH-47	Twin
Boeing Vertol CH-46	Twin
Enstrom+	Piston
McDonnell Douglas (Hughes) 500	Single
Messerschmitt-Boelkow-Blohm BO 105	Twin
Messerschmitt-Boelkow-Blohm BK 117	Twin
Robinson R-22	Piston
Rogerson-Hiller FH 1100	Single
Schweizer/Hughes 300	Piston
Sikorsky H3 Sea King	Twin
Sikorsky CH-53 Sea Stallion	Twin
Sikorsky HH53	Twin
Sikorsky S-58T	Twin
Sikorsky S-61	Twin
Sikorsky S-76	Twin
Westland 30	Twin

* Some models are twin-engine, number of engines of helicopter used at the heliport verified with DMH.

\+ Some models are turbine conversion, engine type of helicopter used at the heliport verified with DMH.

Source: Daily logs provided by PANYNJ.

from 1987 through 1989 and the total number and percent of operations for all 3 years were calculated. A final calculation for this parameter was the percentage of total operations by piston, single, and twin aircraft, respectively, by mission type.

3.2.8 Passenger Operations

Data on the number of passengers using a facility are important to public-use heliports so that passenger handling can be managed efficiently. This report investigated passenger service at the DMH in several ways. First, the number of passenger and non-passenger operations was determined for each year and for all 3 years. Then, the number of operations by type of passenger service, pickup, dropoff, pickup and dropoff, or no passengers, was sorted for each study year. Finally, the total number and percentage of operations by type of passenger service for all 3 years was calculated.

The total number of passengers, both arriving and departing per year and the total number and percentage of passengers for all 3 years were calculated. Then the total number of passengers was determined by month and day of week for each year, and the totals and percentages for these parameters for all 3 years were then calculated. The total number of passengers by time of day was sorted for each year and for all 3 years.

The total number of passenger operations was sorted by mission type for each year and totalled for all 3 years. Then, the percentage of passengers carried by mission type was determined. Finally, the number of passengers was sorted by engine type for each year.

It is important to note that PANYNJ helicopter operations were not included in passenger operations since there was no way of knowing whether PANYNJ flights carried passengers or not.

3.2.9 Fees Collected

Data analyzed in the figures of this report were based on the fees indicated on the daily log sheets and not on the total revenue generated by the heliport. Total revenue generated by the DMH is discussed in section 4.2.9. Fees are only charged for the corporate/executive, air taxi, courier, and scheduled commuter missions. No fees are charged for government or military operations. Fees fall under three categories: takeoff, parking, and miscellaneous. Takeoff fees are those charged for helicopters using the heliport. Parking fees are charged to those helicopters staying longer than 15 minutes. Miscellaneous fees are charges for other nonspecific services or for such items as a film company photographing helicopter operations, or a group taking still pictures of the heliport for advertising, etc.

There are two basic methods for charging landing and parking fees. The first method is to charge the current rate (see section 4.2.9) for the number of landings and parking time incurred by an itinerate operator. These resulting charges are billed to the operator once per month. No fees are collected at the heliport.

The second method is referred to as a bulk rate charge. This method of billing was initiated to encourage greater usage of the facility. It requires that the operator pay, on a monthly basis, an amount equivalent to the schedule of charges for 20 landings for the aircraft. This agreement allows the operator to make up to 40 landings at the facility. The operator is then charged 50 percent of the schedule of charges rate for any landings beyond the allotted 40. In effect, this guarantees the PANYNJ a minimum monthly payment equivalent to 20 landings for each operator holding a bulk rate agreement. There is a similar bulk rate agreement for parking charges. The bulk rate charges are also billed to the operators on a monthly basis.

The fees that are listed on the daily log sheet are only for those operators who do not use the bulk rate charge. Therefore the fees represented in the figures do not reflect the total revenue collected by the DMH. Total revenues are discussed in sections 4.2.9 and 5.1.2. All monies collected are pooled in the PANYNJ operating fund, along with money from its other facilities. The heliport operating budget comes from the pooled PANYNJ fund.

Data were compiled for fees collected annually for each year, for all 3 years, and the percentage of fees by type for all 3 years. The amount of fees by month for each year and for all 3 years was also determined, as well as the percentage per month for all 3 years. Next, the amount of fees collected by mission type for each year, for all 3 years, and the percentage by mission type was determined.

3.2.10 Parking

Parking is the only service provided by the DMH; there is no refueling or maintenance. Operations by PANYNJ helicopters are not included in this analysis because this information was not available for those operations.

The number of helicopters that use DMH parking facilities and the ones that do not were computed on an annual basis for each year, for all 3 study years, as well as for the percentage of total operations. Then, the number of parked helicopters was determined by month and day of week, for each year, and the total and percentage for all 3 years.

The number of helicopters that park by time of day is a different type of analysis and requires some explanation. This analysis shows the number of helicopters that parked and the time that parked helicopters departed the heliport at each hour, for each year, and for all 3 years.

The number of helicopters that parked was further analyzed by engine and mission type for each year, for all 3 years, and by the percentage of the total parked for these parameters.

4.0 ANALYSIS OF DMH OPERATIONS

The quality of data on the DMH furnished by the PANYNJ was excellent. Although there were limited data available before 1987, these data, the number of annual operations between 1960 and 1986, were also complete in their own series and therefore comparable to each other for a valid analysis. The data between 1987 and 1989 provided an accurate hourly record of most operations at the DMH for these years, including every day that the DMH was open and those occurring on nights and weekends with prior permission when the heliport is officially closed. The one area where detailed data is lacking is the operations of the PANYNJ. The accuracy of overall data allowed a detailed analysis of the operational characteristics of the DMH between 1987 and 1989. This section presents the results of that analysis.

4.1 ANALYSIS OF THE DATA DISTRIBUTION

A Poisson frequency distribution was applied to the data as a test to determine the normality of the distribution, shown in figure 10. The line with the "crosses" represents a curve of what the distribution would be if the data followed a normal Poisson curve. The curve with the "squares" represents the actual data distribution. For the most part the normal distribution curve reflects the actual data. The high number of holiday and weekend days when only one or two operations were conducted is balanced by the high number of operations conducted during the week. There is a slight skewing to the right, reflecting the number of times when there were slightly more operations than would be expected with a true normal distribution. The mean number of operations, as derived from the actual data and from which the Poisson distribution is calculated, is 78 operations per day.

4.2 DATA ANALYSIS AND RESULTS

Descriptive parameters were selected to portray heliport operational characteristics of the DMH within the limits of data available from the daily data collection log provided by the PANYNJ. The operational characteristics deemed significant were various aspects of: mission types, numbers of operations, numbers of passengers, services available, and fees collected. The results of the data processing and analyses of these parameters are presented below.

Specific numbers portraying notable operational characteristics are presented in this analysis. The complete numerical results from the data analysis from which the figures were derived is presented in appendix A. The percentages on the pie charts may not add to 100 percent due to rounding. All time denotations are presented by the 24-hour clock.

4.2.1 Operations by Year

Figure 11 presents the total number of annual operations at the DMH from 1960 to 1989. The source of these numbers is the PANYNJ record of total annual operations. Operations by PANYNJ helicopters are not

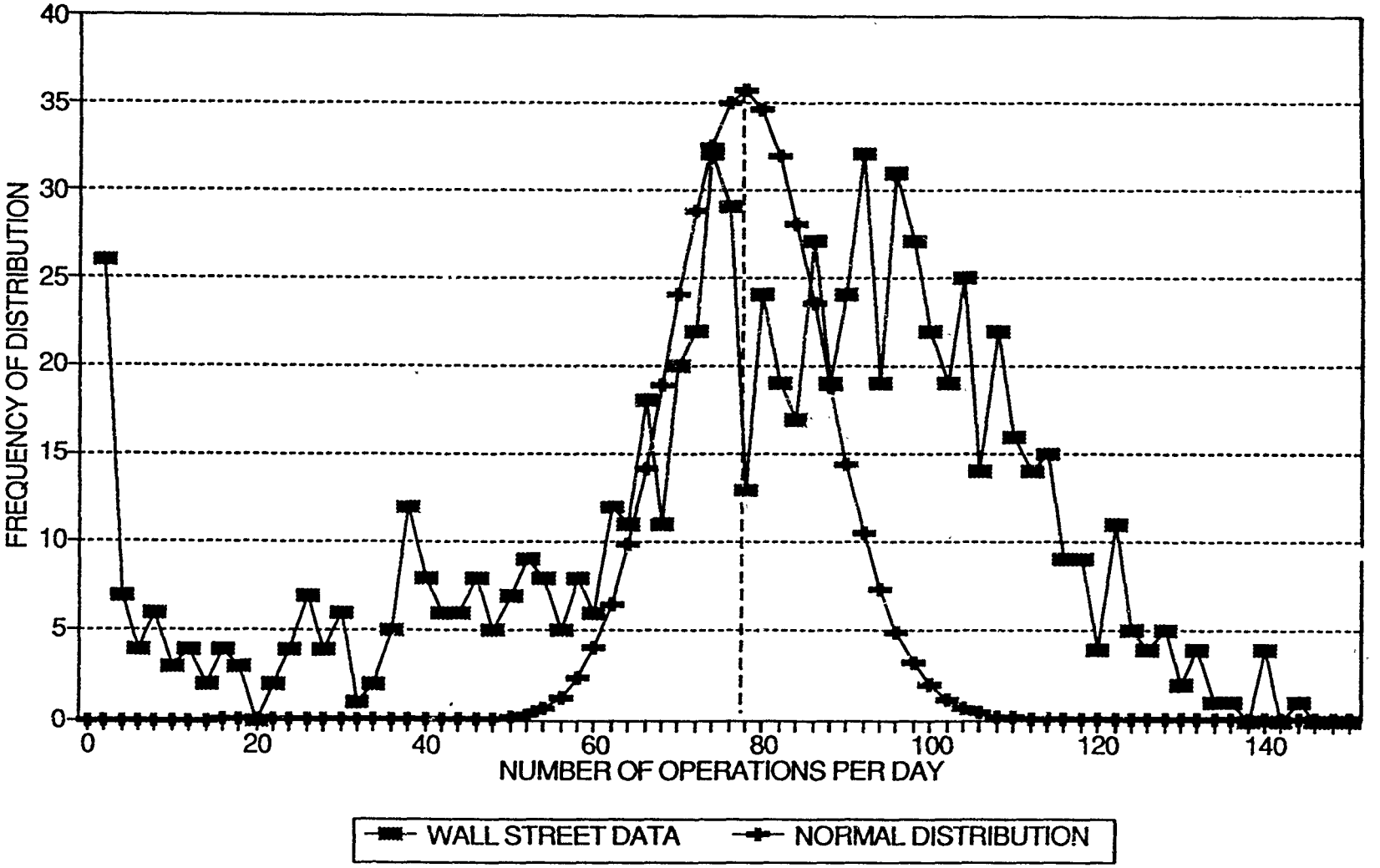


FIGURE 10 FREQUENCY DISTRIBUTIONS OF DAILY OPERATIONS 1987 - 1989

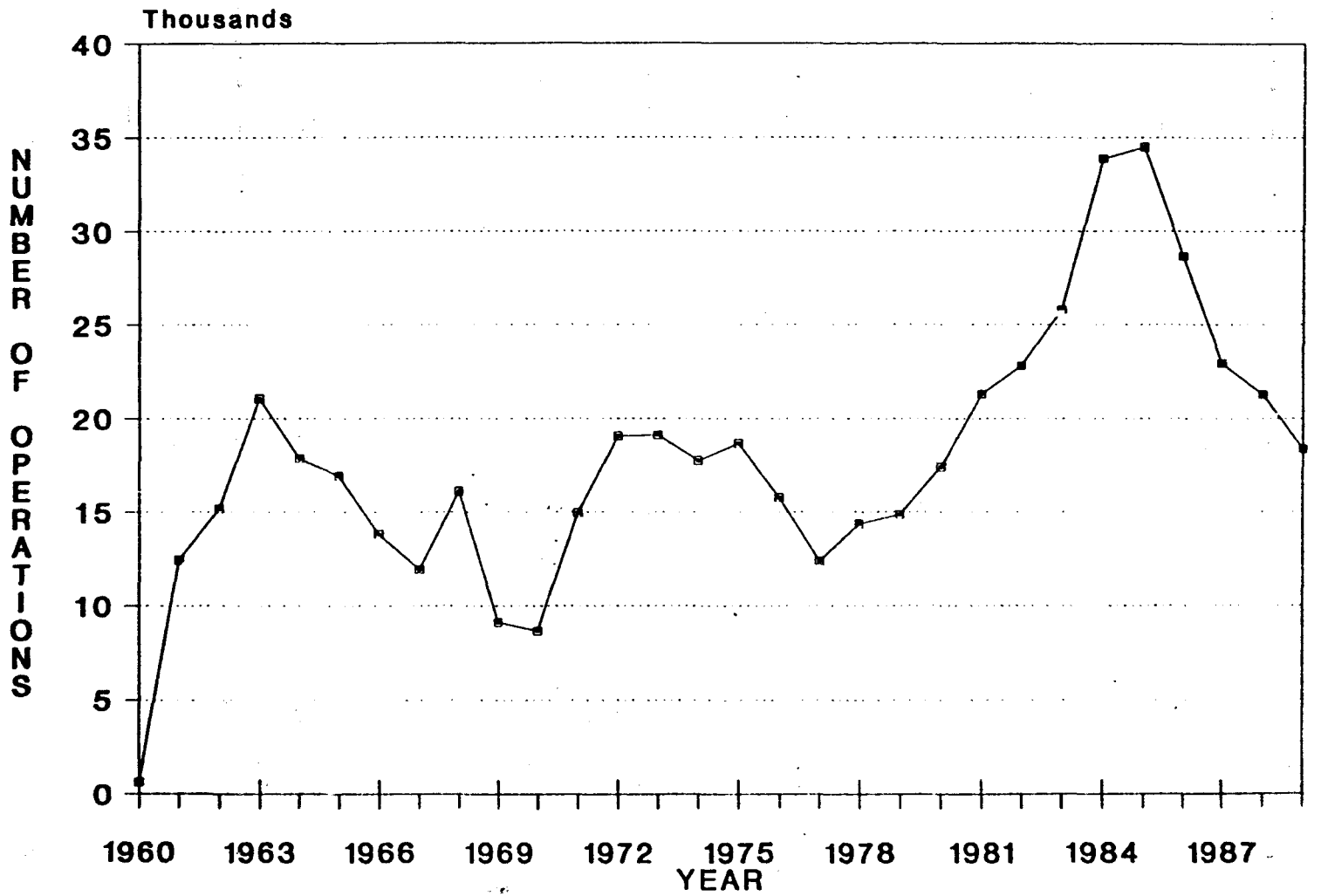


FIGURE 11 NUMBER OF ANNUAL OPERATIONS, 1960 THROUGH 1989 WITHOUT PANYNJ OPERATIONS

included in these totals, since they were not available for all years. However, in years for which the number of PANYNJ operations are available they are shown to be a significant percentage of the total number of operations (16 to 19 percent in the 3 years from 1987 through 1989).

This figure shows that although there has been an overall increase in activity, there have been 3 cycles of high activity followed by decline. The longest period of increase was between 1978 and 1985. The number of operations has decreased each year since 1985.

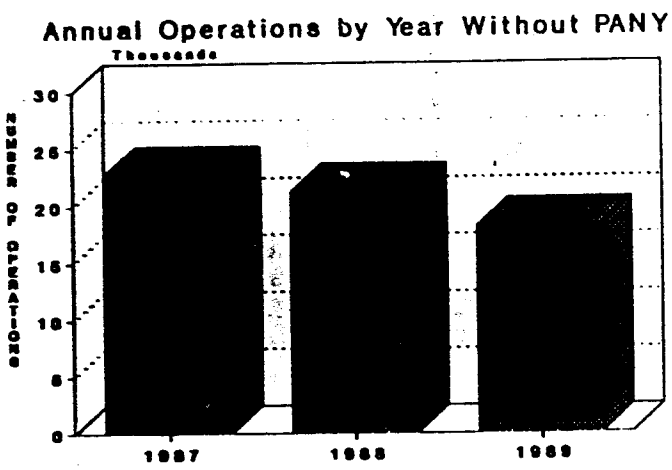
In 1960 there were only 638 operations at the heliport. The number had increased to 21,054 by 1963, then steadily dropped until, in 1967, there were 11,931 operations. There was a 1-year increase in 1968, but the number of operations declined for the next 2 years. From that time, there were 2 years of sharp increases, then a leveling off at an average of 18,600 between 1972 and 1975, when the number of operations again began to decrease. The lowest point of this cycle was reached in 1977 with 12,390 operations. However, for the next 8 years the operations increased yearly to an all time high of 34,480 operations in 1985.

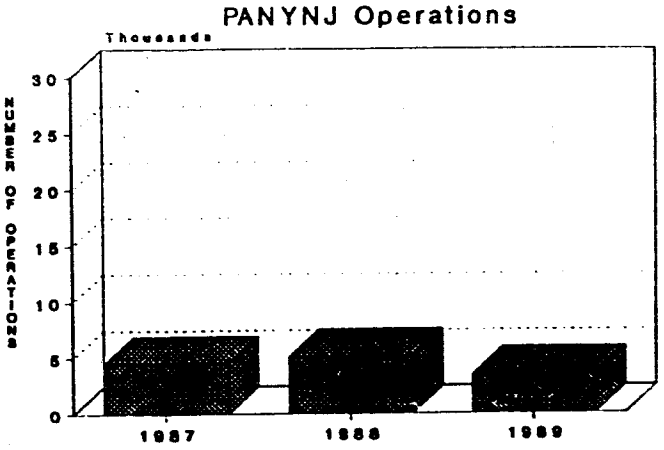
An interesting feature of this period is that between September 1983 and September 1987, the DMH heliport was closed for renovation and all operations were temporarily diverted to the Battery Park Heliport (see section 2.1.1). After 1985 the number of operations at the DMH decreased. In 1986 there were 28,664 operations, in 1987, 22,932; in 1988, 21,264; and in 1989 there were 18,342 operations.

The beginning of the increase that started in 1978 corresponds to the "boom" in the helicopter industry which began in the middle to late 1970's and continued through 1981. During this time aircraft sales and activity were at record highs primarily due to the prosperity of offshore oil helicopter activity, from which the entire industry benefitted. However, the increase in heliport operations continued through the severe depression of the industry that followed 1982. The decline in the number of operations at the DMH has continued even though the helicopter industry has experienced a leveling off, or what some consider a slight economic expansion, over the past 3 years.

Figure 12 shows the total number of operations between 1987 and 1989, without PANYNJ helicopter operations: 22,810, 21,286, and 18,208, respectively. These numbers are from the daily log records kept by the heliport and entered into the database for analysis. The slight discrepancy between these numbers and those the PANYNJ derived from the same source is due to data entry techniques. The difference in the number of operations between the database and the PANYNJ figures for the years 1987 to 1989 is less than 1 percent. These differences are small and they do not alter the validity of the analysis.

This figure also shows the total number of operations by PANYNJ helicopters at the DMH for the years 1987 to 1989. These numbers are 4,492 in 1987, 5,076 in 1988, and 3,468 in 1989. As can be seen, there was an increase in 1988, then a decline in 1989 to below the 1987





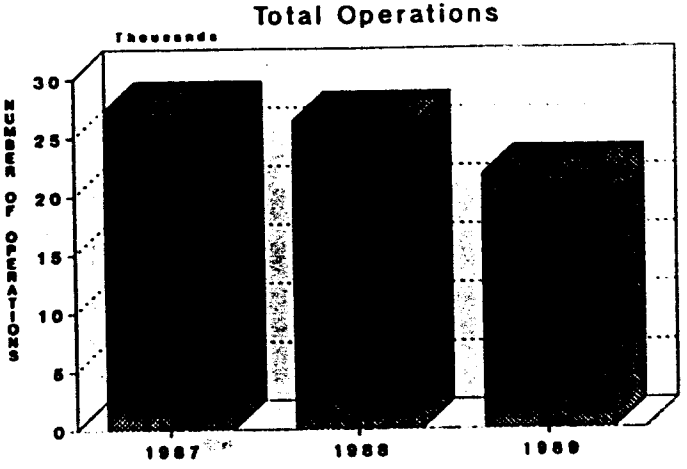


FIGURE 12 NUMBER OF ANNUAL OPERATIONS, 1987 THROUGH 1989

operations. PANYNJ operations are a significant percentage of the total operations, 16.5 percent in 1987, 19.3 percent in 1988, and 16.0 percent in 1989.

The third graph in figure 12 is the total number of annual operations at the DMH including the number of PANYNJ helicopter operations between 1987 and 1989, the years for which these data are available. In 1987 there were a total of 27,296 operations; in 1988, 26,356; and in 1989, 21,688. The use of the PANYNJ operations furnishes the complete picture of total annual activity levels at the DMH during the study years.

Totals that include PANYNJ operations will be used for all further analysis except in the parameters where data on PANYNJ operations were unavailable, i.e., those parameters evaluating "time of day," "passenger operations," and "parking," as explained in section 3.1.

4.2.2 Operations by Month

Figure 13 presents the number of operations per month for the study years 1987 to 1989. Monthly operations were, to a large extent, evenly distributed throughout the year, with a variation of only a few hundred operations between months.

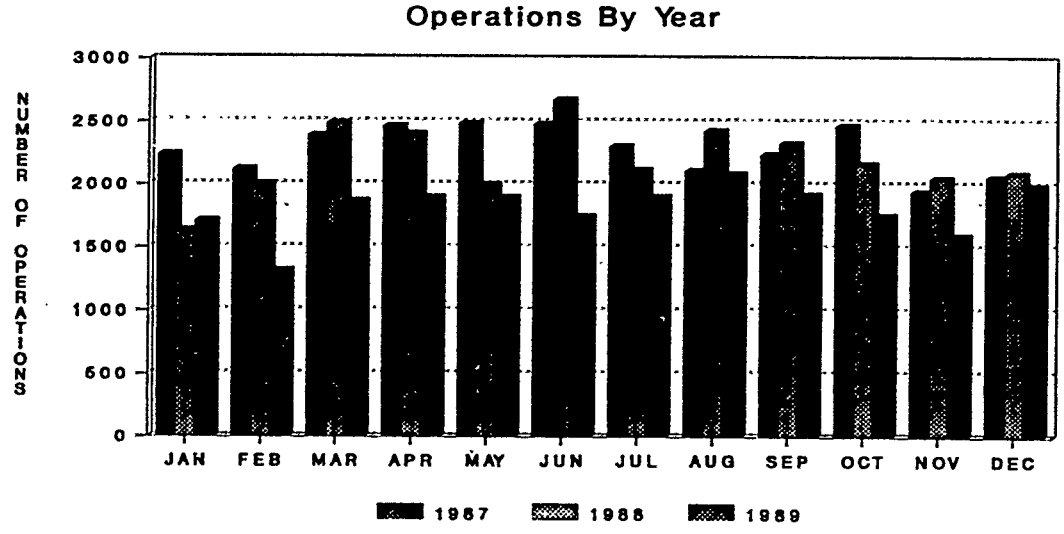
The year with the most even monthly distribution was 1987, while monthly operations were somewhat more erratic for 1988 and 1989. There is no apparent pattern for monthly operations between years. For instance, in 1987 the highest number of operations was in May, but April, June, and October also had high numbers of operations; the lowest number was in November. In 1988 the highest number of operations was in June and the low was in January; and in 1989, the high was in August, and the lowest was in February.

Figure 13 also shows the total number of operations by month for all 3 years. It can again be seen that there is no great variation in the number of operations between months, although the numbers do fluctuate. Considering the total number of operations, June had the highest number and January, February, and November the lowest.

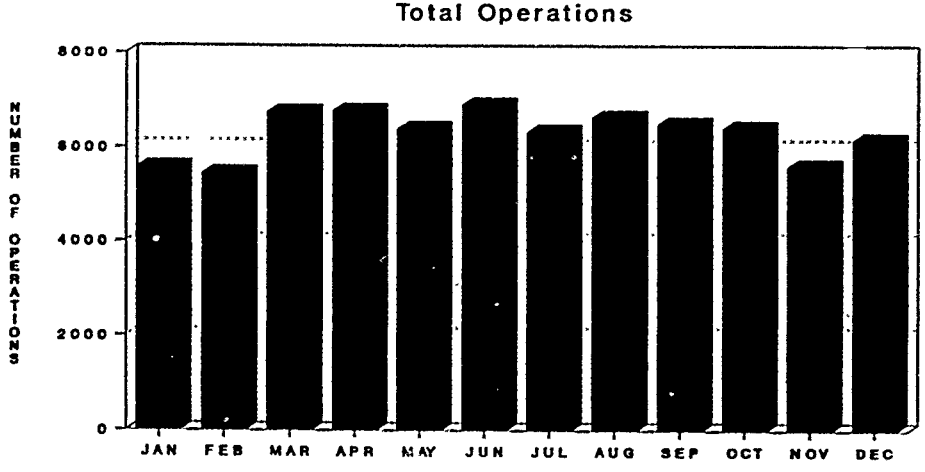
The consistency of operations between months is again evident in percentage of total operations by month, shown in figure 13. The variation between months ranges only between 7 and 9 percent: March, April, June, August, and September have 9 percent each; May, July, October, and December, 8 percent; and, January, February, and November, 7 percent.

4.2.3 Operations by Day of Week

The DMH is only open Monday through Friday, 0700 hours to 1930 hours. Operations can only take place on weekends and nights with prior permission. The distribution of operations by day of week is therefore almost exclusively from Monday through Friday. Figure 14 presents the distribution of operations by day of week for each study year. Wednesday



Note: Includes PANYNJ operations.



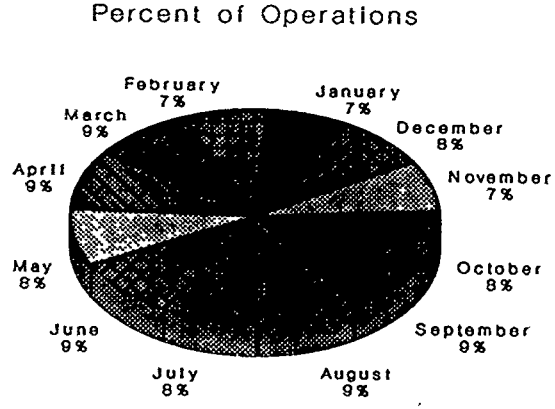
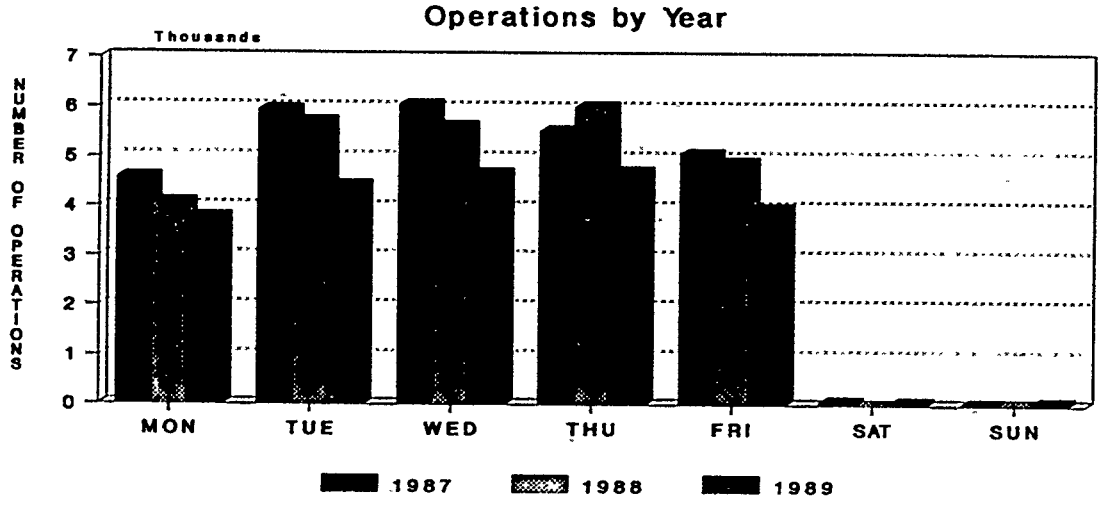
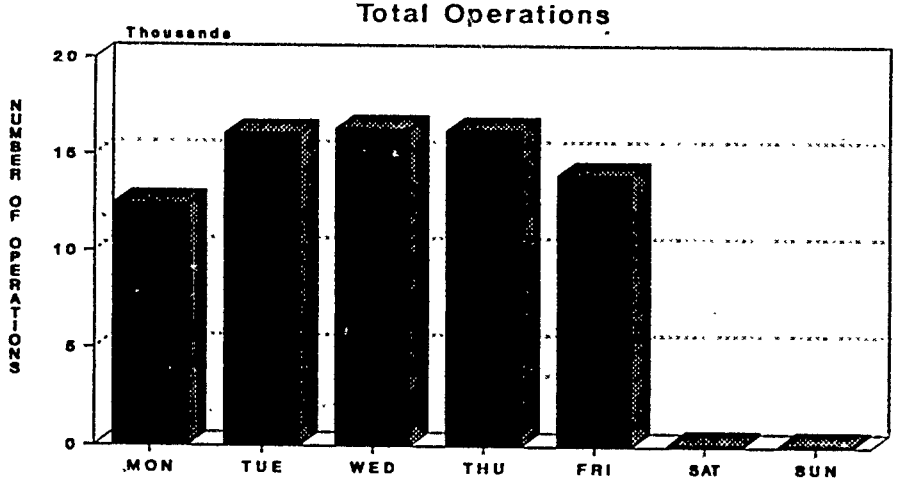
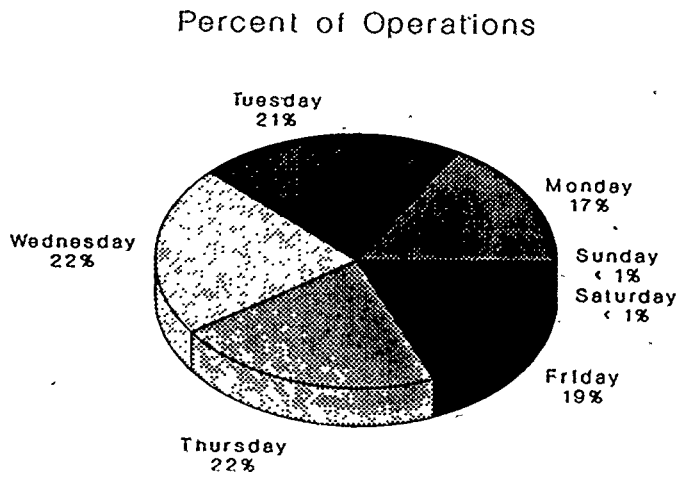


FIGURE 13 NUMBER AND PERCENT OF OPERATIONS BY MONTH AND YEAR, 1987 THROUGH 1989







Note: PANYNJ operations estimated, see section 3.2.3.

FIGURE 14 NUMBER AND PERCENT OF OPERATIONS BY DAY OF WEEK AND YEAR, 1987 THROUGH 1989

had the most operations in 1987; Monday, with 4,580, had the least. In 1988 and 1989, Thursday had the most operations, and again, Monday had the least.

In 1987, there were 66 operations on Saturday and 32 on Sunday. Weekend operations dropped in 1988, with 6 on Saturday and 16 on Sunday, the smallest amount for all 3 years. In 1989, weekend operations rebounded, with 54 on Saturday and 54 on Sunday.

The total number of daily operations for all 3 years, is also shown in figure 14. The overall pattern shows a higher operation count Tuesday through Thursday, and a lower count on Monday and Friday, with Friday having more operations than Monday. By a very small margin, total operations data shows that Wednesday is the peak day, even though more operations took place on Thursdays in both 1987 and 1988. Total Sunday operations were 102 for all 3 years, and the Saturday total was 126.

The percentage of daily operations, the last graph in figure 14, verifies the pattern presented by the operational numbers. Wednesday and Thursday each had 22 percent of the operations, Tuesday 21 percent, Friday 19 percent, and Monday 17 percent. Saturday and Sunday accounted for less than 1 percent each.

4.2.4 Operations by Time of Day

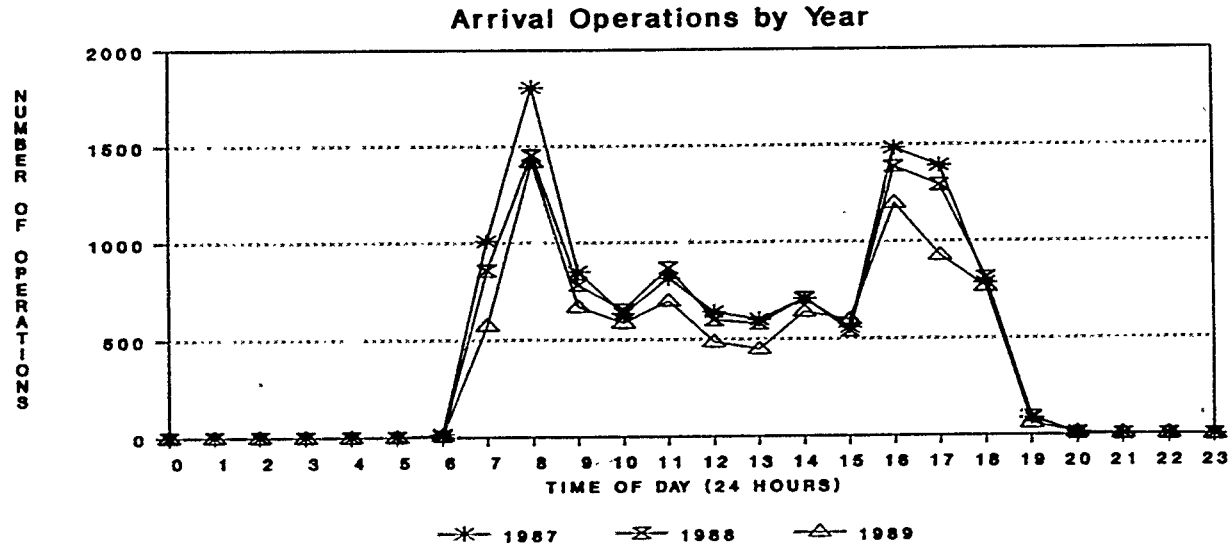
Operations by time of day were analyzed by arrival and departure, and by total operations. This parameter does not include PANYNJ helicopter operations, since these data were not available (see section 3.1). There are no regular night operations because the heliport is only open between 0700 hours and 1930 hours. Night operations can only be performed with prior permission.

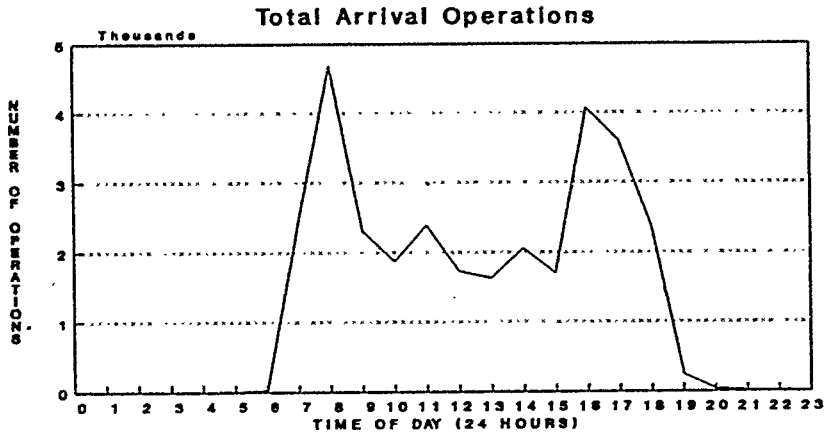
4.2.4.1 Arrival Operations by Time of Day

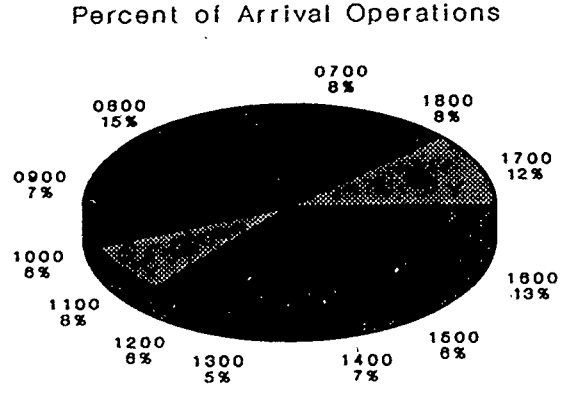
Figure 15 presents arrival operations by time of day for the years 1987 to 1989. It can be seen that the hourly pattern of arrival traffic is very similar for all 3 years. The primary variation in the numbers from one year to the next is seen in the overall decrease in operations between 1987 and 1989. The heliport is busiest at 0800 hours and between 1600 and 1700 hours. There are small secondary peaks at 1100 hours and at 1400 hours for each of the 3 study years. The slowest time during operating hours is 1300 hours.

As would be expected, the pattern of arrival for the total operations for all 3 years is identical to the pattern by time of day for each of the years, shown in figure 15.

Furthermore, this pattern can be seen in the percent of total arrival operations for all 3 years, also shown in the pie chart in figure 15. Fifteen percent of all traffic arrives at 0800 hours, 13 percent at 1600 hours, and 12 percent at 1700 hours. The slowest time of day is 1300 hours, which accounts for only 5 percent of all operations. The percentages for all other hours range from 6 to 8 percent.







Note: Does not include PANYNJ operations.

FIGURE 15 NUMBER AND PERCENT OF OPERATIONS BY TIME OF DAY AND YEAR - ARRIVAL, 1987 THROUGH 1989

4.2.4.2 Departure Operations by Time of Day

The time of day for departure operations for each study year, 1987 to 1989, is presented in figure 16. The hourly pattern of departure traffic is very similar for all 3 years and very similar to that of the arrival traffic, although the numbers and percentages of operations do not match exactly. The variation among the 3 years appears to be due to the decreasing number of total operations between 1987 and 1989. The most departures occurred at 0800 hours and between 1600 and 1700 hours, with a small decrease at 1800 hours. There were small secondary peaks at 1100 hours and at 1400 hours. The slowest times between opening and closing in 1987 were at 1000 hours and 1500 hours. In 1988 and 1989, the slowest times were 1000 hours and 1300 hours.

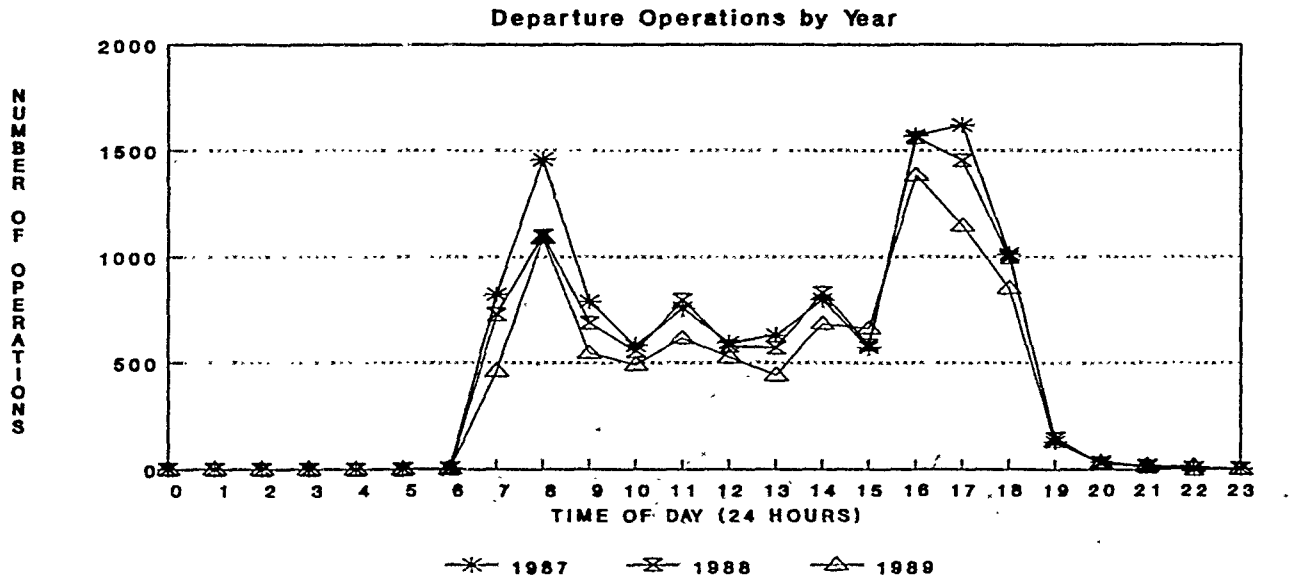
Due to the similarities in the hourly pattern of departures for each study year, the pattern of departure traffic is the same by time of day for the total number of operations for all 3 years, as it was for each individual year, as shown in figure 16. Due to the fact that the slowest time of day was at 1300 hours for two years, 1988 and 1989, this pattern is reflected in the total operations as the overall pattern.

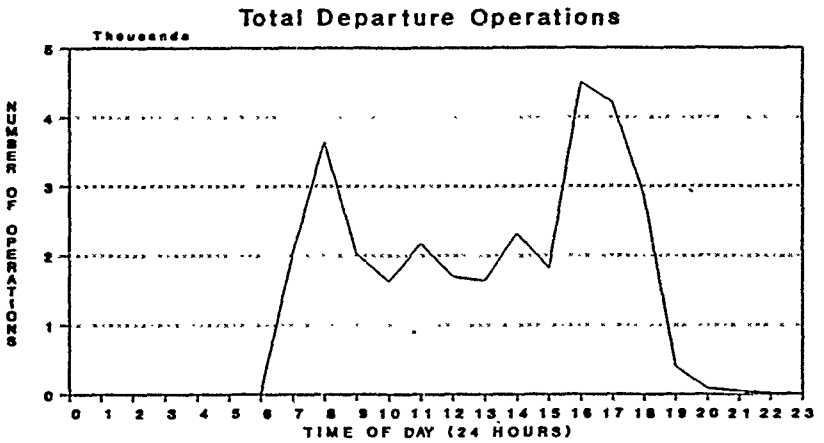
Figure 16 also shows the percentages of total departure operations for all 3 years. This figure shows that 12 percent of all traffic departs at 0800 hours, 15 percent at 1600 hours, and 14 percent at 1700 hours. The slowest times of day are 1000 hours and 1300 hours, which each accounted for only 5 percent of all operations. The percentages for all other hours range from 6 percent to 9 percent.

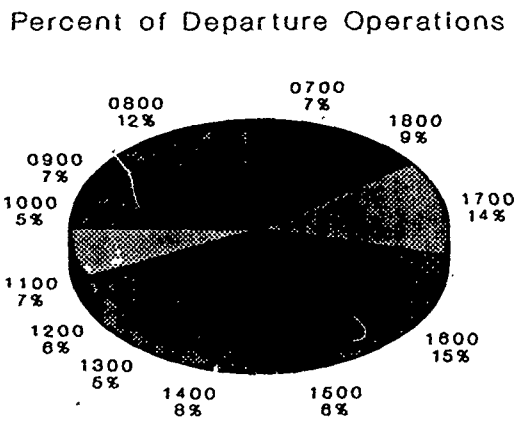
4.2.4.3 Total Operations by Time of Day

Figure 17 shows the total number of operations by time of day, arrivals plus departures. It is not surprising that the pattern of heliport usage for the total number of operations by time of day for each study year shows the same general trends as arrivals and departures considered separately. There are the 0800 and the 1600 to 1700 hour peaks, with secondary peaks at 1100 hours and 1400 hours. The lowest number of operations occur at 1000 hours, 1300 hours, and 1500 hours.

However, although the general pattern of heliport activity is consistent, the difference in operations at specific times of day that could be caused by the overall decrease in number of operations between 1987 to 1989 is not consistent. For instance, the number of operations at 0800 hours decreased by 711 operations from 3,264 to 2,553 between 1987 and 1988, but only dropped by 50 operations to 2,503 in 1989. The number of operations at 1100 hours increases by 91 from 1,574 in 1987 to 1,665 in 1988, but drops by 350 operations to 1,315 in 1989. The same was true at 1400 hours, where the number of operations increased by 37 from 1,504 in 1987 to 1,541 in 1988, then dropped by 217 to 1,324 in 1989. The afternoon peak between 1600 and 1700 hours did not show any unusual trends; operations decreased steadily from 1987 to 1989 at these times of day.

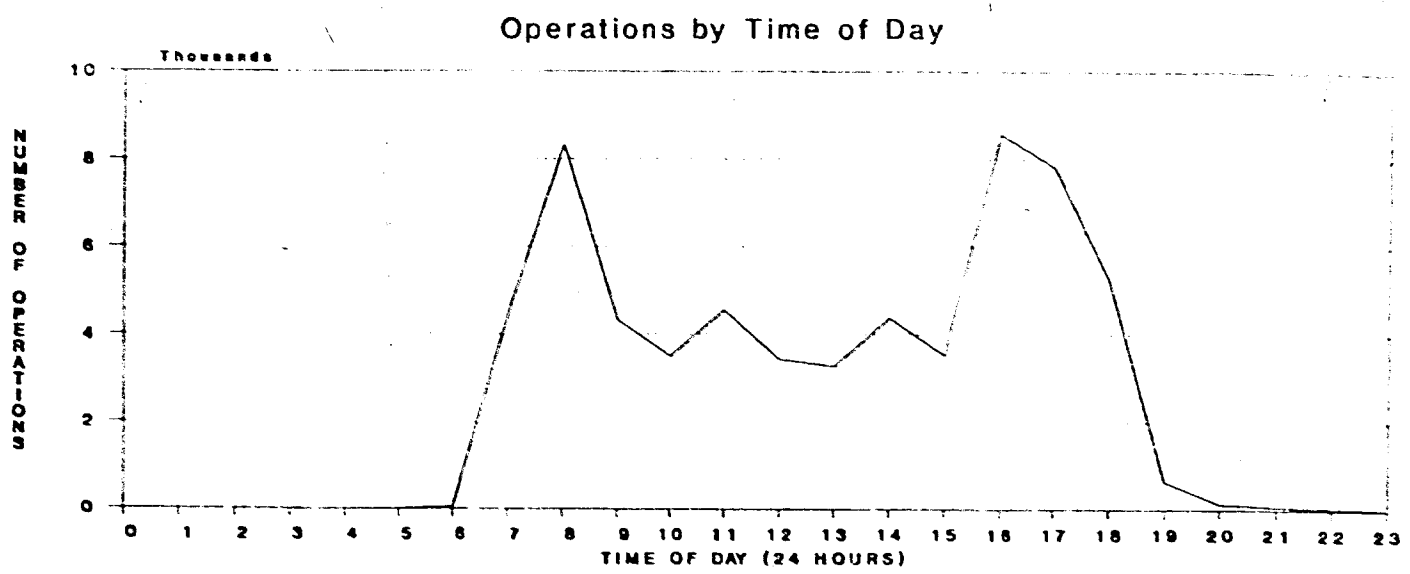


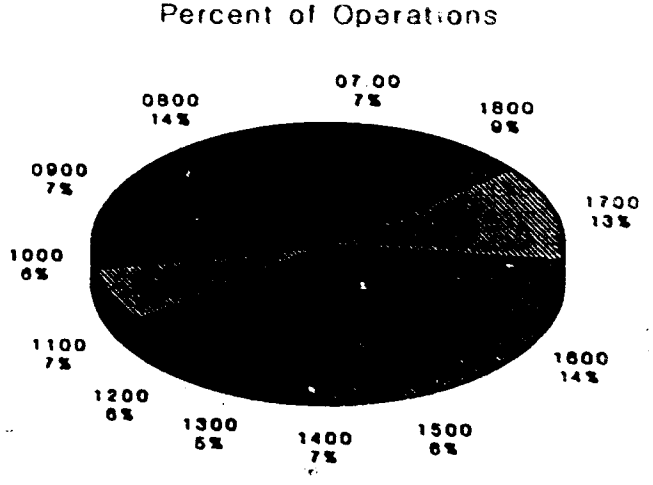




Note: Does not include PANYNJ operations.

FIGURE 16 NUMBER AND PERCENT OF OPERATIONS BY TIME OF DAY AND YEAR - DEPARTURE, 1987 THROUGH 1989





Note: Does not include PANYNJ operations.

FIGURE 17 TOTAL NUMBER AND PERCENT OF OPERATIONS BY TIME OF DAY ARRIVAL AND DEPARTURE, 1987 THROUGH 1989

4.2.5 Operations by Mission Type

4.2.5.1 Operations by Mission Type and Year

Figure 18 shows the number of operations at the DMH by mission type for each of the study years. The missions that operate at the heliport are: corporate/executive, courier, PANYNJ, government, air taxi, military, and scheduled commuter. The scheduled commuter operations included here are those recorded for the Trump service that only operated from the heliport in December of 1989, the last study year. Therefore, there are no scheduled commuter operational numbers for 1987 or 1988. The scheduled commuter service was cancelled in early 1990.

In 1987, corporate/executive operations showed the highest number of operations with 12,172, followed by courier operations with 7,608, PANYNJ with 4,492, air taxi with 1,328, government with 1,292, and military with 404.

In 1988, corporate/executive and air taxi operations decreased to 10,606 and 964, respectively, while the other missions increased operations. Courier operations increased very slightly to 7,628. The PANYNJ, military, and government flights also increased to 5,076, 422, and 1,660, respectively. The overall decline in activity between 1987 and 1988 is attributed primarily to the decrease in corporate/executive operations.

However, in 1989, every mission except air taxi decreased in the number of operations flown. Corporate/executive operations decreased to 9,144; courier to 6,386; PANYNJ to 3,468; government to 1,104; and military to 268. Even the missions that had increased operations in 1988 experienced operations below 1987 levels during 1989. Air taxi, the only mission to increase its number of operations flown in 1989, increased to 1,016 but still remained below 1987 levels. The scheduled commuter service was only active in December of 1989, showing 282 operations.

Figure 18 also shows the total number of operations by mission type for all 3 study years. It shows that corporate/executive had the highest number at 31,922, followed by courier with 21,622, PANYNJ with 13,036, government with 4,056, air taxi with 3,308, and military with 1,094.

The percentages of missions operating at the DMH are shown in figure 19 for each year, and for all 3 study years. In 1987, the mix of mission types showed that corporate/executive represented 45 percent of all operations, courier 28 percent, PANYNJ 16 percent, air taxi and government each 5 percent, and military 1 percent.

In 1988, the corporate/executive mission share of operations had dropped to 40 percent, while PANYNJ rose to 19 percent. Courier, government, and military all increased 1 percent to 29 percent, 6 percent, and 2 percent, respectively. Air taxi decreased to 4 percent in 1988.

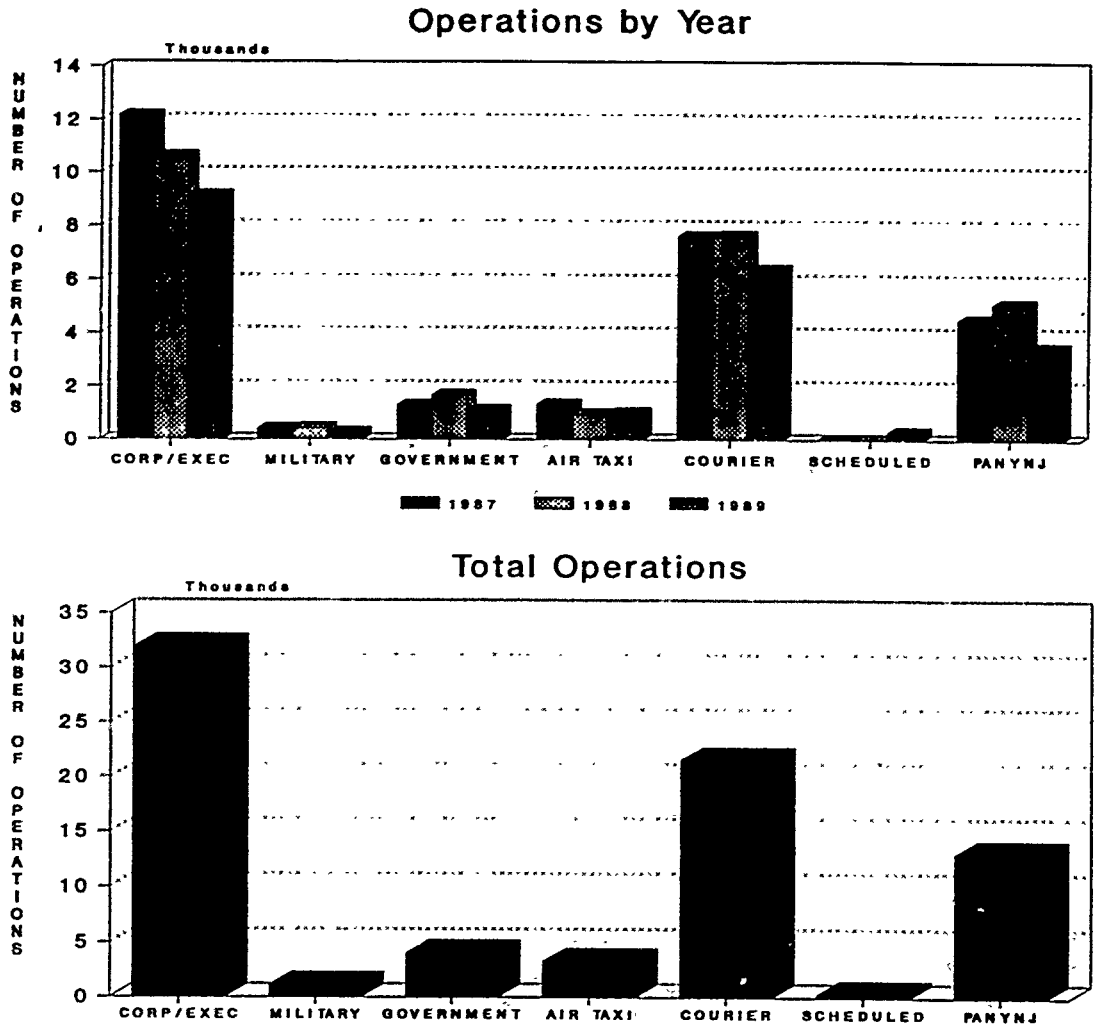


FIGURE 18 NUMBER OF OPERATIONS BY MISSION TYPE AND YEAR, 1987 THROUGH 1989

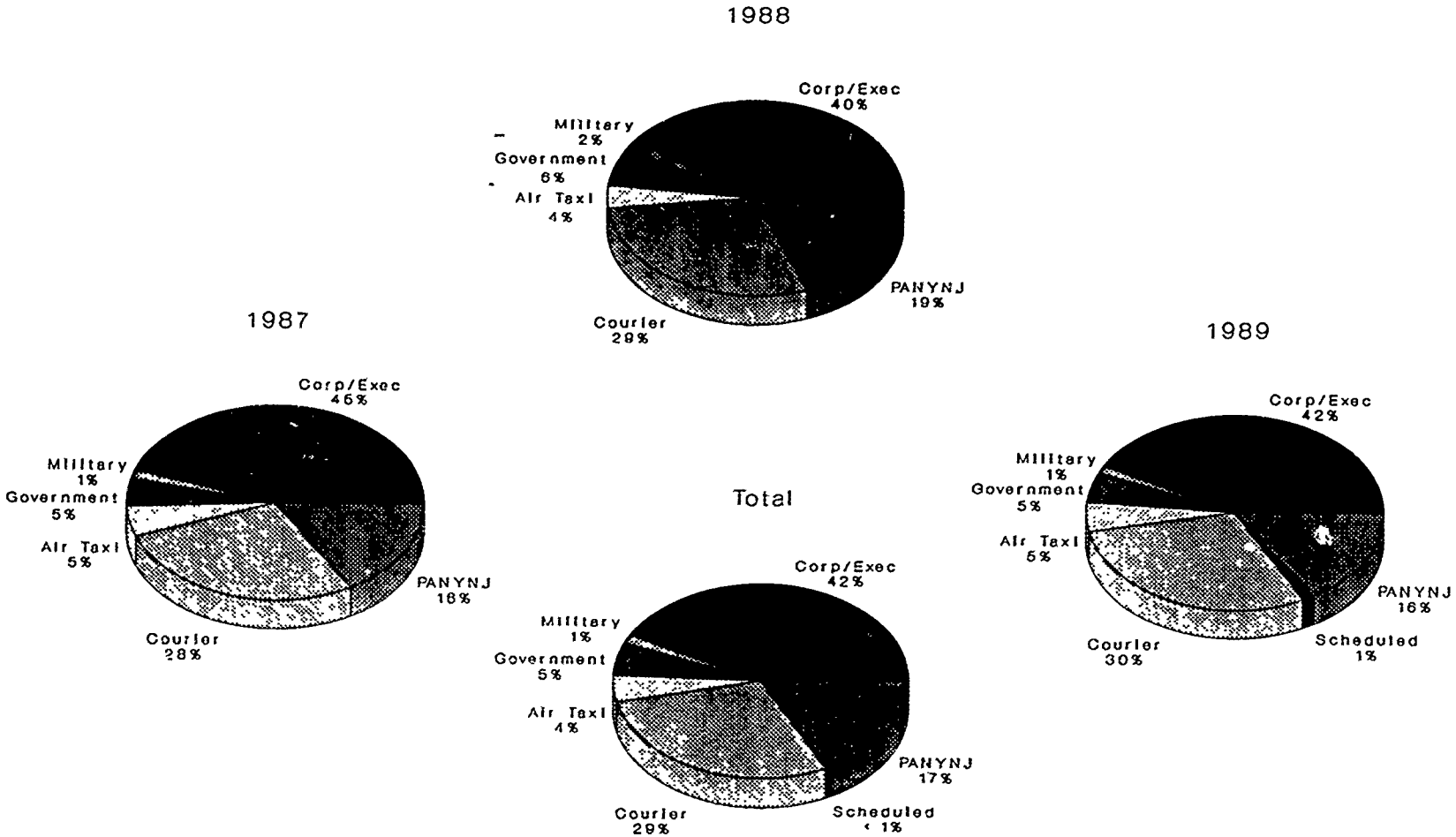


FIGURE 19 PERCENT OF OPERATIONS BY MISSION TYPE, 1987 THROUGH 1989

By 1989, corporate/executive had increased 2 percent to 42 percent. Air taxi had gained 1 percent to equal its 1987 level of 5 percent. Courier increased to its highest level of 30 percent. The PANYNJ had dropped to 16 percent; this was also its 1987 level. The military mission dropped 1 percent back to 1 percent of all operations, its 1987 level. In the 1 month that the Trump scheduled commuter operated, it accounted for 1 percent of the entire 1989 operations.

The final graph in this figure shows the mission mix for total operations for all 3 years. Corporate/executive represents 42 percent for all operations, courier 29 percent, PANYNJ 17 percent, government 5 percent, air taxi 4 percent, military 1 percent, and scheduled commuter less than 1 percent. By far, corporate/executive is the dominant mission at the DMH.

4.2.5.2 Operations by Mission Type, Month and Year

When considering all operations by month in 1987 the number of operations for each mission varied only slightly between months, although each mission seemed to have highs and lows in different months, as shown in figure 20. For corporate/executive, the highest number recorded in 1987 was in May; the lowest number was in November. Courier flights were also relatively consistent all year, with the highest number also in May and the lowest number in November. The highest number of flights by the PANYNJ was in April and the lowest was in August. Government had the highest number in June and the lowest in February. For air taxi, the highest number was in January and the lowest in March. The largest number of military operations were performed in December and the fewest in April.

Figure 21 shows the breakdown in 1988, in which corporate/executive operations showed a greater variation between months than in 1987. The highest number of operations for corporate/executive, courier, and PANYNJ was recorded in June; the lowest number was in January. Government had the highest number of operations in December, and the lowest in January. For air taxi, the highest number of operations was in August and the lowest was in April. The largest number of military operations were performed in April, and the fewest were in January.

In 1989, as presented in figure 22, corporate/executive operations again showed a smaller variation between months. The highest number of operations for corporate/executive was in September and lowest was in February. Courier operations were highest in August and the lowest in February, but also with little monthly variation for the year. The PANYNJ showed the highest number of operations in June and the lowest in November. Government showed the highest number of operations in March, and the lowest in February. For air taxi, the highest number was in August and the lowest was in February. The largest number of military operation were performed in September and October and the least in November.

From the data on operations by mission type by year, it can be seen that there is no annual pattern of operations by month for any mission,

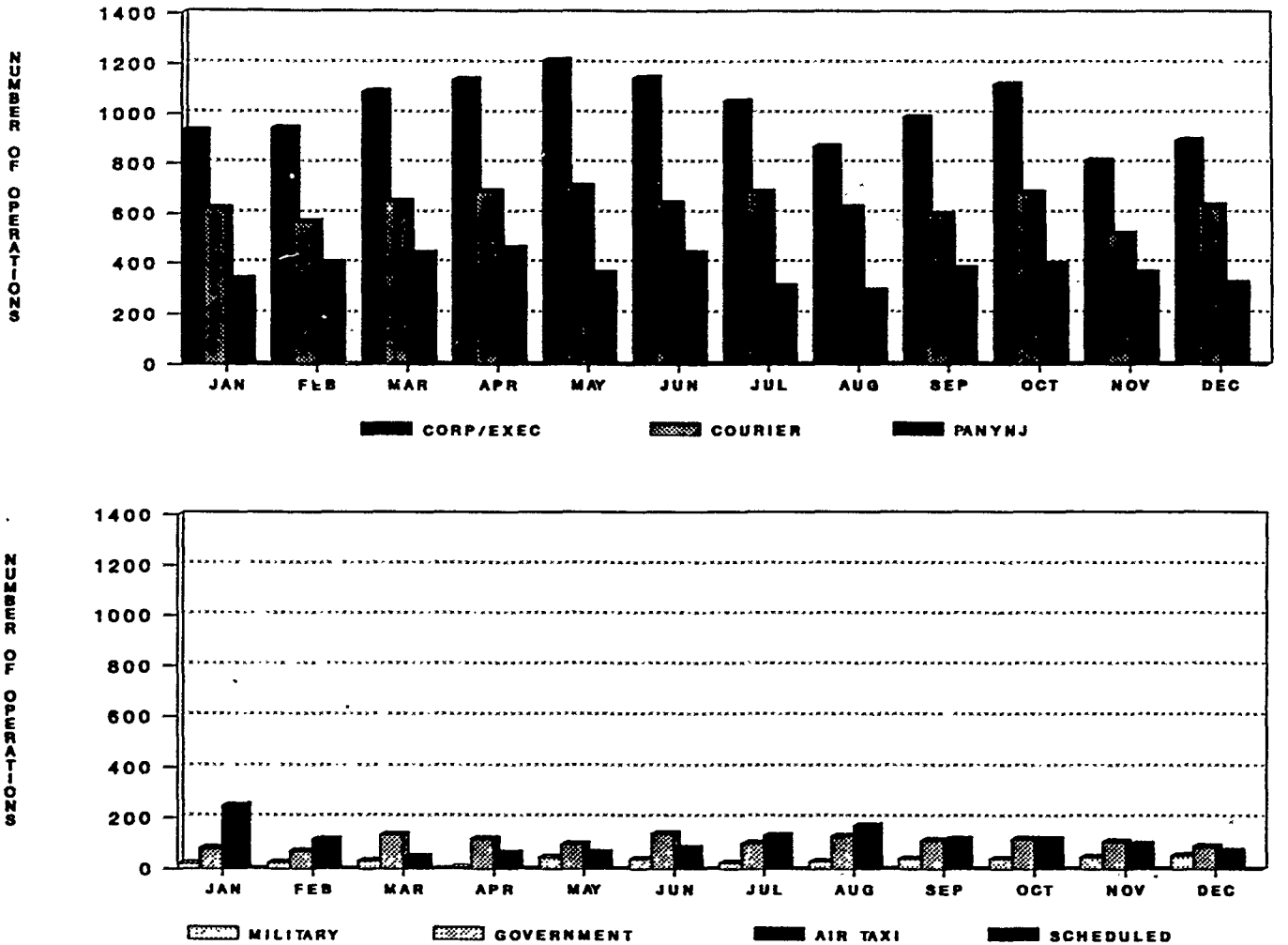


FIGURE 20 NUMBER OF OPERATIONS BY MISSION TYPE, MONTH, AND YEAR, 1987

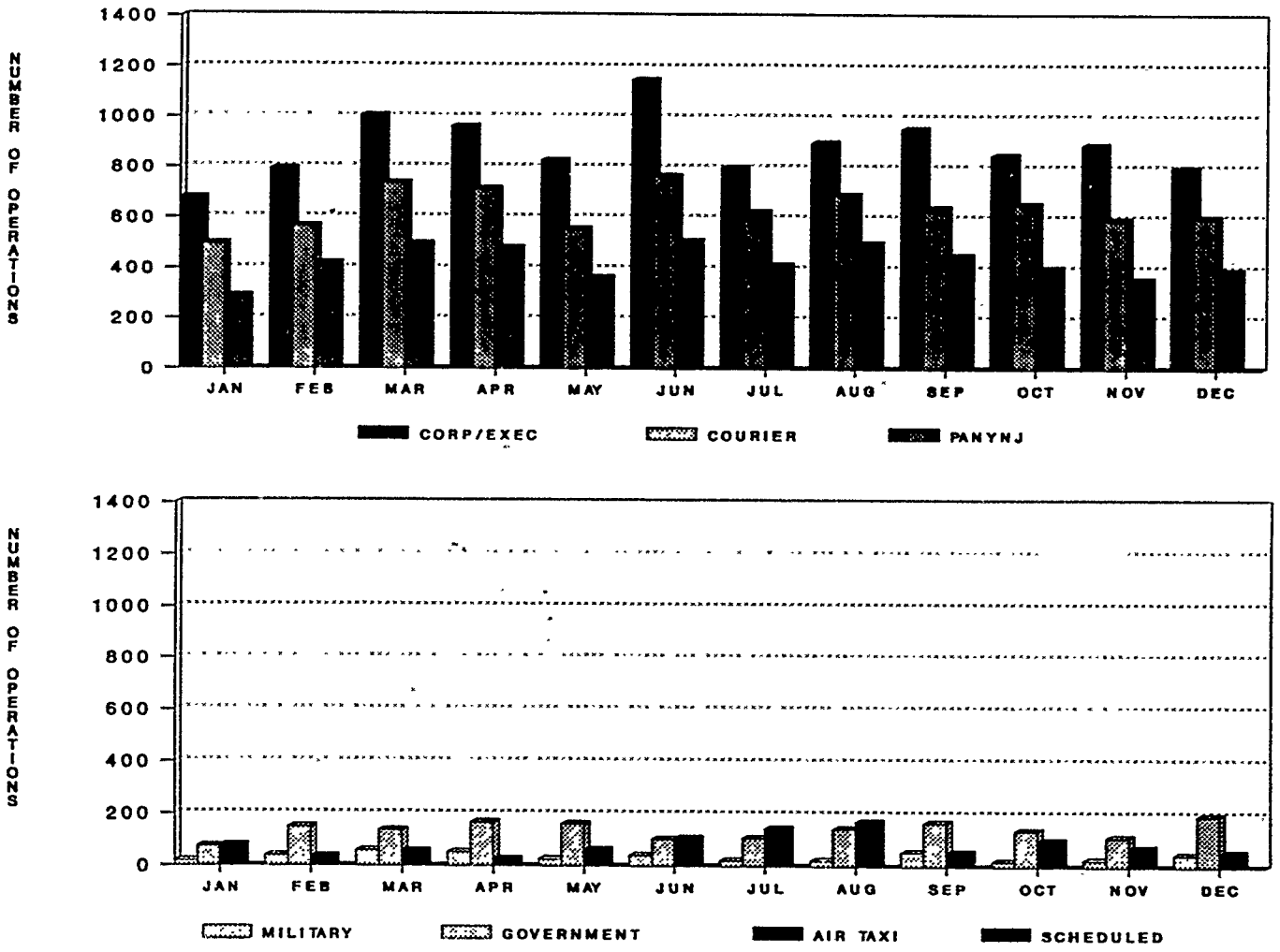


FIGURE 21 NUMBER OF OPERATIONS BY MISSION TYPE, MONTH, AND YEAR, 1988

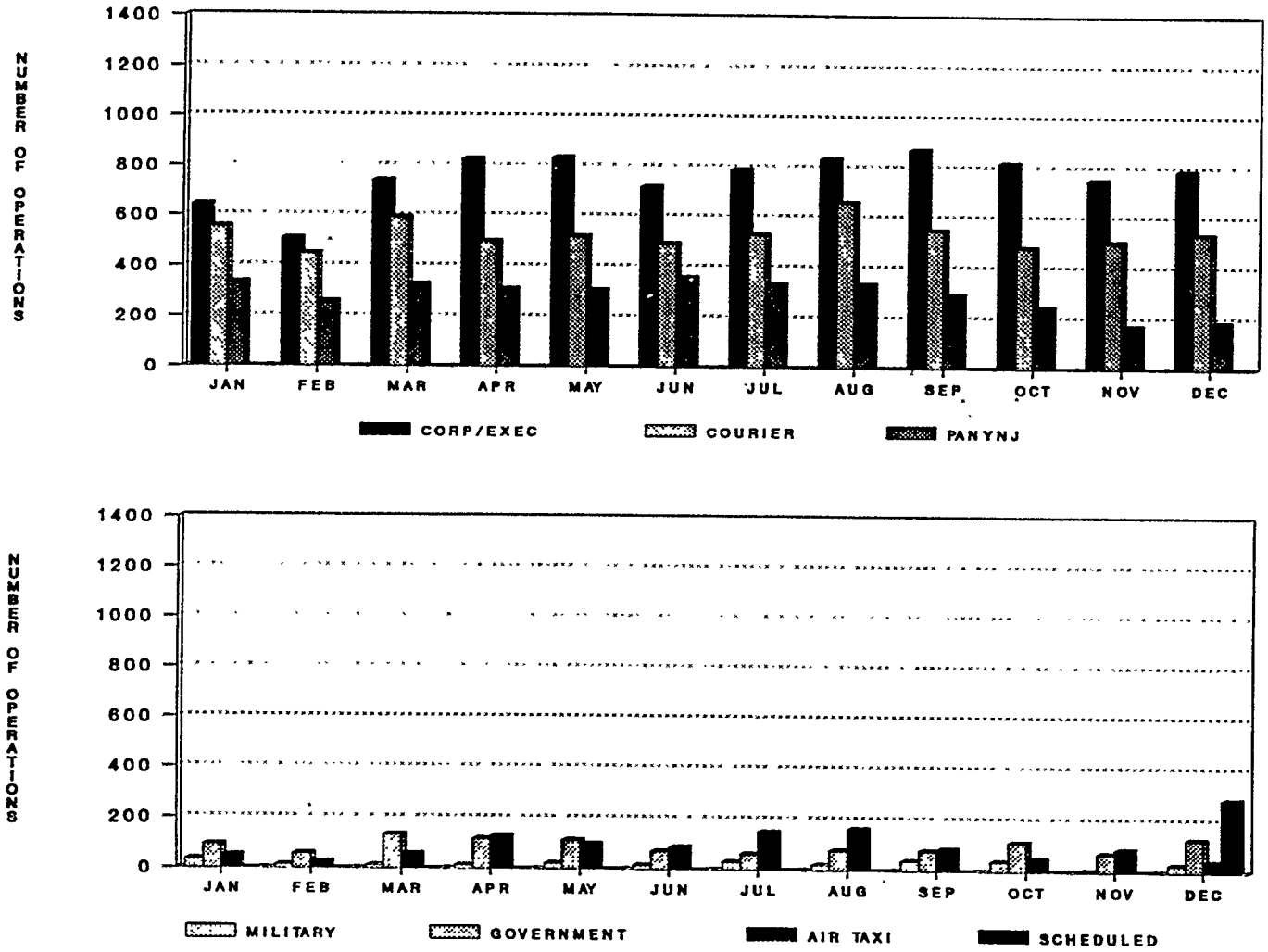


FIGURE 22 NUMBER OF OPERATIONS BY MISSION TYPE, MONTH, AND YEAR, 1989

i.e., no mission had its highest or lowest number consistently in any one month. Figure 23 shows the monthly breakdown for total operations for all 3 years. Due to the lack of a pattern in monthly operations for each mission, when all operations are added, even less monthly variation can be seen: Overall, the most corporate/executive operations were performed in June, the least in January and February. Courier operations were greatest in March, closely followed by August and least in February. PANYNJ showed the most operations in June and the least in November. Government had the most operations in December and the least in January. Air taxi operated the most in August and the least in March, followed closely by December. Military operations were highest in September and at their lowest in January, April, and August, followed closely by February. Scheduled commuter operations only operated in December 1989.

The percentages of operations by mission type using the total operations by month for all 3 study years are shown in figures 24 and 25. These data confirm the mission mix that shows that corporate/executive is the most common mission at the DMH, with courier second, and PANYNJ operations third in every month, although the exact percentage per month varies. Military operations are also consistent in the rank of total operations, showing the lowest number of operations. Government and air taxi operations alternate ranking fourth and fifth.

Corporate/executive operations range from a high of 45 percent in May to a low of 39 percent in August. Courier operations also vary but with less of a range, from 28 percent in April, May, June, September, and October, to 30 percent in February, March, July, and November. PANYNJ operations vary from a high of 20 percent of total operations in February to a low of 15 percent in December. Military operations are 1 percent of total operations for every month except September, October, and December, when they increase to 2 percent of the total.

Air taxi operations vary from a high of 8 percent of the total operations in August to a low of 3 percent in February, April, and December, with variations in the other months. Government operations vary less widely than air taxi operations, ranging from a high of 7 percent of all operations in December, to a low of 4 percent in January and July. Government operations are also consistent in the other months, with operations between 5 to 6 percent of all operations for the rest of the year.

Scheduled commuter operations are not shown, since this mission only operated in December of 1989. One month of operations is not statistically significant when compared to total DMH operations for 3 years.

4.2.5.3 Operations by Mission Type, Day of Week and Year

Operations by mission type and day of week for 1987 are shown in figure 26. Corporate/executive operations were highest on Tuesday and fewest on Monday. Courier operations showed the highest numbers on Wednesday and the lowest on Monday. PANYNJ operations were highest on Tuesday and Wednesday, and lowest on Monday. Government operations were

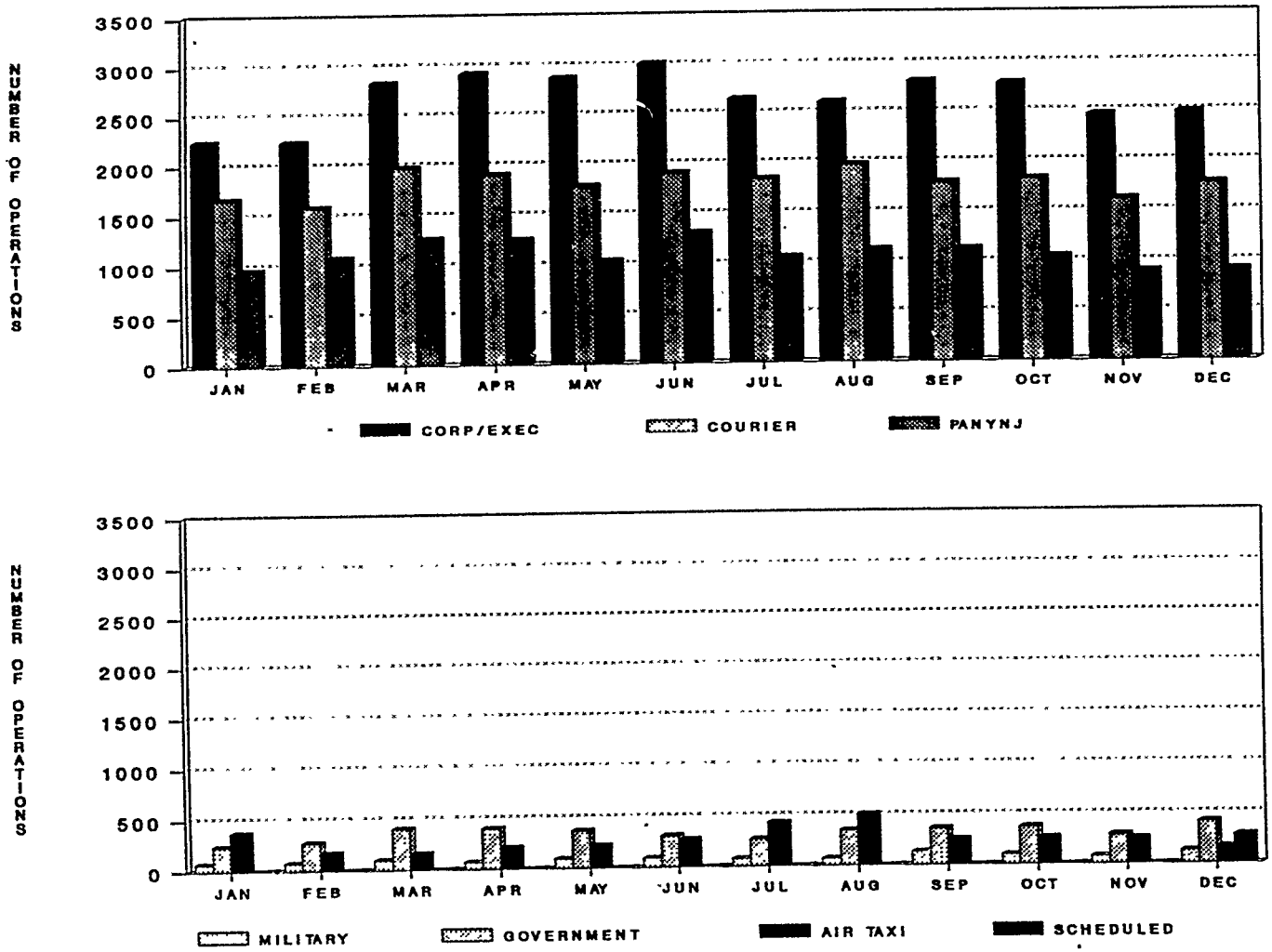


FIGURE 23 TOTAL NUMBER OF OPERATIONS BY MISSION TYPE, MONTH, AND YEAR, 1987 THROUGH 1989

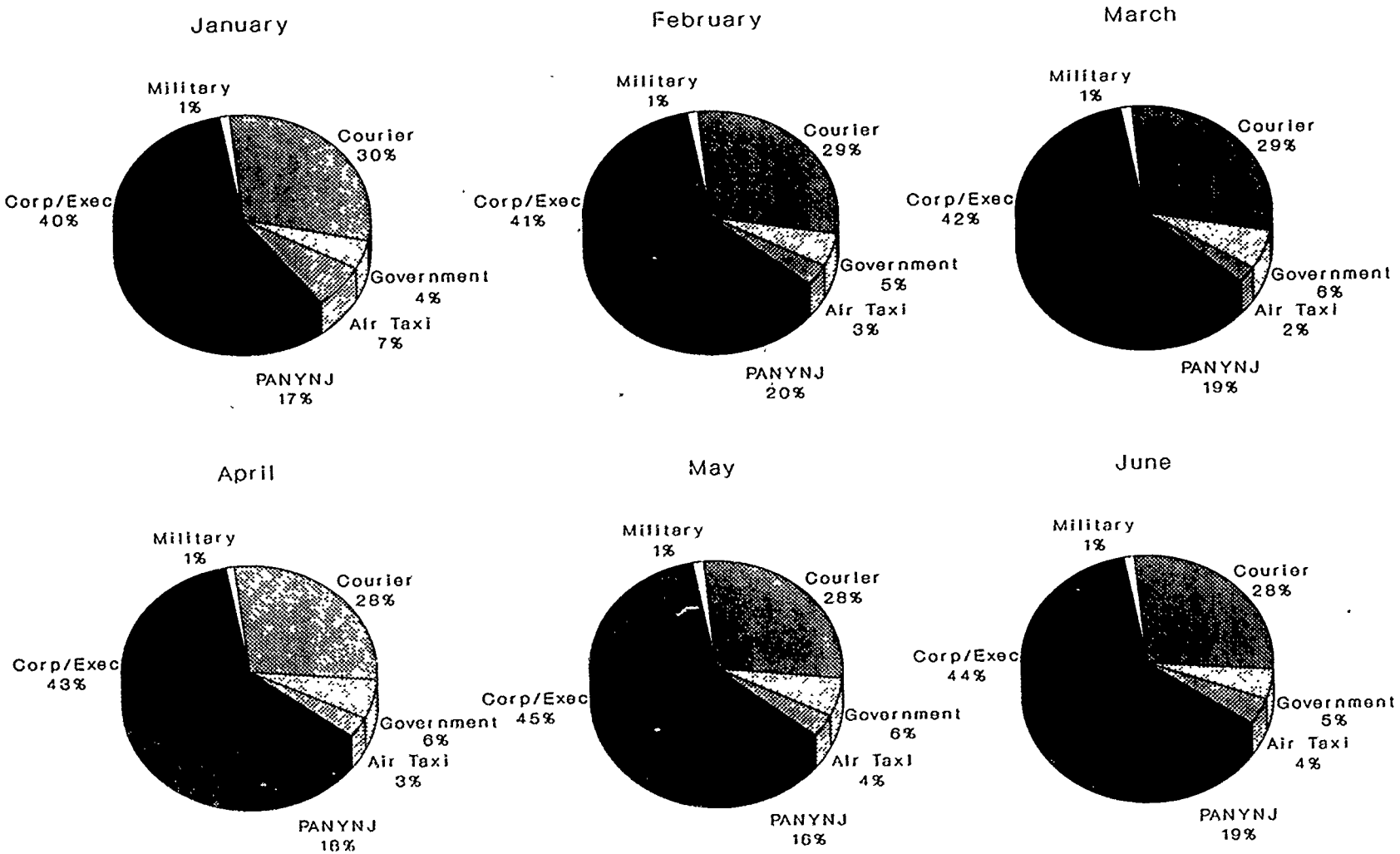


FIGURE 24 PERCENT OF TOTAL OPERATIONS BY MISSION TYPE JANUARY TO JUNE, 1987 THROUGH 1989

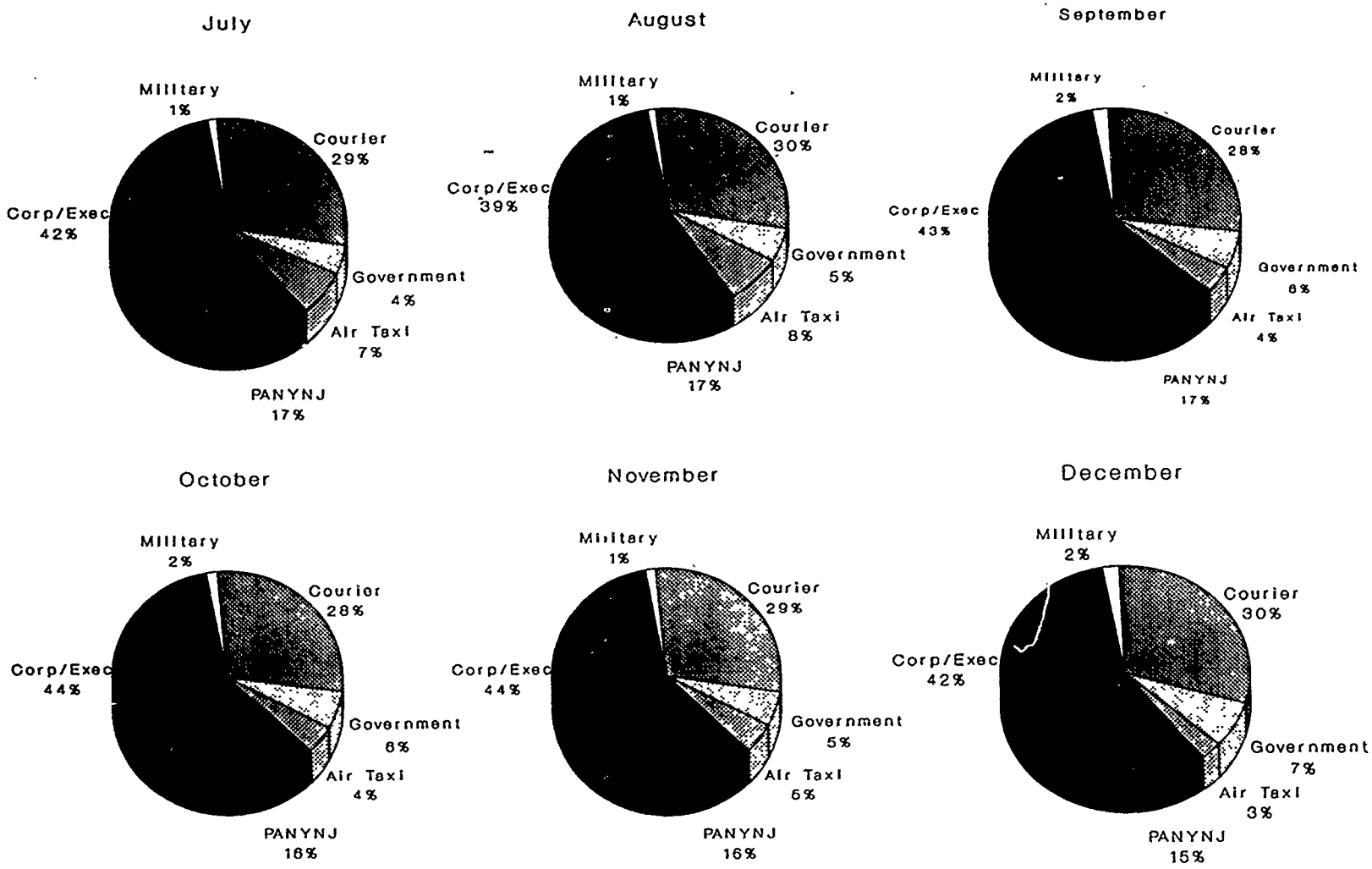


FIGURE 25 PERCENT OF TOTAL OPERATIONS BY MISSION TYPE JULY TO DECEMBER, 1987 THROUGH 1989

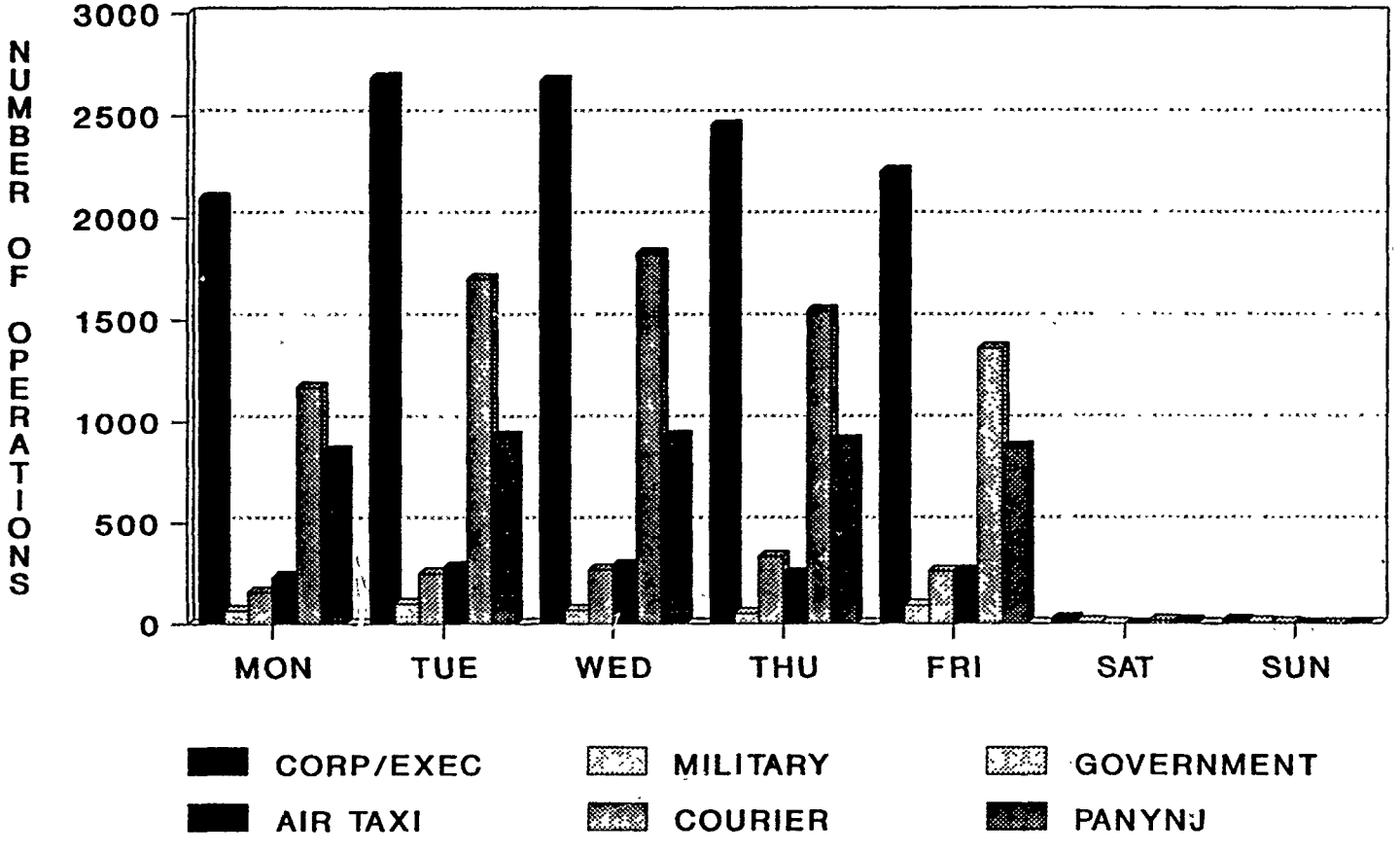


FIGURE 26 NUMBER OF OPERATIONS BY MISSION TYPE AND DAY OF WEEK, 1987

greatest on Thursday and fewest on Monday. Wednesday showed the most air taxi flights, with the least on Monday. The military flew to the DMH the most on Tuesday and the least on Thursday.

Weekend operations in 1987 showed that on Sunday the only missions using the DMH were corporate/executive with 18 operations, military with 8, and government with 6. On Saturday corporate/executive operations numbered 26, military had 8, government had 2, courier flights totaled 16, and PANYNJ 14.

In 1988, the overall pattern of activity with the highest operations on Tuesday through Thursday and the least on Monday and Friday remained the same, but the number of operations on specific days changed, as shown in figure 27. The most corporate/executive operations were on Thursday but the fewest was still on Monday. The highest number of courier operations for this year were on Tuesday, followed closely by those on Thursday; the fewest courier operations were on Monday. PANYNJ operations were highest on Thursday and lowest on Monday. Government operations were greatest on Thursday and fewest on Monday, just as in 1987. Thursday and Friday had the most air taxi flights and Tuesday and Wednesday the least. Military operations were highest on Tuesday and lowest on Monday.

Weekend operations in 1988 dropped significantly for corporate/executive, with no operations on Saturday and four operations on Sunday. On Saturday, the only mission to use the DMH was government with six operations. Both military and government had six operations on Sunday.

Figure 28 shows that for 1989, the daily pattern was again somewhat altered. Corporate/executive operations were again highest on Wednesday and lowest on Friday. Courier operations were almost equally high on Tuesday, Wednesday, and Thursday and almost equally low on Monday and Friday. PANYNJ operations kept the same distribution that was experienced in 1988, being highest on Thursday and lowest on Monday. Government operations also showed the same pattern as in 1987 and 1988, with the highest operations on Thursday and fewest on Monday. Air taxi flights were highest on Friday; Monday showed the lowest number. Military operations were highest on Thursday and lowest on Tuesday. Scheduled commuter operations were highest on Thursday and lowest on Friday.

In 1989 weekend operations increased with operations for every mission type except for scheduled commuter. The corporate/executive mission had 26 operations on Saturday and 22 operations on Sunday. Military showed four on Saturday but none on Sunday. Government had four operations on Saturday and eight on Sunday. Air taxi showed eight on Saturday and two on Sunday. PANYNJ had four on Saturday and none on Sunday.

The overall pattern of operation by mission types for all 3 years is shown in figure 29. Overall, section 4.2.3 showed that the DMH experiences the fewest weekday operations on Monday and Friday and the most on Tuesday through Thursday. Due to the slight daily variation of each mission, the pattern for total operations shows little daily variation.

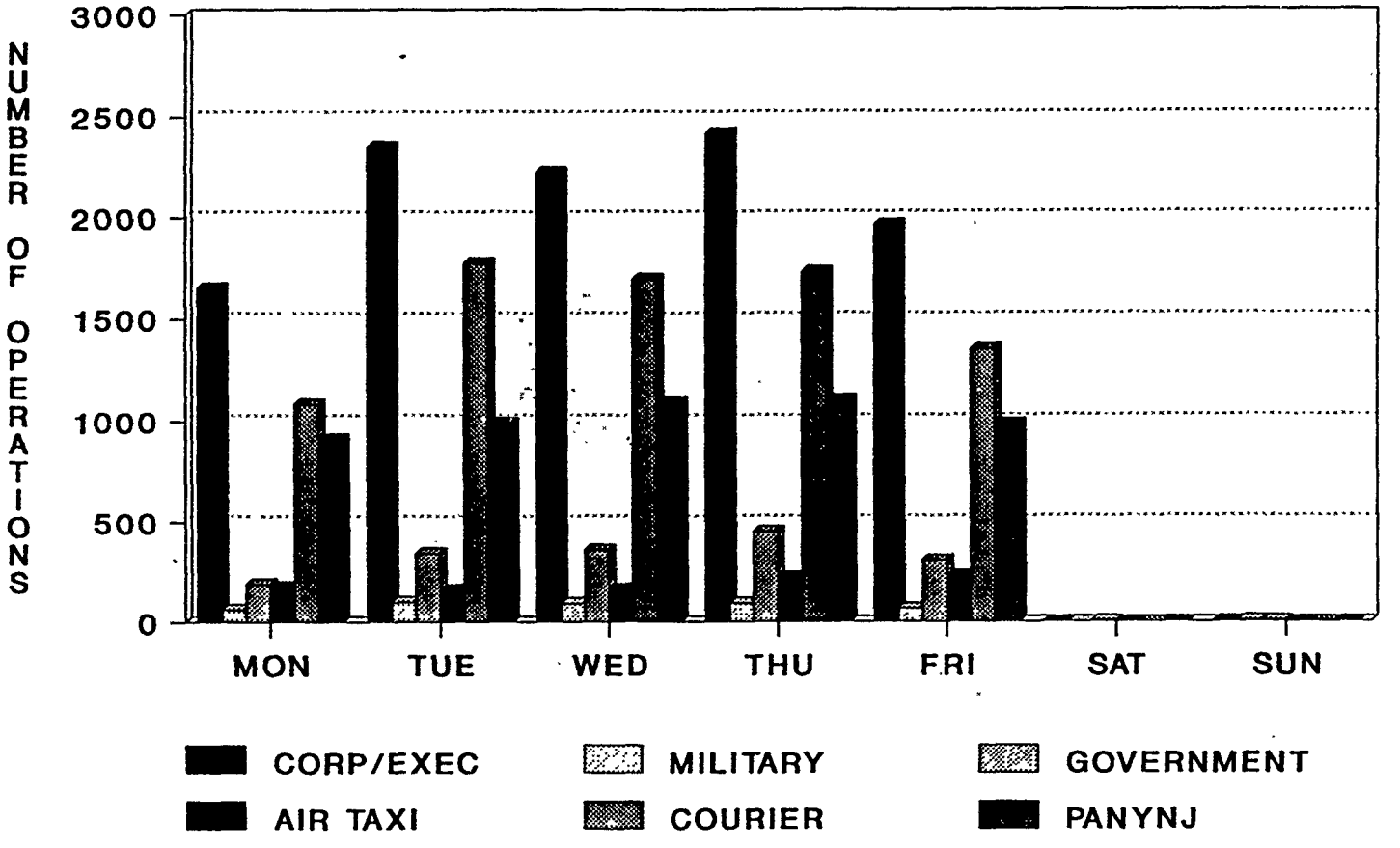


FIGURE 27 NUMBER OF OPERATIONS BY MISSION TYPE AND DAY OF WEEK, 1988

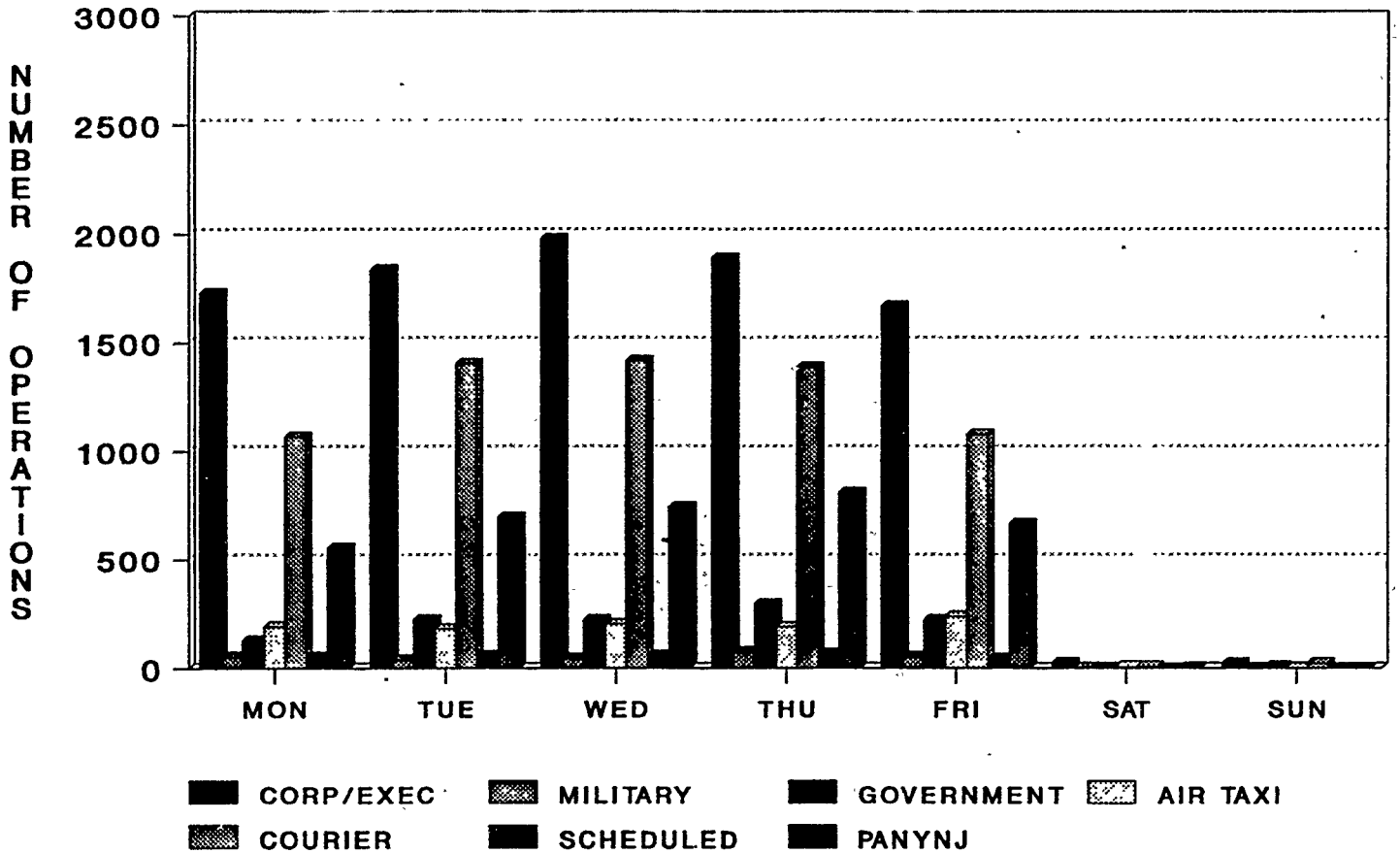


FIGURE 28 NUMBER OF OPERATIONS BY MISSION TYPE AND DAY OF WEEK, 1989

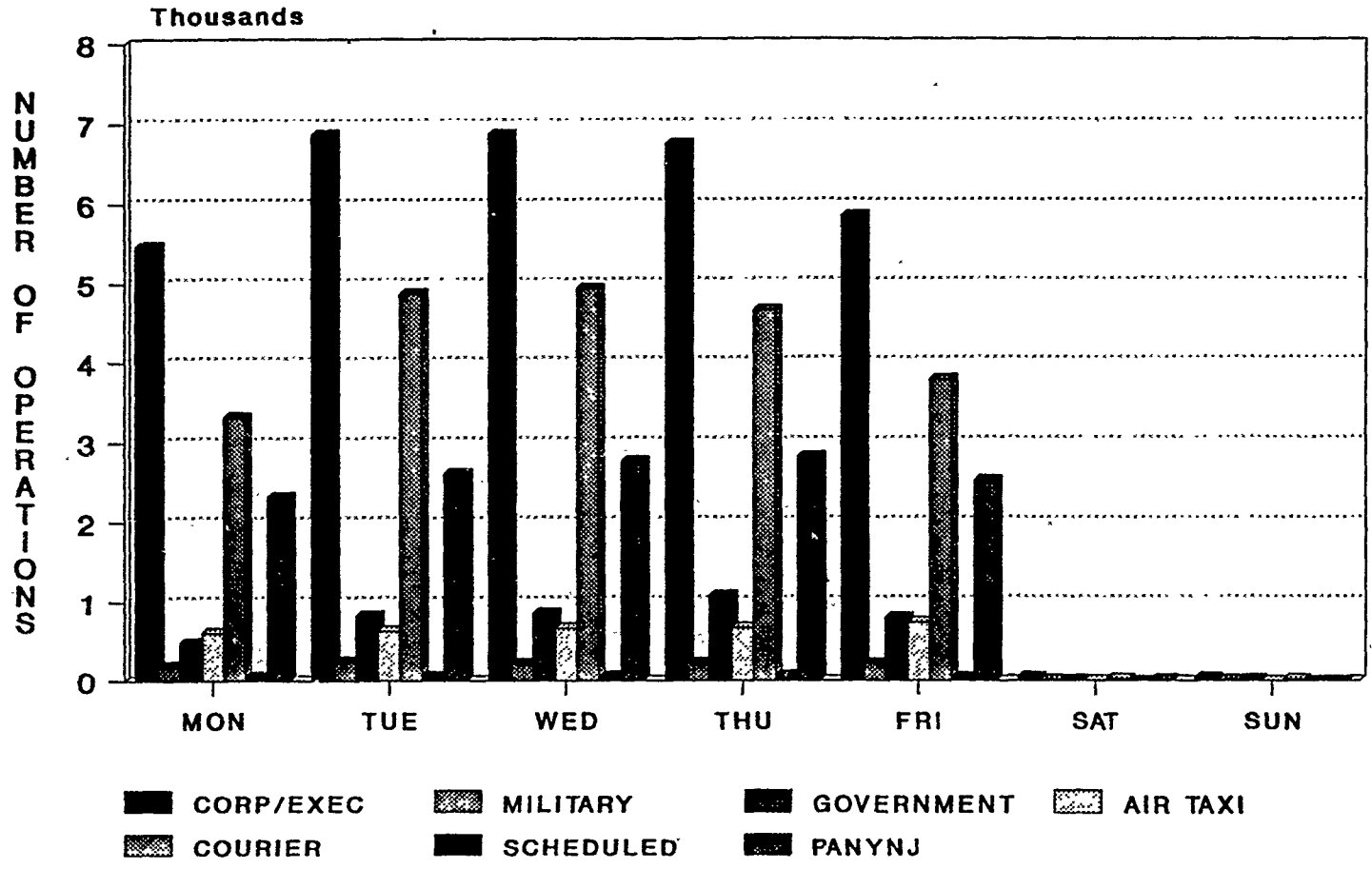


FIGURE 29 TOTAL NUMBER OF OPERATIONS BY MISSION TYPE AND DAY OF WEEK, 1987 THROUGH 1989

The percentage of operations by mission type and day of week for all 3 study years is shown in figure 30. This figure shows the same general mix of mission types, with little, if any, differences of the percentages in like mission types. Corporate/executive had the most operations per day, with courier second and PANYNJ third, etc. Weekends operations show quite a different mix, due primarily to the very low number of flights and the fact that not all missions operate on Saturday and Sunday.

The range of corporate/executive operations is very slight. The highest percentage of operations is on Monday at 44 percent, with 43 percent on Tuesday, and 42 percent the other weekdays. Courier operations show the highest percentage on Tuesday and Wednesday when this mission comprises 30 percent of total operations. The lowest percentage for the courier mission is on Monday and Friday at 27 percent. The highest percentage of PANYNJ operations is on Monday at 19 percent, and the lowest is on Tuesday at 16 percent. The highest percentage of government operations is on Thursday at 7 percent, and the lowest is on Monday at 4 percent. Air taxi shows the highest percentages on Monday and Friday at 5 percent each, and has 4 percent of the total operations the other weekdays. Military has 1 percent of all operations Monday through Thursday, with an increase to 2 percent on Friday.

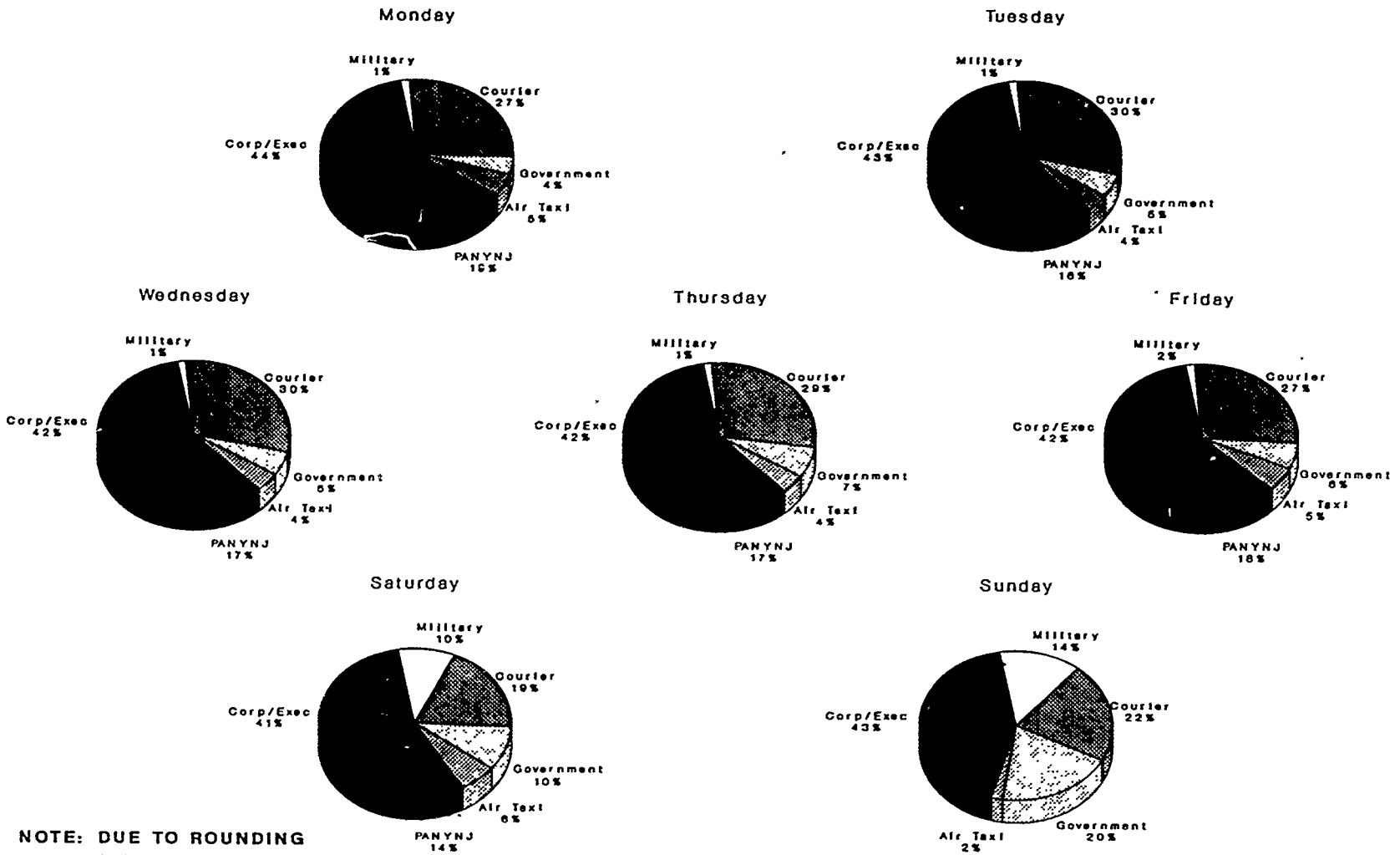
On Sunday corporate/executive missions are 43 percent of the total, courier 22 percent, government 20 percent, military 14 percent, and air taxi 2 percent, with no PANYNJ operations. Saturday's mix is slightly different. Corporate/executive operations are 41 percent of the total; courier, 19 percent; PANYNJ, 14 percent; government and military, 10 percent each; and air taxi, 6 percent.

4.2.5.4 Number of Operations by Mission Type by Time of Day

Figure 31 presents the number of operations in 1987 by mission type and time of day. Corporate/executive operations follow the overall pattern of heliport activity presented in section 4.2.4, as do the courier and air taxi missions. This means that most operations occurred in the morning between 0700 and 0900 hours and again in the afternoon between 1600 and 1800 hours. Corporate/executive operations were responsible for the 1400 hour peak and courier for the 1100 hour peak shown in the total operations. The two missions that operated most frequently during non-peak hours were government and military.

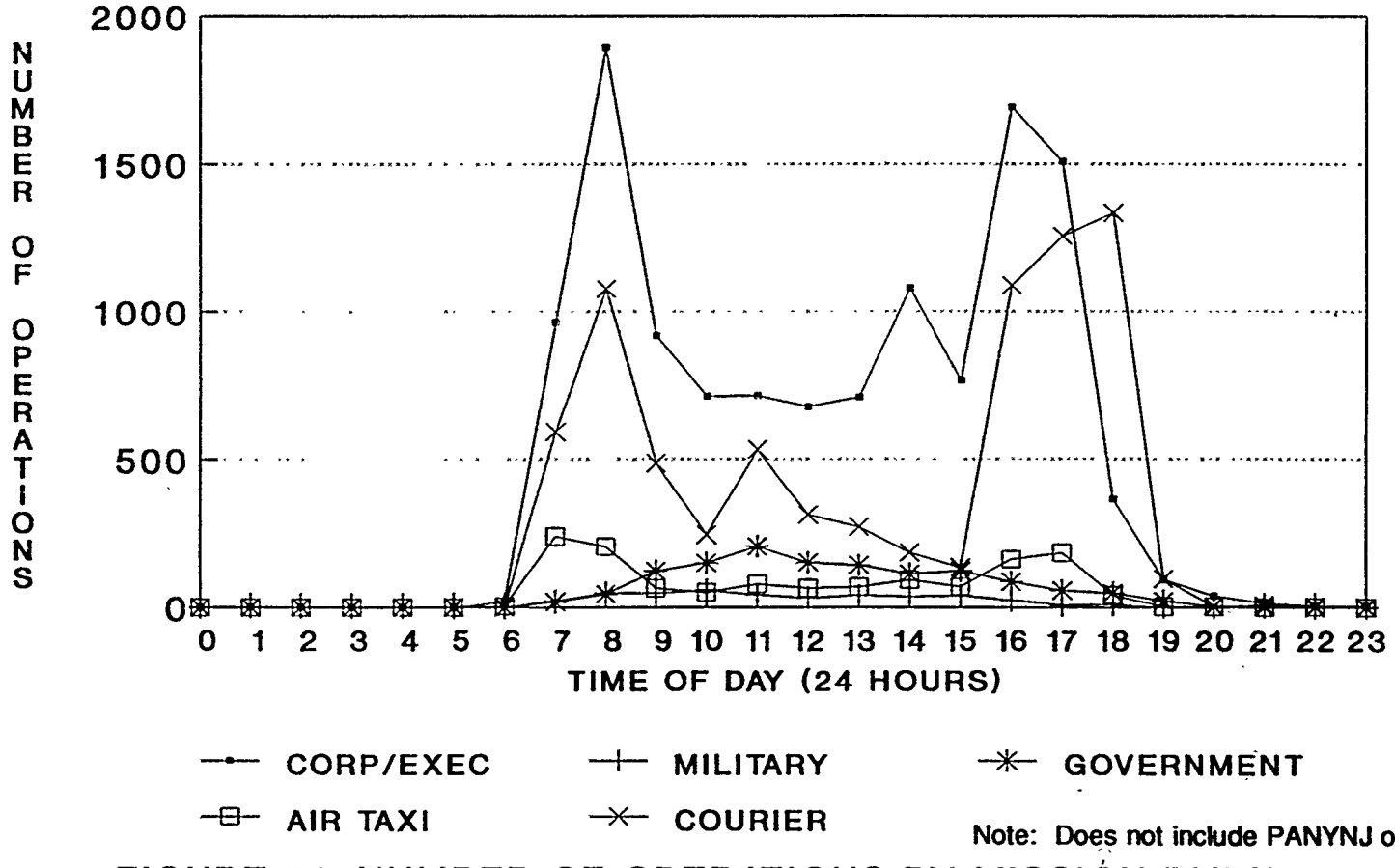
In 1988, shown in figure 32, the same general pattern of activity exists as in 1987. The fact that the number of corporate/ executive and courier operations were nearly equal during peak periods can be seen clearly.

The trends change in 1989, as shown in figure 33. Although corporate/executive operations again outnumber courier operations, the time of operation was different from not only 1987 and 1988, but from the overall activity trends seen in section 4.2.4. The figure shows that the corporate/executive mission had a high level of operations between 1400



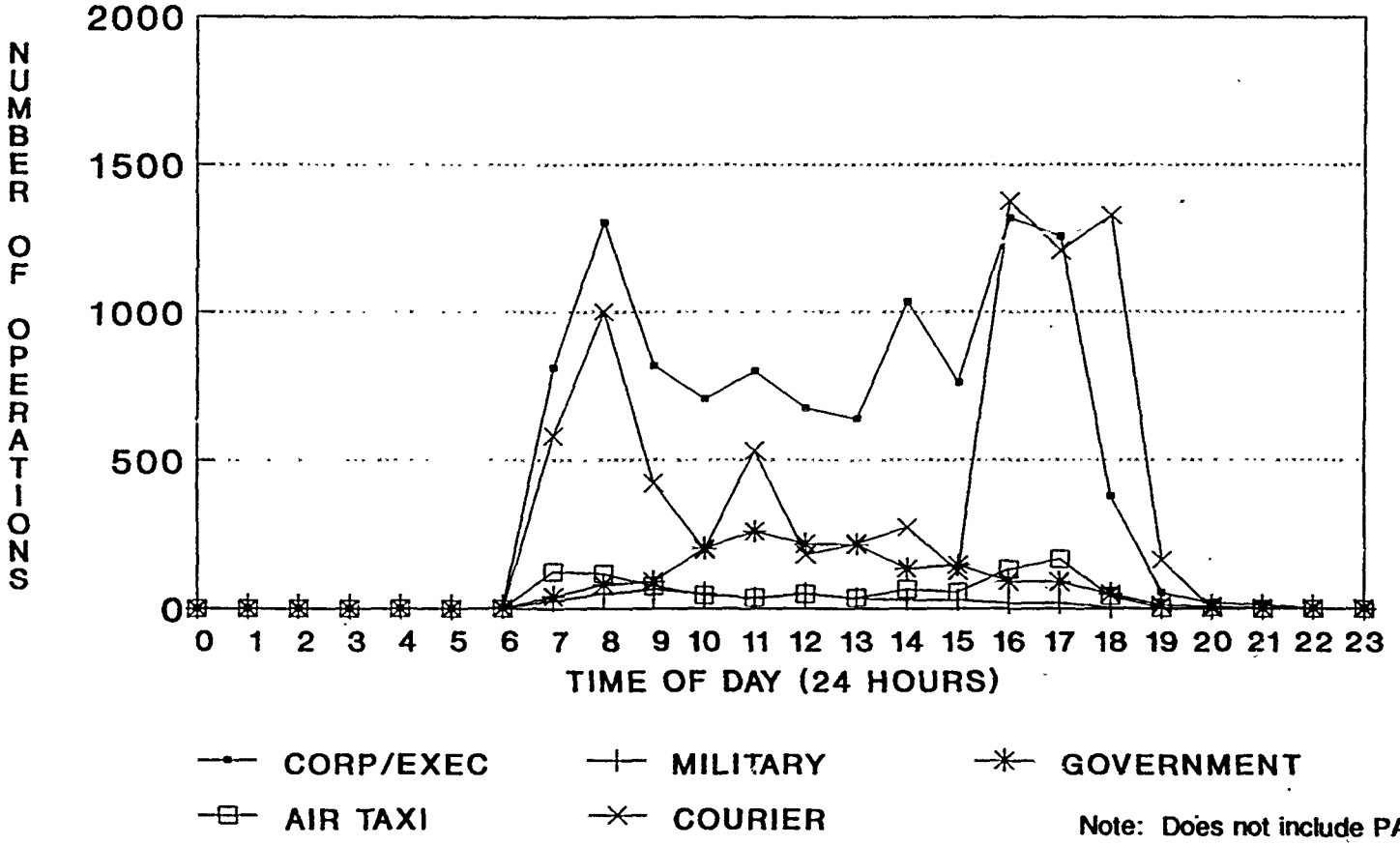
NOTE: DUE TO ROUNDING NUMBERS MAY NOT TOTAL 100%

FIGURE 30 PERCENT OF TOTAL OPERATIONS BY MISSION TYPE AND DAY OF WEEK, 1987 THROUGH 1989



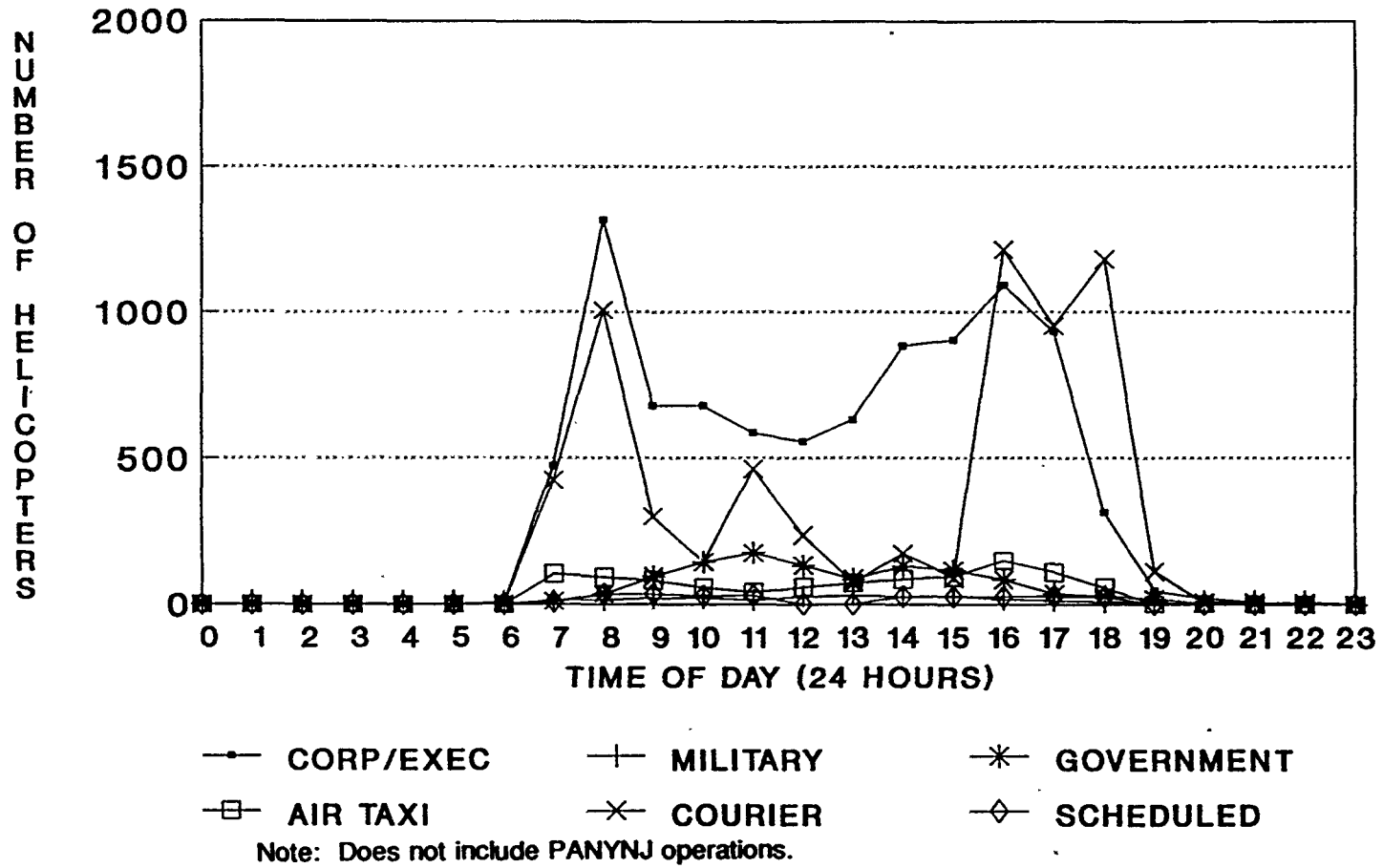
Note: Does not include PANYNJ operations.

FIGURE 31 NUMBER OF OPERATIONS BY MISSION TYPE AND TIME OF DAY, 1987



Note: Does not include PANYNJ operations.

FIGURE 32 NUMBER OF OPERATIONS BY MISSION TYPE AND TIME OF DAY, 1988



Note: Does not include PANYNJ operations.

FIGURE 33 NUMBER OF OPERATIONS BY MISSION TYPE AND TIME OF DAY, 1989

and 1700 hours without the 1500 hour dip, and that the 1700 hour number was not as high as in the other 2 years.

The pattern for all operations in all 3 years is shown in figure 34. When considering the total number of operations for each mission, there is a return to the previous pattern of activity. Operations for corporate/ executive, courier, and PANYNJ occur during the usual peaks, and military and government missions operate more often at non-peak hours.

4.2.6 Operations by Engine Type

4.2.6.1 Operations by Engine Type by Year

It can be seen from figure 35 that the turbine engine helicopter is the predominate type used at the DMH and that there are slightly more singles than twins using the heliport. A few piston helicopters use the facility.

The decreasing number of operations of these three helicopter types over the 3-year period is due primarily to the overall decrease in heliport activity. There are, however, variations in the number of operations within each category that cannot be attributed to overall operational patterns. For instance, the number of twin operations increased in 1988 even though the total number of operations at the DMH decreased. In addition, piston helicopters used the facility more in 1988 than in either of the other 2 years, and even though there was a drop in piston activity in 1989, there were still more piston operations in 1989 than in 1987.

The total number of operations in each helicopter category for all 3 years by engine type is also shown in figure 35. There were 40,156 single operations for all 3 years, 35,016 twin, and 148 piston operations.

The percentage of operations by engine type are shown for each year and for all 3 years in figure 36. The share of single helicopters decreased from 54 percent in 1987, to 52 percent in 1988, then returned to 54 percent in 1989. The twin share increased from 45 percent to 48 percent, and then dropped 1 percent, back to 46 percent, in the 3 study years, respectively. Piston helicopters remained at less than 1 percent of DMH activity for all 3 years.

4.2.6.2 Operations by Engine Type, Month, and Year

Figures 37, 38, and 39 show the number of operations by engine type, month, and year. In 1987, single helicopters performed more operations in every month than twins. In 1988, twins performed slightly more operations than singles in January, February, and April. In 1989, twins performed more operations in April and December.

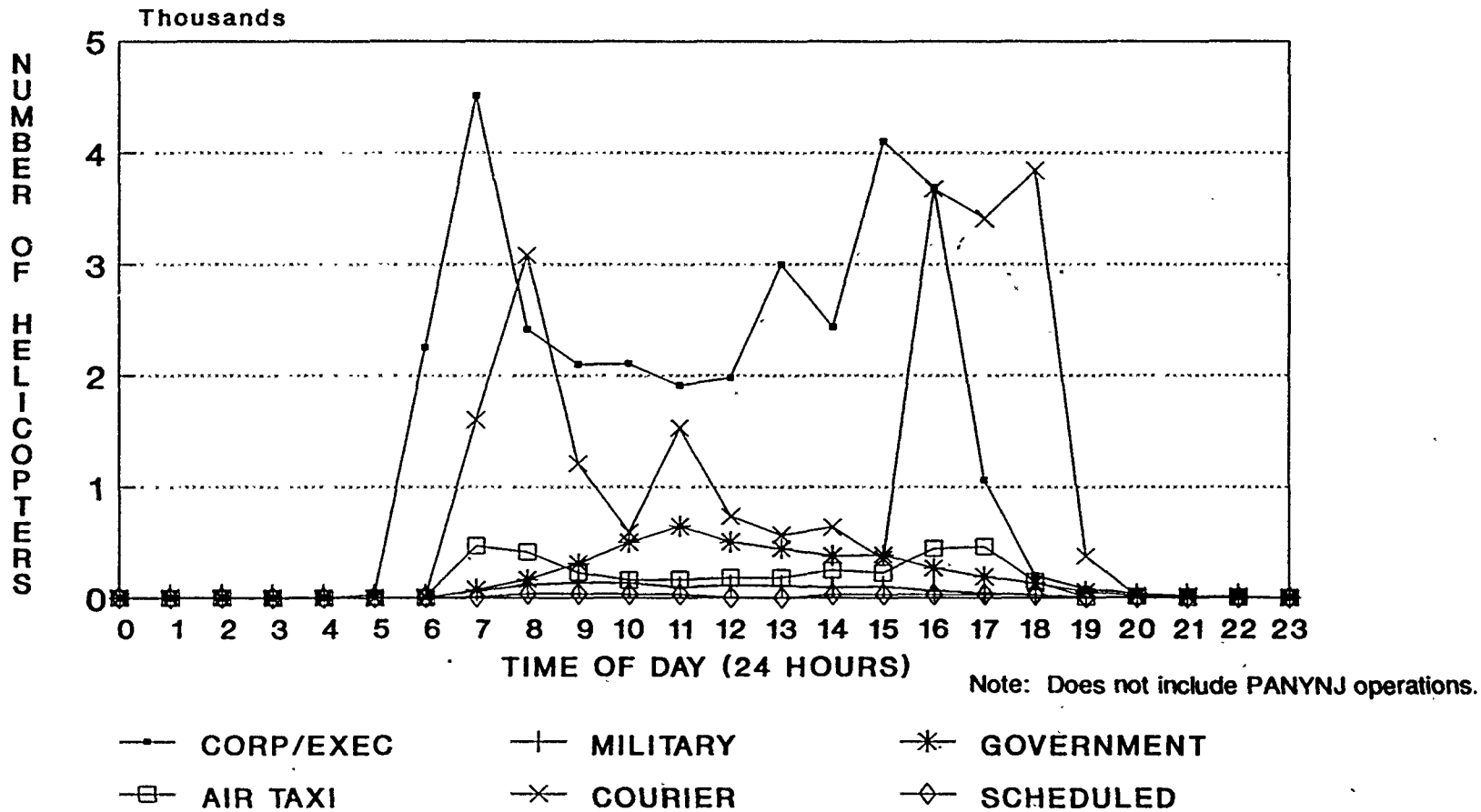
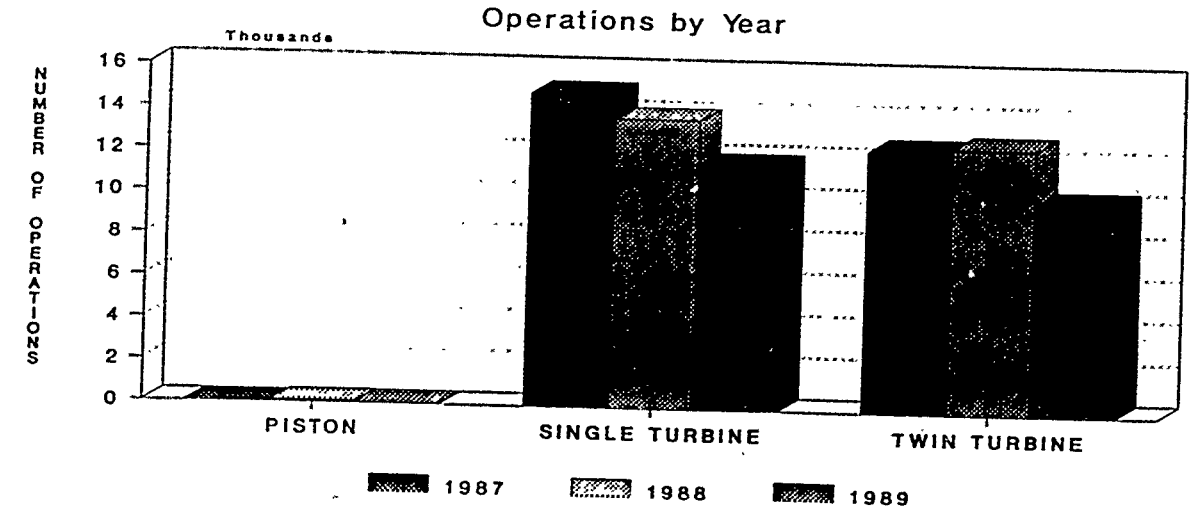
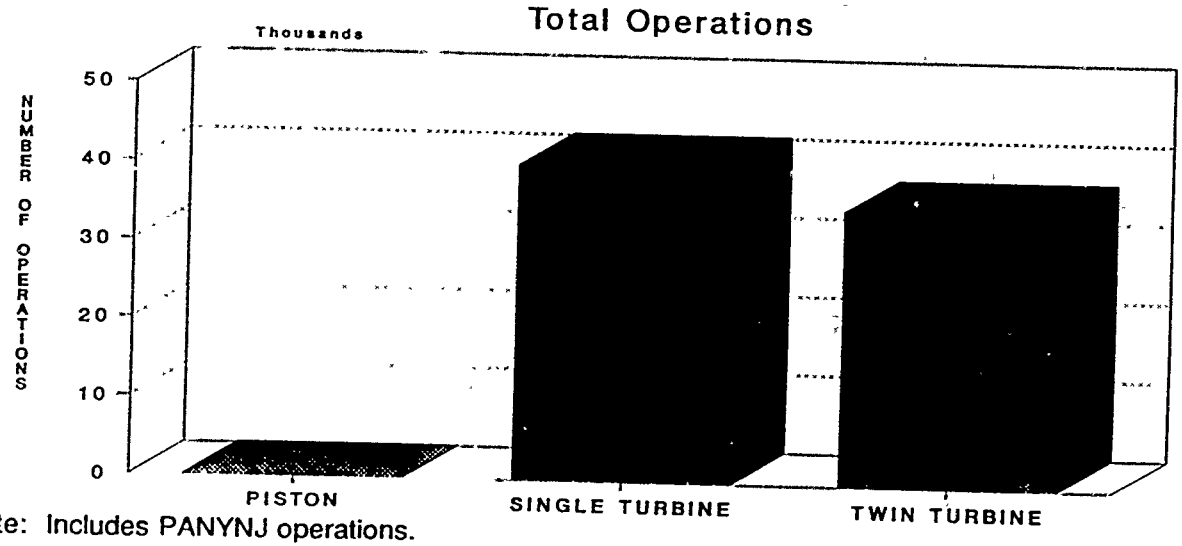


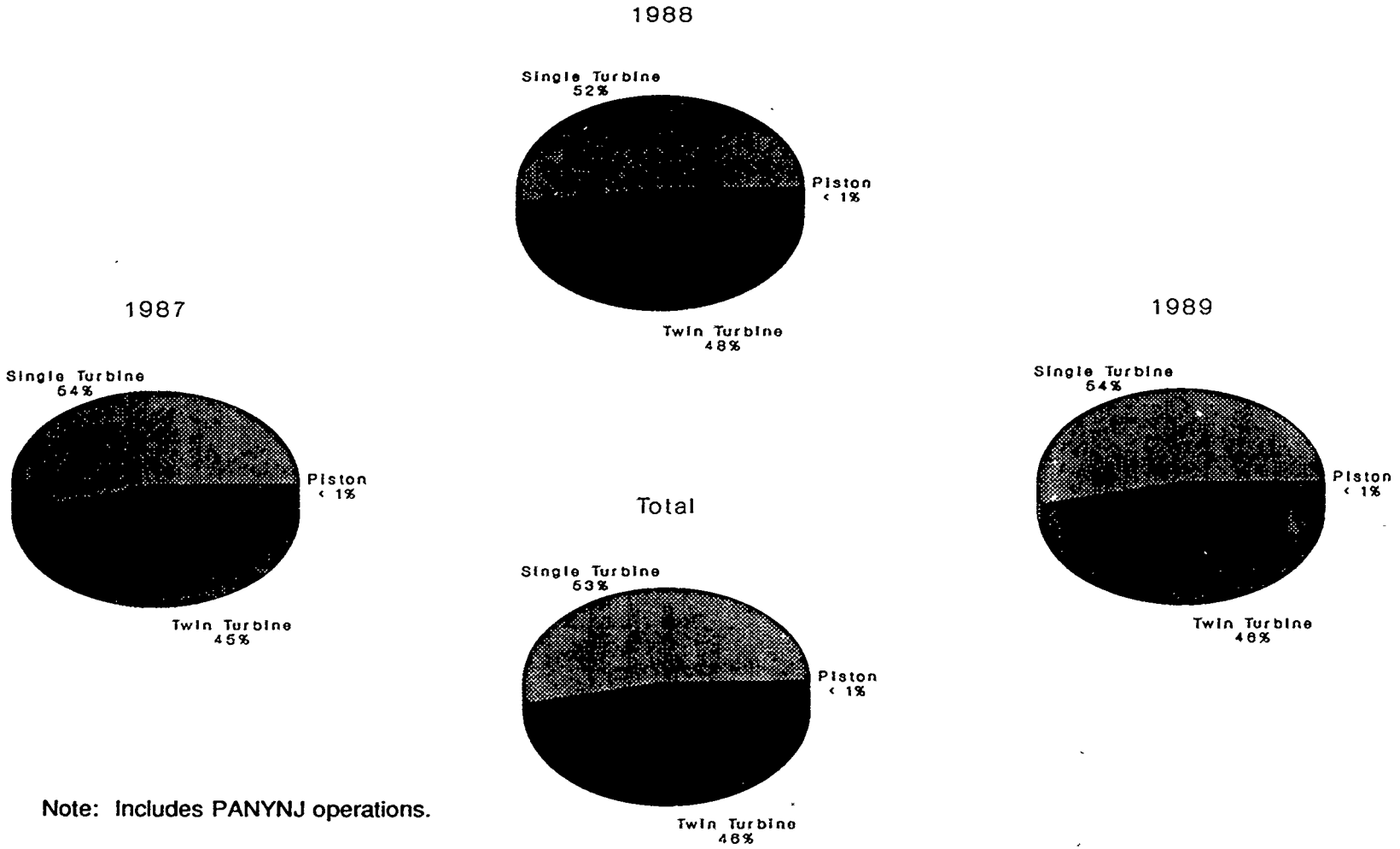
FIGURE 34 TOTAL NUMBER OF OPERATIONS BY MISSION TYPE AND TIME OF DAY, 1987 THROUGH 1989





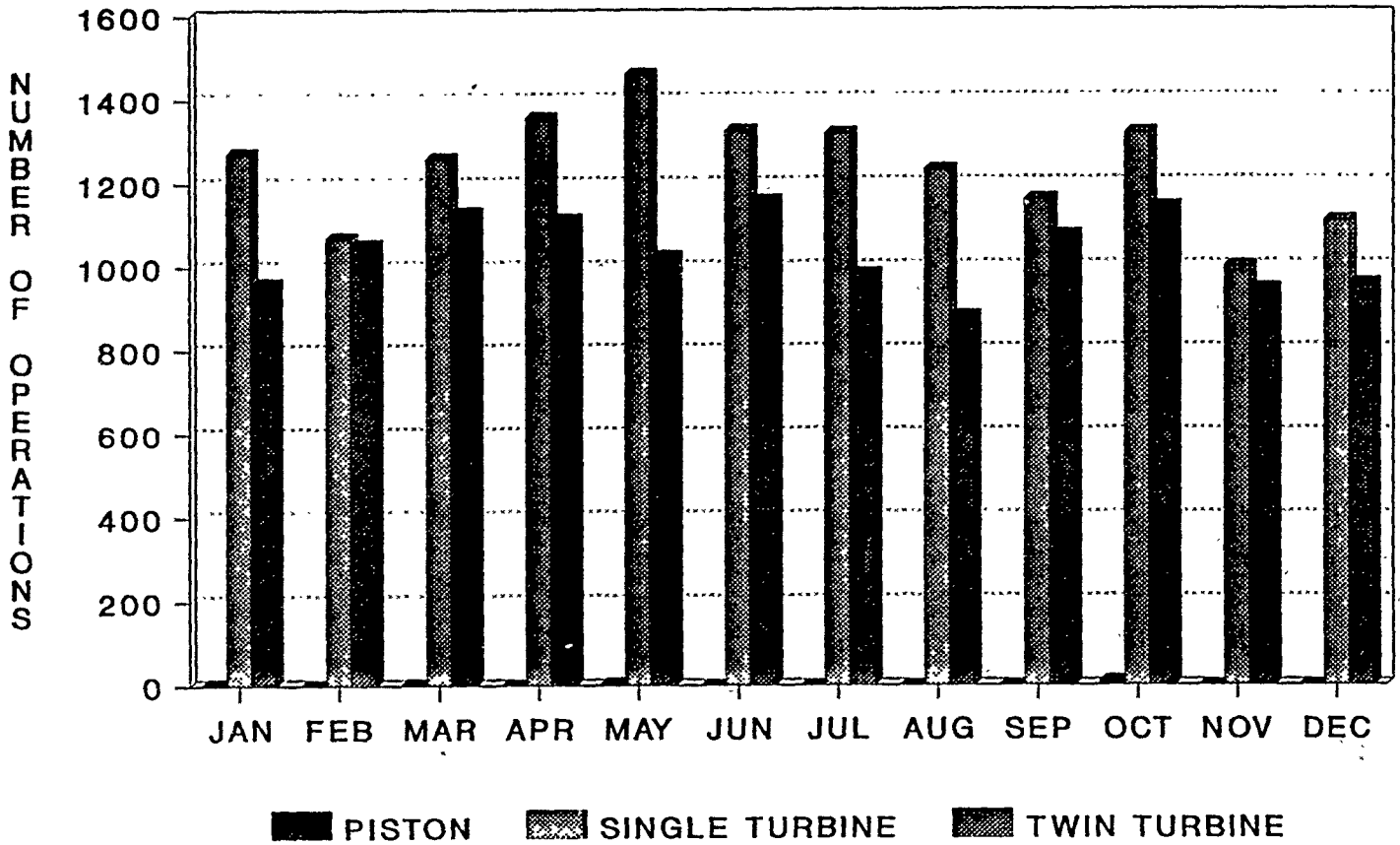
Note: Includes PANYNJ operations.

FIGURE 35 NUMBER OF OPERATIONS BY ENGINE TYPE AND YEAR, 1987 THROUGH 1989



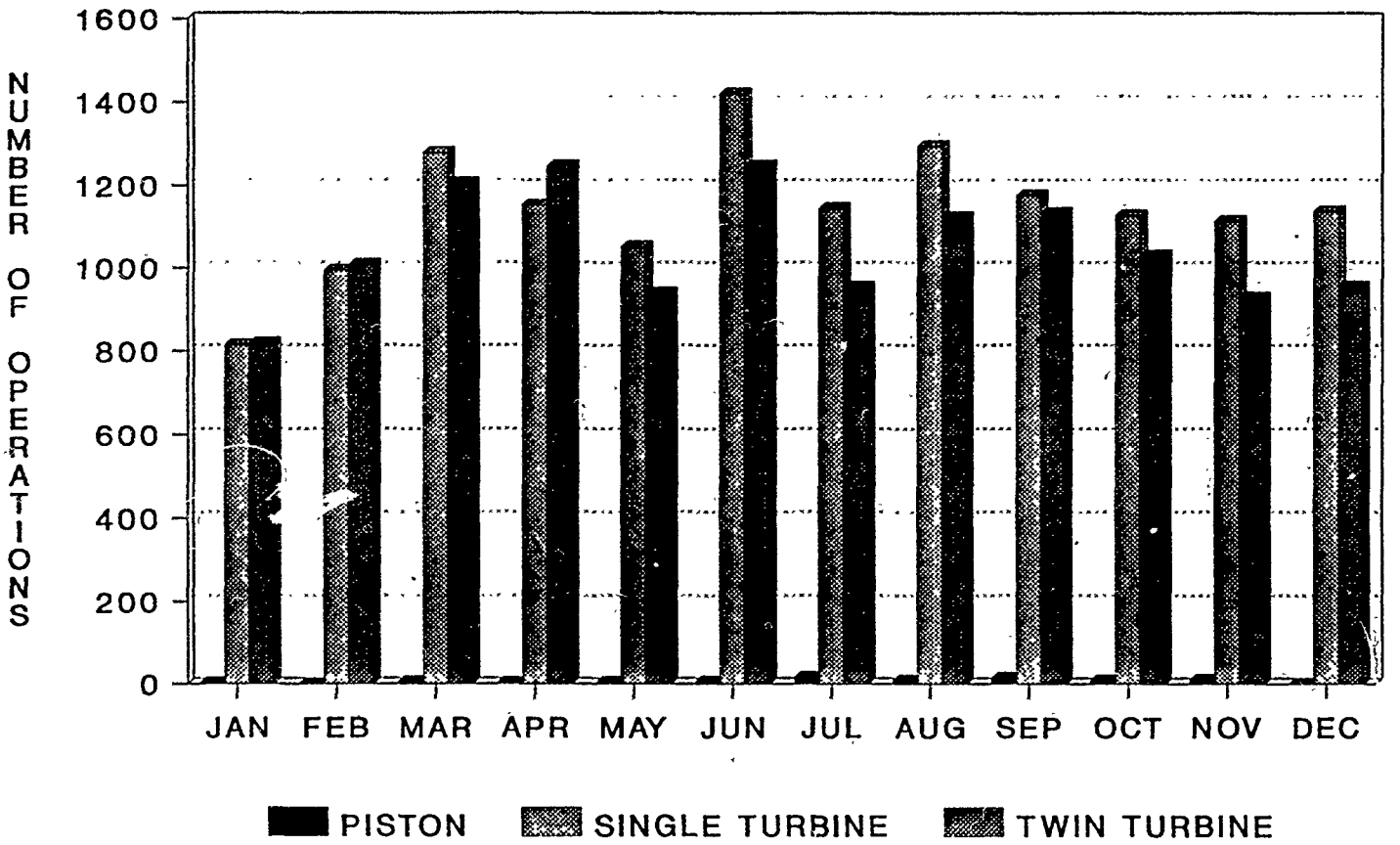
Note: Includes PANYNJ operations.

FIGURE 36 PERCENT OF OPERATIONS BY ENGINE TYPE AND YEAR, 1987 THROUGH 1989



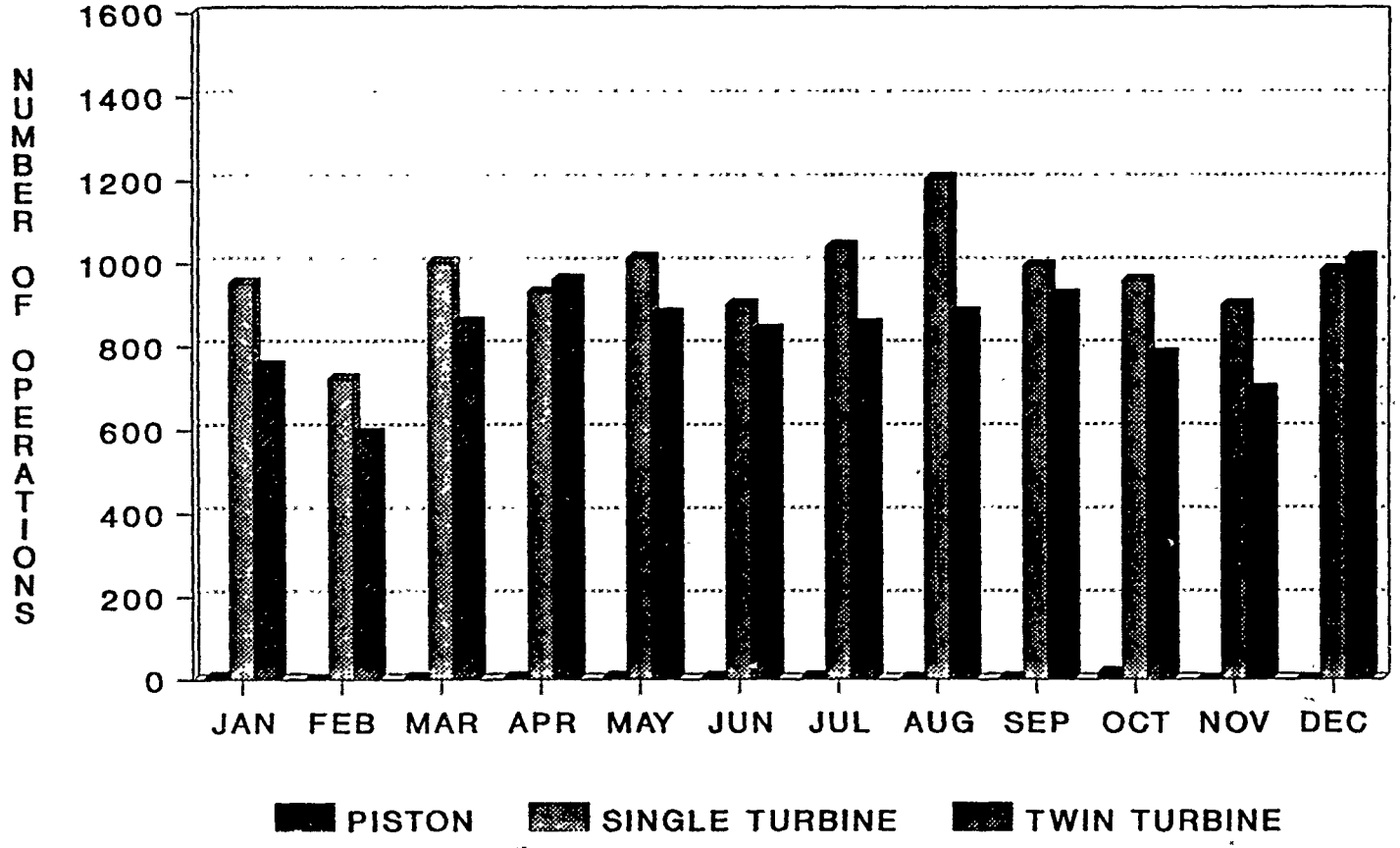
Note: Includes PANYNJ operations.

FIGURE 37 NUMBER OF OPERATIONS BY ENGINE TYPE AND MONTH, 1987



Note: Includes PANYNJ operations.

FIGURE 38 NUMBER OF OPERATIONS BY ENGINE TYPE AND MONTH, 1988



Note: Includes PANYNJ operations.

FIGURE 39 NUMBER OF OPERATIONS BY ENGINE TYPE AND MONTH, 1989

Figure 40 shows that for the total number of operations per month for all 3 years, singles performed more operations every month than twins. There is no consistent pattern of monthly operation by engine type, i.e., twins did not always have more operations in April.

In 1987, the highest number of single operations was in May; the lowest number was in November. The number of twins was highest in June, closely followed by October; the lowest number was in August. Piston helicopters did not operate at the DMH every month in 1987. For the months in which pistons operated, the highest activity was in October and the lowest was in January. The only other month in 1987 that showed piston operations was May.

In 1988, the highest number of single helicopter operations was in June, and the lowest number was in January. The highest amount of twin activity occurred in both April and June, and the lowest amount was in January. Piston helicopters operated in every month but February and December. The highest number of piston helicopter operations was in July.

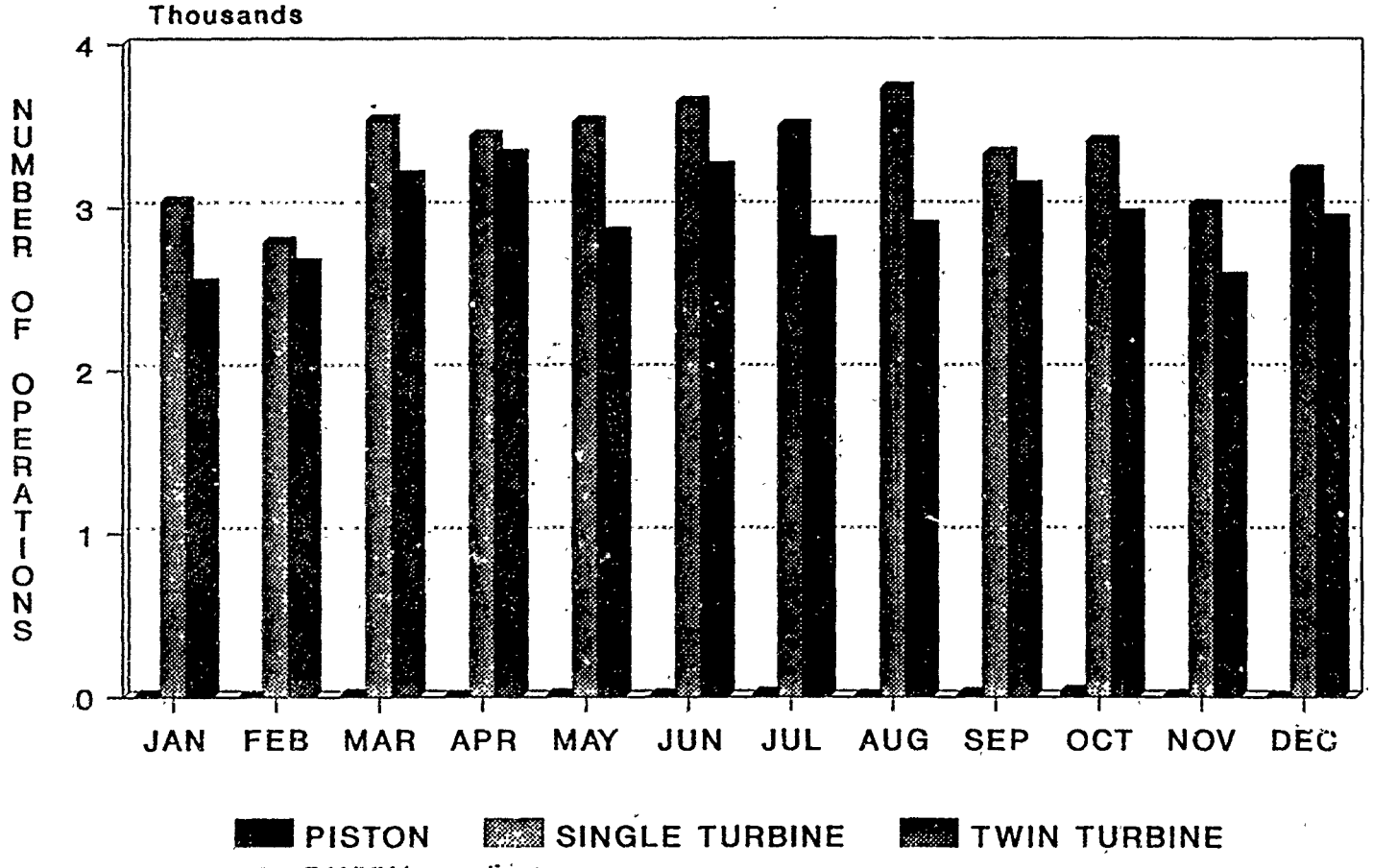
In 1989, the highest number of single helicopter operations was in August, and the lowest number was in February. Twins performed the most operations in December, and the least in February. Piston helicopters did not show any operations in February, November, and December. The highest number of piston operations was in October.

Figures 41 and 42 presents the percentages of total operations by engine type and month for all 3 study years. As shown, the difference in the number of operations between single and twin operations for any one month was not great. The biggest variation in the number of operations of these two types of helicopters occurred in August, which showed 56 percent single and 44 percent twin. The least variation occurred in both February and April with 51 percent single operations and 49 percent twin operations in each of those two months. Piston helicopter operations were less than 1 percent in all years, and there were no piston operations in either February or December in any of the 3 study years.

4.2.6.3 Operations by Engine Type, by Day of Week and Year

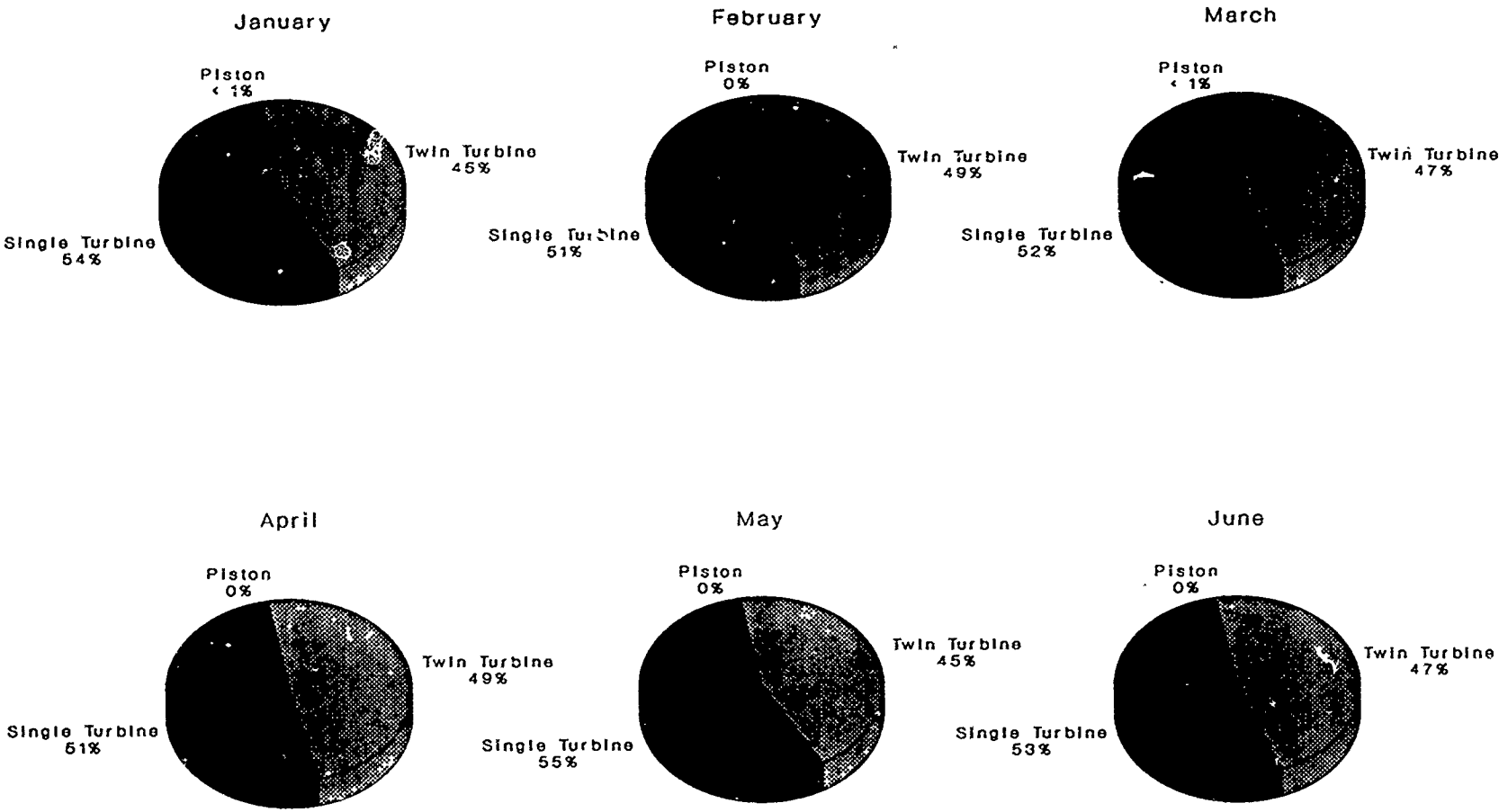
Operations by engine type and day of the week for each year and for all 3 study years are shown in figure 43. On no weekday did twin helicopters use the DMH more than single helicopters. In 1988 the aircraft mix was more equal, particularly on Monday and Friday, than in either of the other 2 years. However, on weekends twins operated more frequently at the DMH than singles. Only on Sundays in 1989 did single helicopters perform more operations than twins. Fewer helicopters of any type used the heliport on weekends in 1988 than in either of the other 2 years. Piston helicopters used the heliport most often on Thursday in 1987, on Monday and Friday in 1988, and on Thursday and Friday in 1989. Piston helicopters did not use the heliport on any weekend.

Figure 44 shows the overall percentages of operations by day of the week for all 3 years. Taking into account all operations, the difference



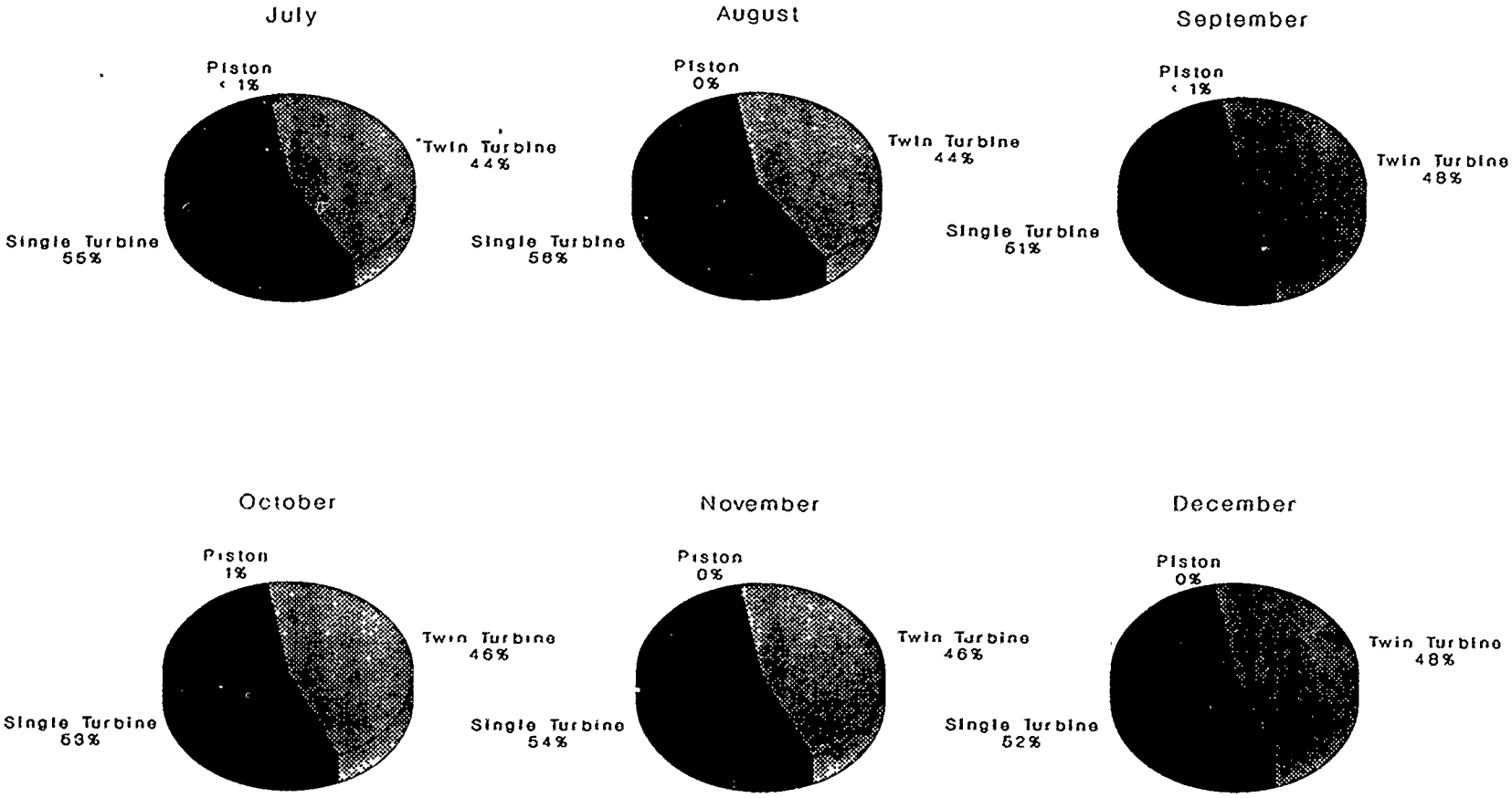
Note: Includes PANYNJ operations.

FIGURE 40 TOTAL NUMBER OF OPERATIONS BY ENGINE TYPE AND MONTH, 1987 THROUGH 1989



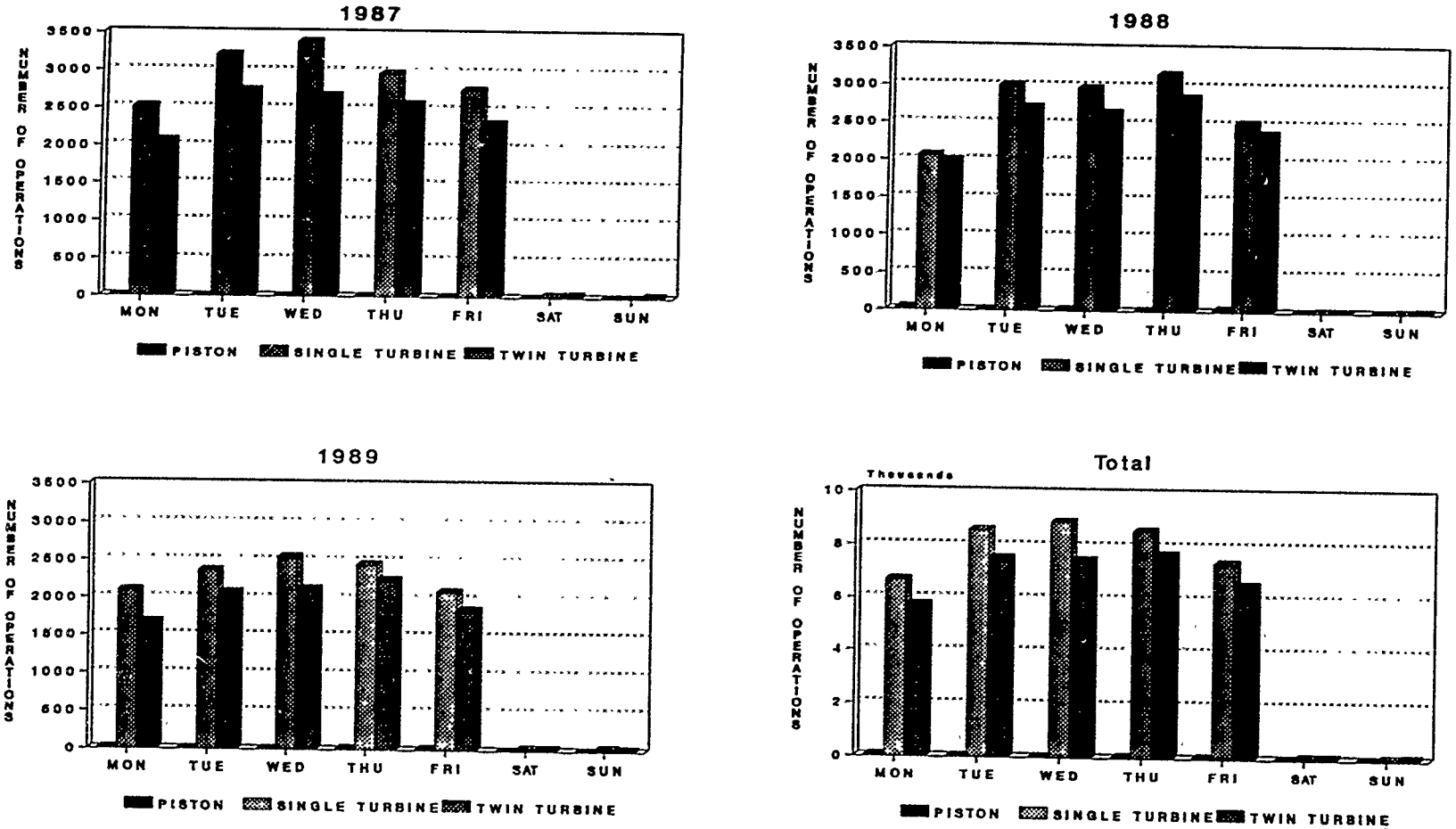
Note: Includes PANYNJ operations.

FIGURE 41 PERCENT OF TOTAL OPERATIONS BY ENGINE TYPE, JANUARY TO JUNE, 1987 THROUGH 1989



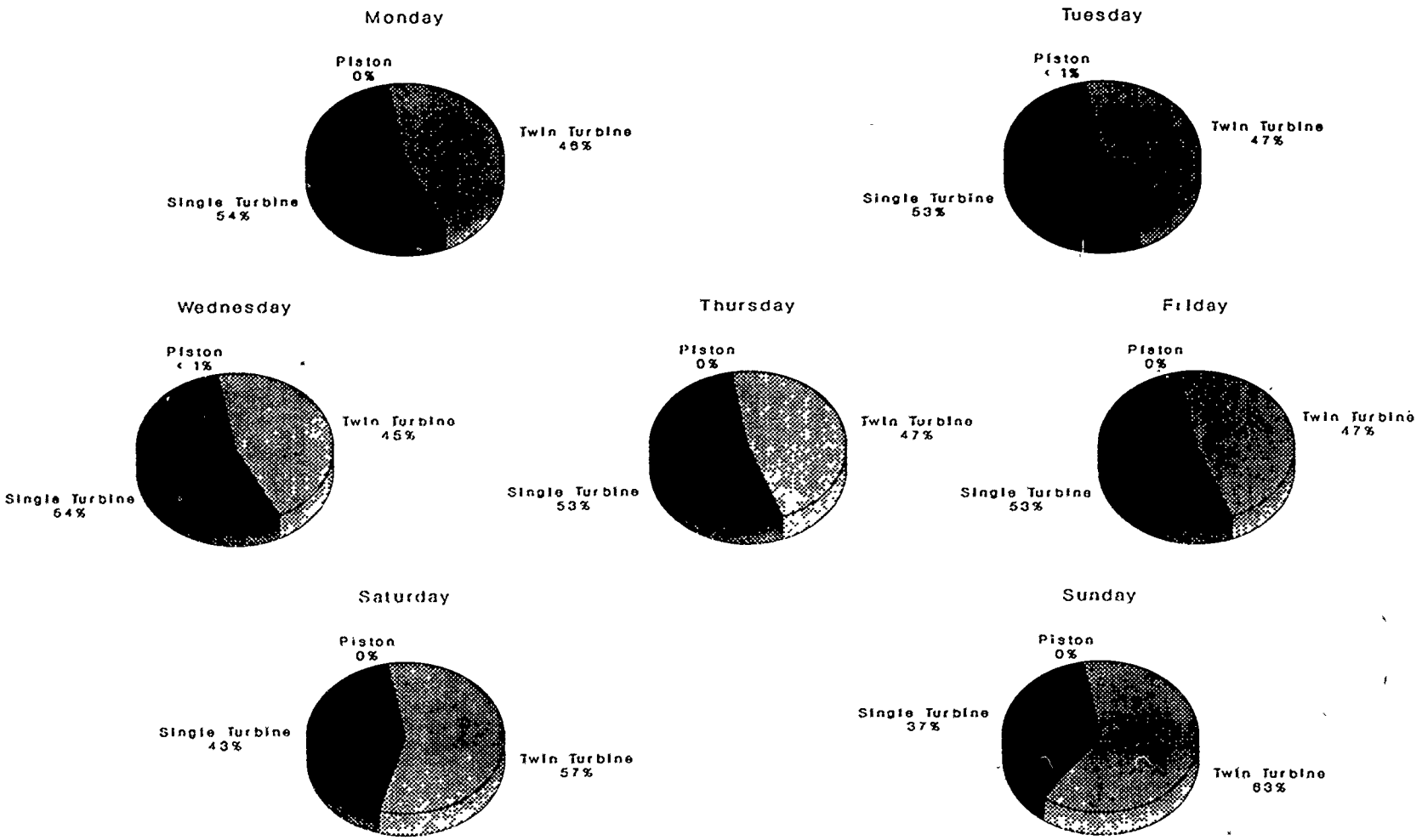
Note: Includes PANYNJ operations.

FIGURE 42 PERCENT OF TOTAL OPERATIONS BY ENGINE TYPE, JULY TO DECEMBER, 1987 THROUGH 1989



Note: PANYNJ operations estimated, see section 3.2.3.

FIGURE 43 NUMBER OF OPERATIONS BY ENGINE TYPE, DAY OF WEEK, AND YEAR, 1987 THROUGH 1989



Note: PANYNJ operations estimated, see section 3.2.3.

FIGURE 44 PERCENT OF TOTAL OPERATIONS BY ENGINE TYPE, DAY OF WEEK, AND YEAR, 1987 THROUGH 1989

in the percentage in the helicopter mix on any day was very small. However, the mix of single to twin helicopters was most diverse on Monday and Wednesday, with singles outnumbering twins 54 to 46 percent on Monday and 54 to 45 percent on Wednesday. On Tuesday, Thursday, and Friday, singles performed 53 percent of all operations, and twins performed 47 percent. Piston operations accounted for less than 1 percent on any day. Twins operated more often on weekends, with 63 percent of the operations on Sunday and 57 percent on Saturday. There were no piston operations on weekends.

4.2.6.4 Operations by Engine Type by Time of Day

The pattern of activity by engine type and time of day is shown in figure 45 for each study year and for the 3 combined study years. In 1987, the mix of single to twin helicopters by time of day varied most extensively during the morning and afternoon peaks. Except for the secondary peak at 1100 hours, single helicopters performed the most operations at any given hour. In fact, 1100 hours is the only time that twins showed more operations. There were so few piston operations that no activity patterns could be observed.

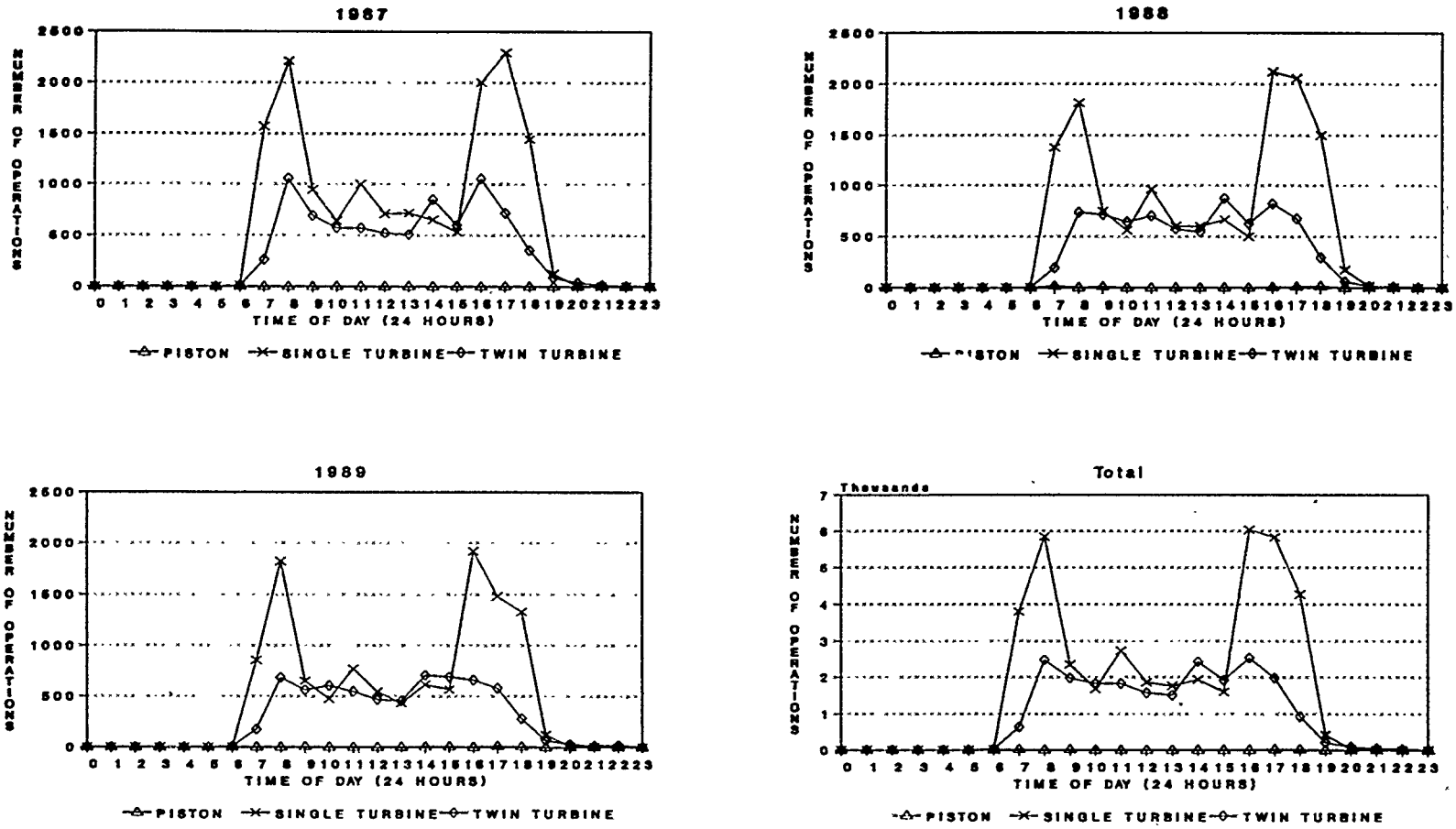
1988 exhibited the same pattern with one exception. During a non-peak time, 1000 hours, twins showed more operations than singles. Within the operational pattern, twin operations also occurred at a more constant level throughout the day in 1988 than they did in 1987. Piston operations showed some activity at 0700 hours and at 1800 hours.

The 1989 graph showed a difference from the other two years in the operational pattern during the afternoon peak. There were more twins operating at 1000 hours, 1500 hours, and 1400 hours than singles. There was no defined activity peak for twins at 1600 hours, as there was in 1987 and 1988. Piston helicopters showed the most activity between 1400 and 1500 hours, and a few operations at 1700 hours.

The total number of operations for all 3 years is also shown in figure 45. Considering total operations, singles showed the most operations at 0800 hours during the morning rush hour, at 1100 hours, and in the afternoon rush hour between 1600 and 1800 hours. Twins had more operations than singles only at 1000 hours and 1400 hours.

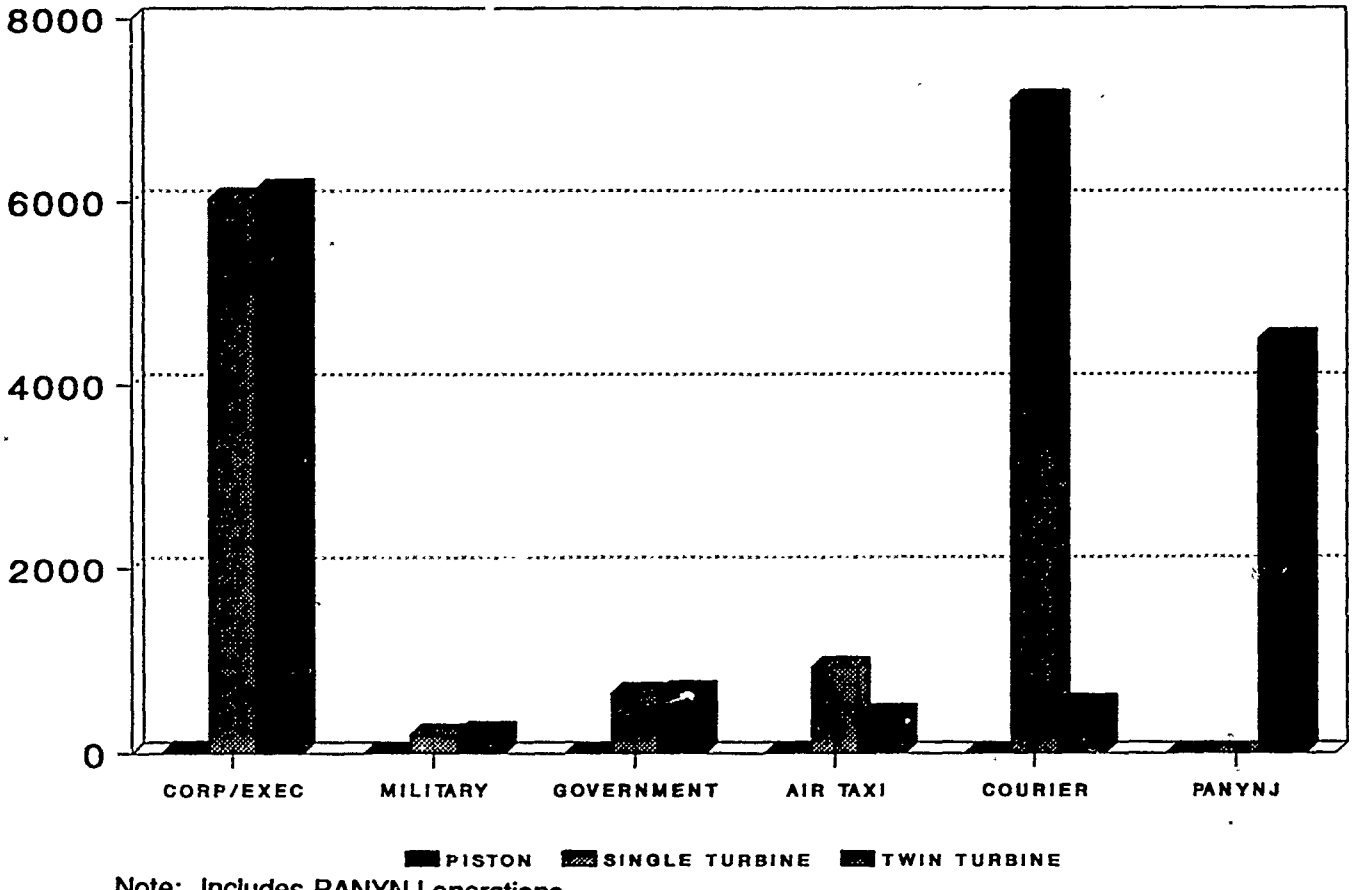
4.2.7 Number of Operations by Mission and Engine Type

The number of operations in 1987 by mission and engine type are shown in figure 46. The operations for two missions, corporate/executive and government, show an almost even distribution between single and twins, but both missions showed a slightly higher number of twin operations. Corporate/executive had 6,028 operations with single and 6,132 with twin helicopters, while military had 636 with single and 656 for twins. There were more air taxi operations with singles than twins, with 918 to 404, respectively. Courier operations were overwhelmingly performed with singles. The PANYNJ only operates twins for their mission. Piston helicopters were used for 12 corporate/executive operations and 6 air taxi operations.



Note: Does not include PANYNJ operations.

FIGURE 45 TOTAL NUMBER OF OPERATIONS BY ENGINE TYPE AND TIME OF DAY, 1987 THROUGH 1989



Note: Includes PANYNJ operations.

FIGURE 46 NUMBER OF OPERATIONS BY MISSION AND ENGINE TYPE, 1987

In 1988, shown in figure 47, the difference between twins and singles increased in favor of twins for corporate/executive operations, with 5,906 twin to 4,628 single operations. The use of singles increased for air taxi operations, with a mix of 798 single to 162 twin operations. The mix of engine types stayed about the same for the other missions. Military had 206 single and 216 twin operations; government had 872 single and 788 twin; and courier had 7,192 single and 436 twin. Piston helicopters were used for 72 corporate/executive operations, a large increase from 1987, but pistons were used for only 4 air taxi operations.

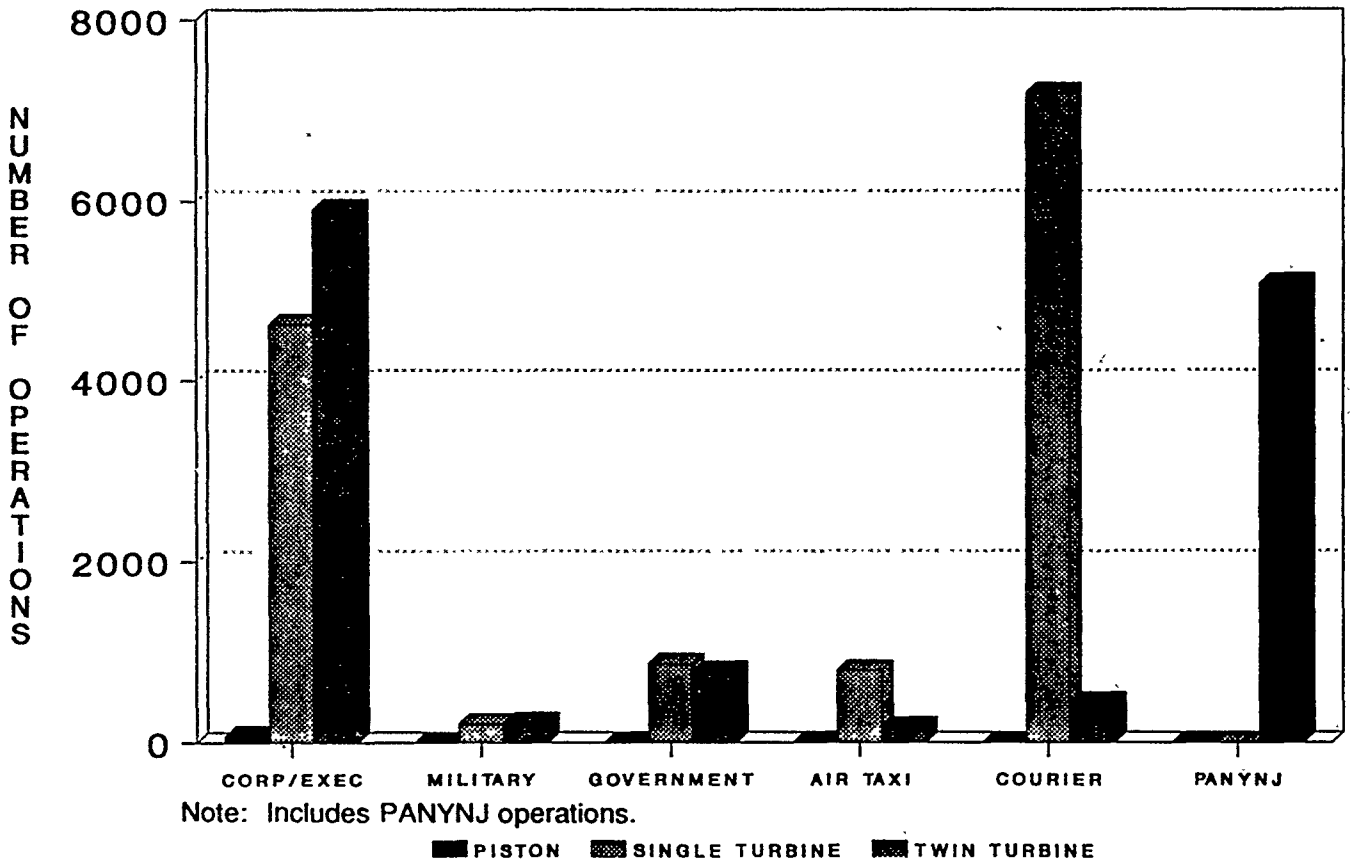
Engine types for 1989 are shown in figure 48. The ratio of single to twin helicopter operations stayed nearly the same for corporate/executive with 3,992 to 5,100, respectively. It also stayed nearly the same for military operations with 130 to 138, and for air taxi, with 858 to 158 single to twin operations. Single operations decreased for the government mission with 444 single operations to 658 twin operations. The 1 month of scheduled commuter operations is also seen in figure 48. It shows that only twin helicopters were used for the scheduled commuter mission. Piston helicopters accounted for 52 corporate/executive operations, a decrease from the previous year. Government flights accounted for 2 piston operations.

The total number of operations by mission and engine type for all 3 study years is shown in figure 49. Overall, singles are used more for air taxi and courier missions, while twins are used the most for corporate/executive, military, government, scheduled commuter, and the PANYNJ. The majority of piston helicopters are performing the corporate/executive mission. It can also be seen that the overwhelming use of the single engine helicopter for the courier mission, and the large percentage of singles used in the corporate/executive mission account for the fact that the majority of operations at the DMH are performed by single helicopters (see section 4.2.6).

Figure 50 shows the percentage of operations by mission type performed by the three different engine type categories. Of all single operations, 51 percent are courier, 37 percent are corporate/executive, 6 percent are air taxi, 5 percent are government, and 1 percent are military.

Of all twin operations, 48 percent are corporate/executive, 37 percent are PANYNJ, 6 percent are government, 3 percent are courier, 2 percent are air taxi, and 2 percent are military. The 1 month of scheduled commuter operations, although not directly comparable to the other percentages since those figures represent 3 years of data, accounts for 1 percent of all twin helicopter flights.

Figure 50 presents a clearer view of piston operations. Due to the small number of total piston operations, the types of missions these helicopters perform cannot be easily seen in figures presenting all types of operations. Here, it can be seen that 92 percent of all piston operations are corporate/executive, 7 percent are air taxi, and 1 percent are government.



Note: Includes PANYNJ operations.

FIGURE 47 NUMBER OF OPERATIONS BY MISSION AND ENGINE TYPE, 1988

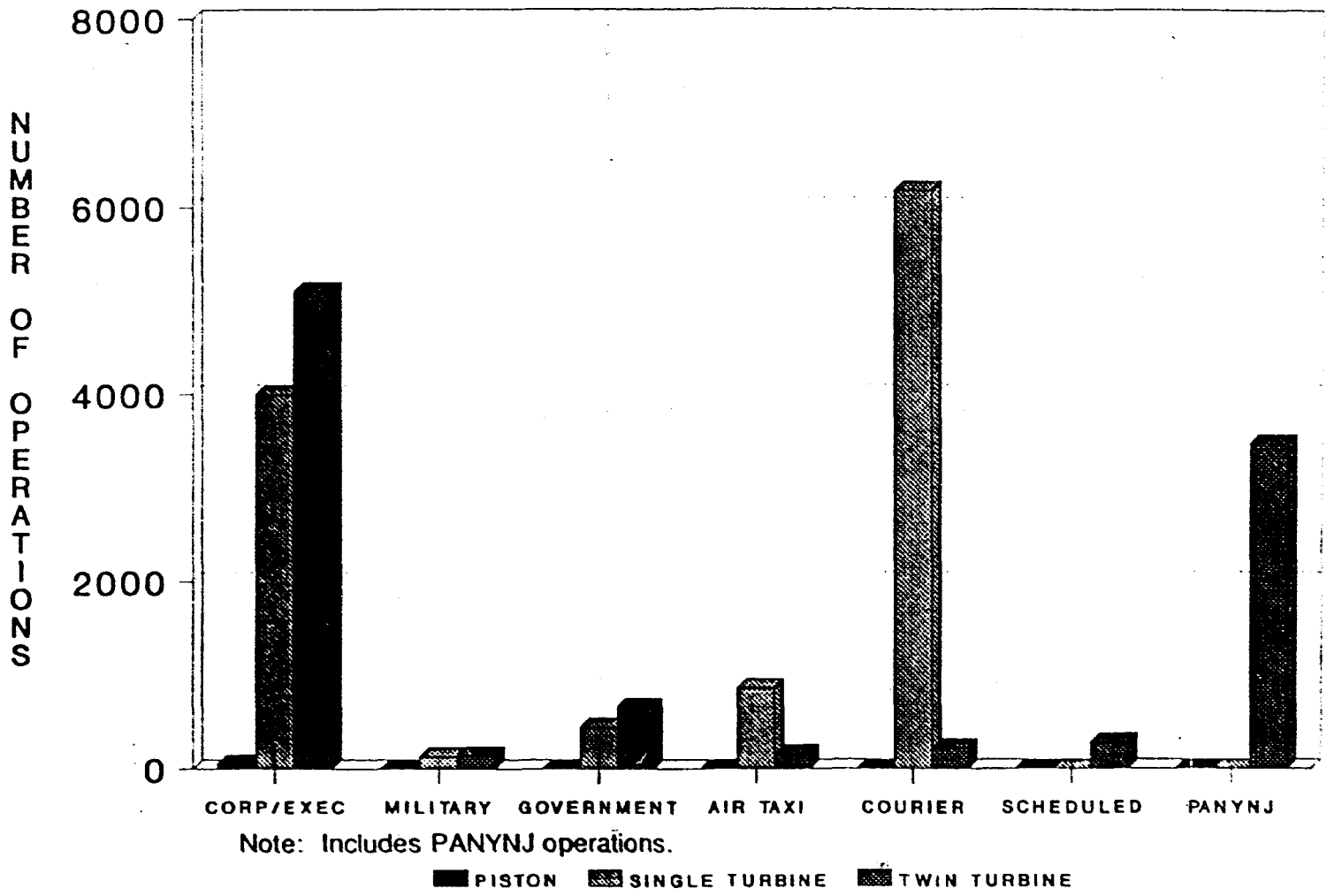


FIGURE 48 NUMBER OF OPERATIONS BY MISSION AND ENGINE TYPE, 1989

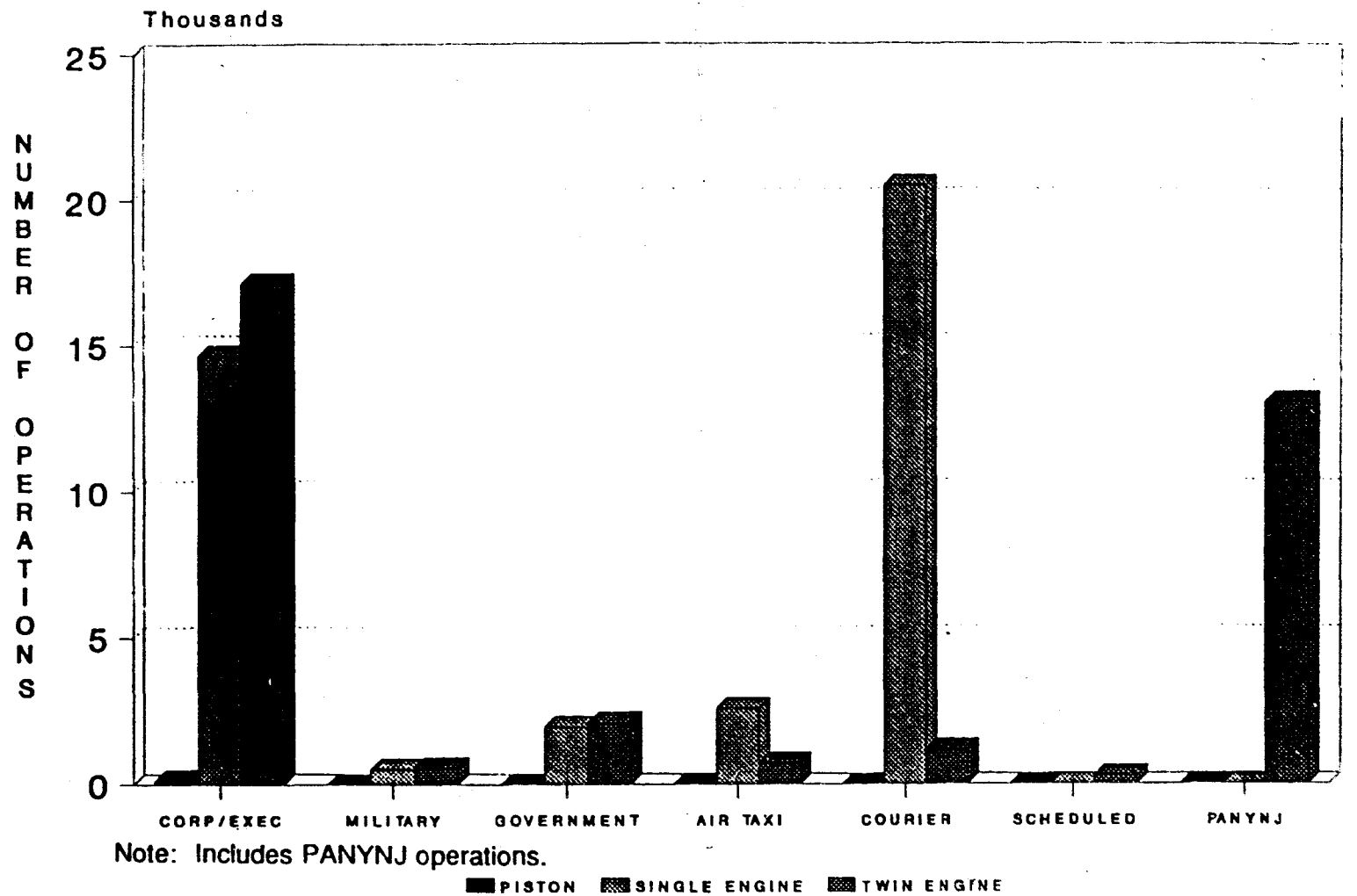


FIGURE 49 TOTAL NUMBER OF OPERATIONS BY MISSION TYPE AND ENGINE TYPE, 1987 THROUGH 1989

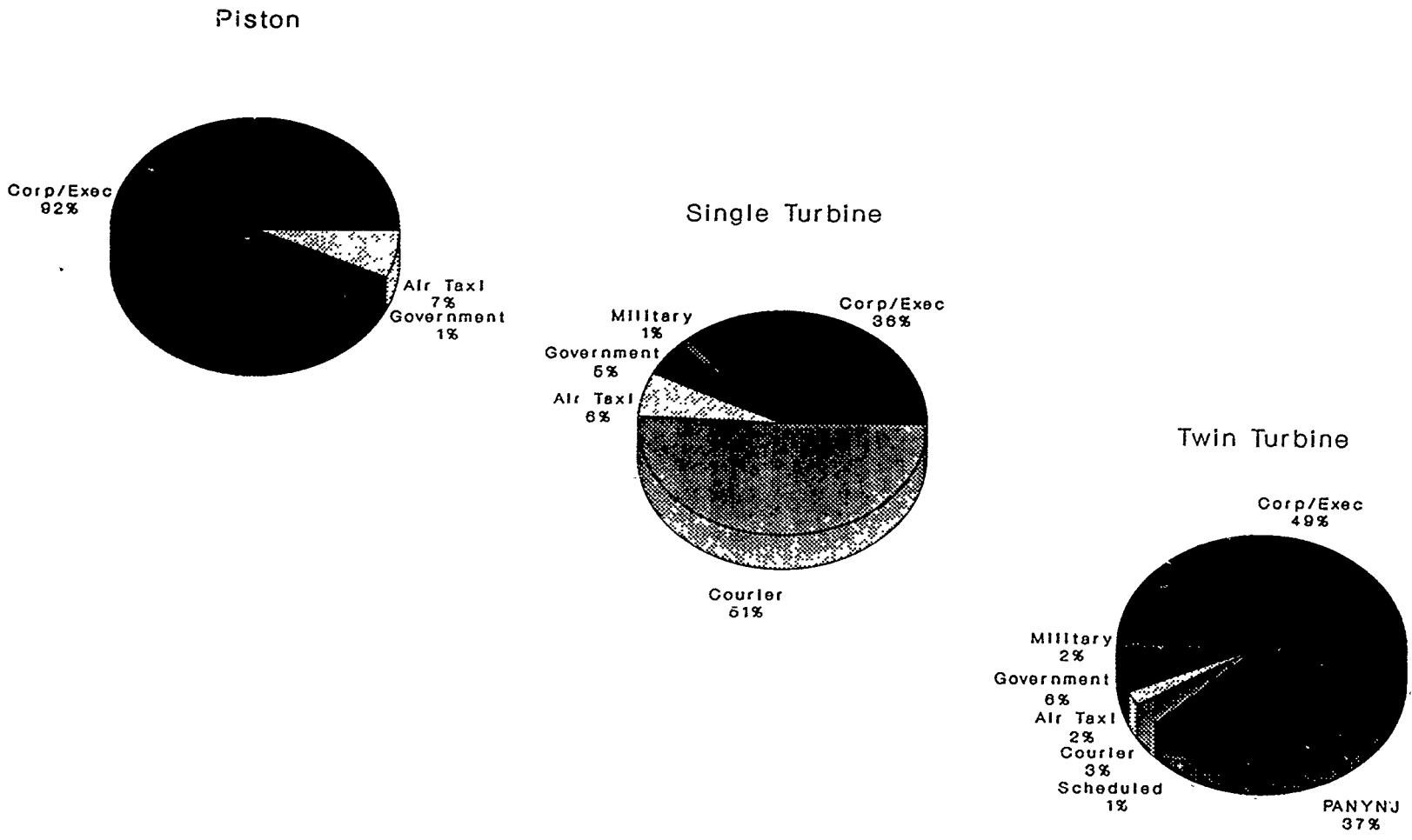


FIGURE 50 PERCENT OF TOTAL OPERATIONS BY MISSION AND ENGINE TYPE, 1987 THROUGH 1989

4.2.8 Passenger Operations

Operations by PANYNJ helicopters are not included in this analysis because this information was not available for those operations, as discussed in section 3.1.

4.2.8.1 Passengers by Year

The number of operations that carry passengers is shown for each study year and for all 3 study years in figure 51. This figure indicates that the majority of flights do not carry passengers. It also indicates that the number of passengers handled by the DMH is decreasing as overall operations decrease. Over the 3 years a total of 23,361 operations carried passengers, while 38,923 did not.

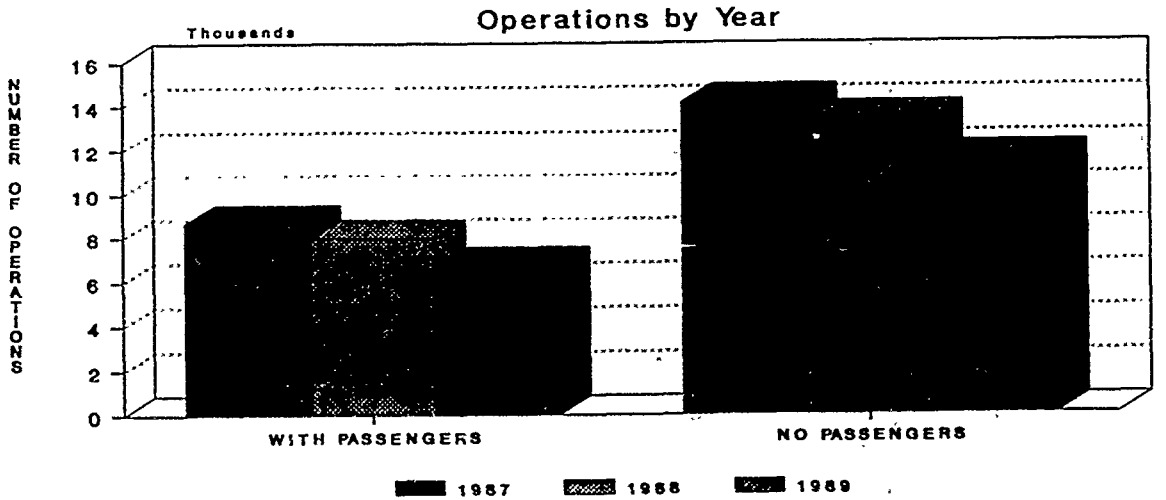
One explanation for the limited number of passengers may be the strong courier/cargo activity (see section 4.2.5.1) which represents almost 30 percent of the total number of operations. During cargo operations the helicopter arrives fully loaded and departs fully loaded with the exchange of cargo accomplished at the heliport. Therefore, cargo operations are considered a more efficient use of aircraft, and from a heliport owner's perspective they allow the opportunity to derive greater revenues on an annual basis from rental of ancillary space and services.

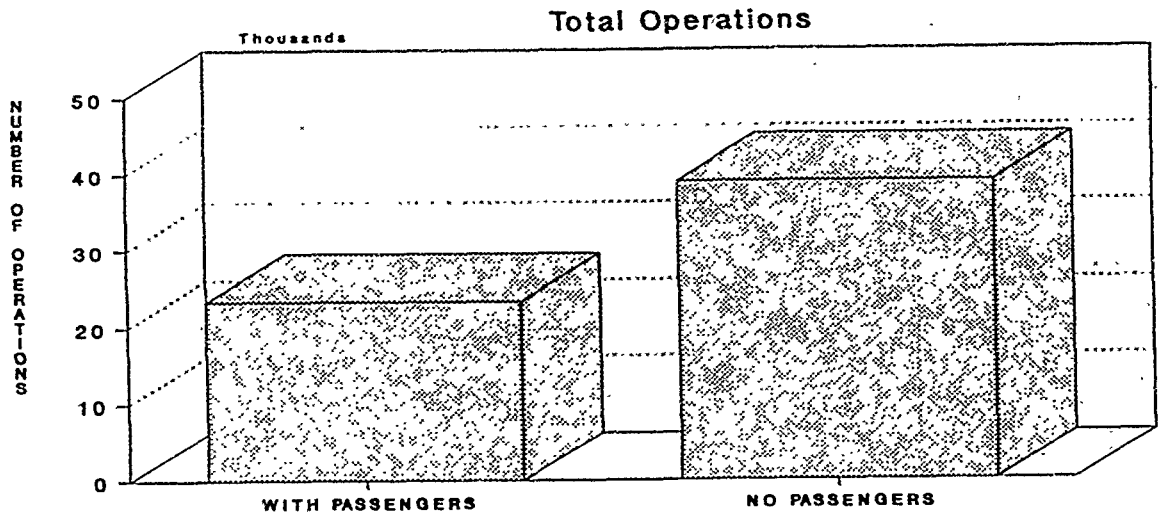
To provide a more detailed analysis of passenger data, operations were divided into four passenger service categories: dropoff only, pickup only, dropoff and pickup, and no passengers. The breakdown on these categories is shown in figure 52. When considering the dropoff and pickup categories alone, in 1987 there were slightly more operations that picked up passengers with 3,356, than dropped off them up with 3,323; 2,006 operations did both, and 14,119 carried no passengers. In 1988, there were more operations that dropped off passengers with 3,099, than picked them up with 2,968; 1,910 did both, and 13,303 carried no passengers. The same was true in 1989, with 2,586 operations picking up passengers and 2,465 dropping them off; 1,648 did both, and 11,501 carried no passengers. The second bar chart in figure 52 presents the total number of operations providing passenger service for all 3 study years for these four categories. Overall, more operations dropped off passengers with 9,008, than picked them up with 8,789, while 5,564 did both.

The percentages of passenger operations, also shown in figure 52, show that 14 percent dropped off passengers, 14 percent picked up passengers, only 9 percent did both, and 62 percent of all operations carried no passengers.

4.2.8.1.1 Passengers by Arrival and Departure

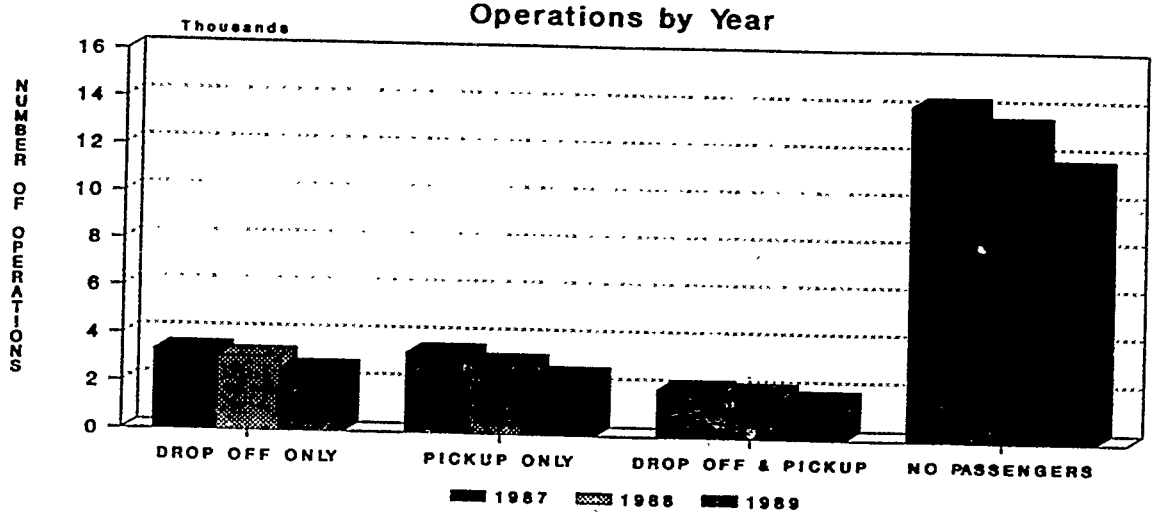
This parameter examines the number of passengers using the DMH. Figure 53 presents the number of arrival and departure passengers for each of the 3 study years, the number of passengers for all of the study years, and the percentages of both.

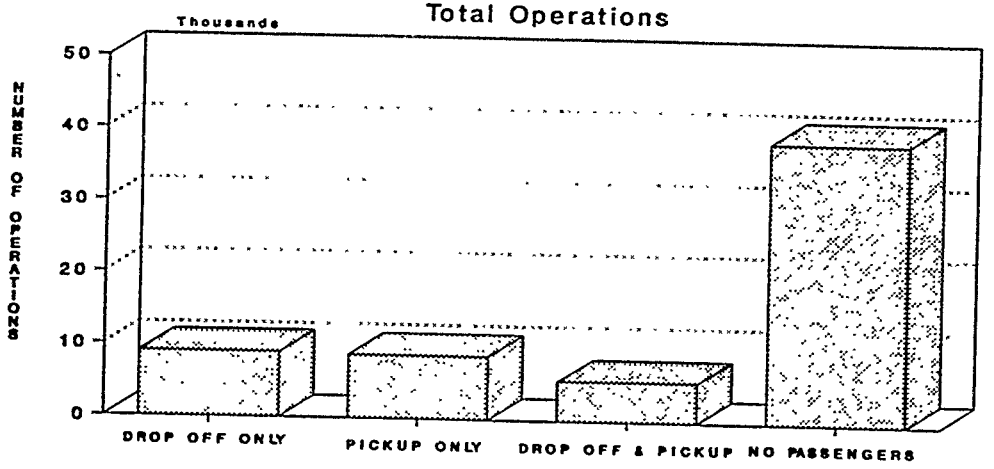


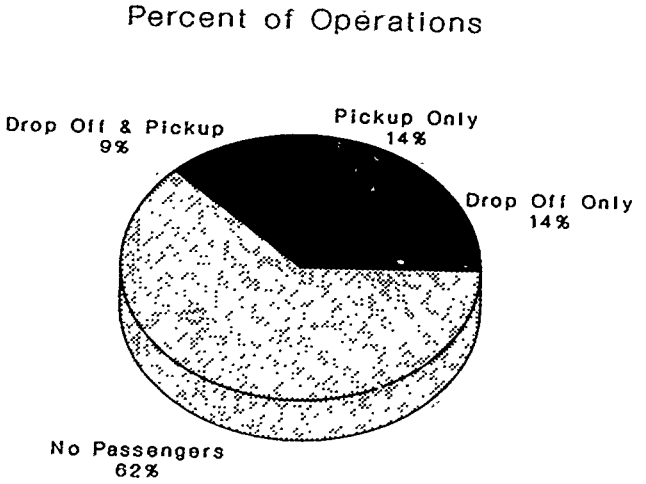


Note: Does not include PANYNJ operations.

FIGURE 51 NUMBER OF PASSENGER AND NON-PASSENGER OPERATIONS BY YEAR, 1987 THROUGH 1989

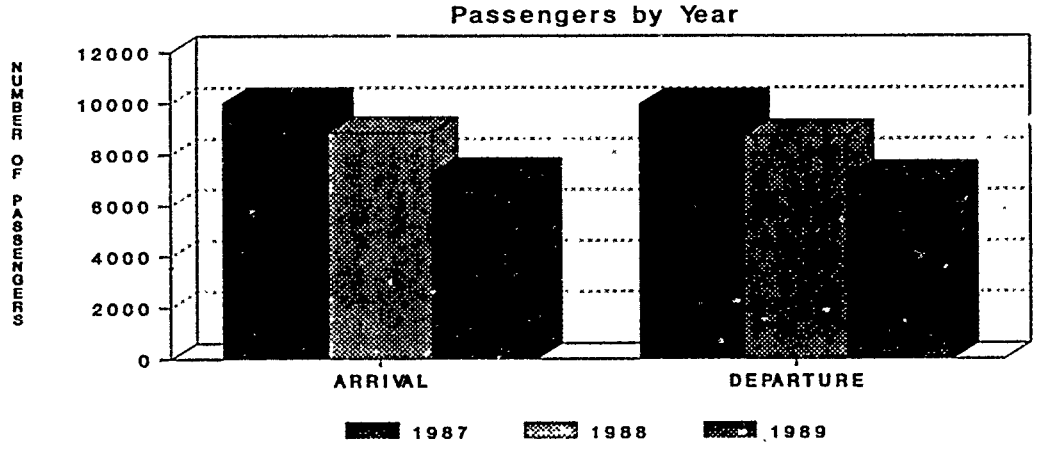


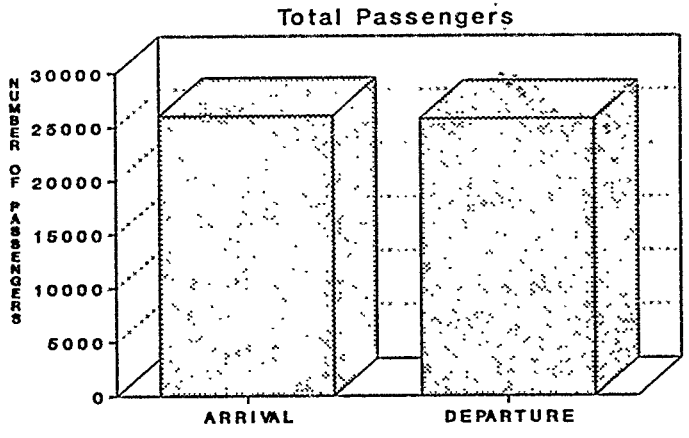


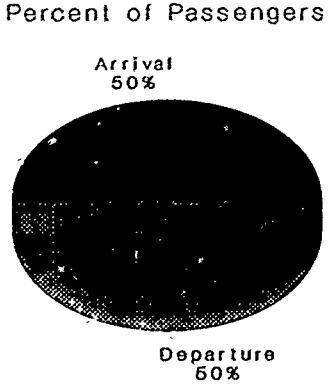


Note: Does not include PANYNJ operations.

FIGURE 52 NUMBER AND PERCENT OF OPERATIONS BY PASSENGER SERVICE AND YEAR, 1987 THROUGH 1989







Note: Does not include PANYNJ operations.

FIGURE 53 NUMBER AND PERCENT OF PASSENGERS BY ARRIVAL AND DEPARTURE, 1987 THROUGH 1989

It is evident that nearly equal numbers passengers arrive and depart by helicopter. The total number of arriving passengers for all 3 study years is 26,103 and the number of departing passengers is 25,816. This is a difference of only 287 people in 3 years. This is best portrayed by the pie chart in figure 53 that shows 50 percent each for arriving and departing passengers. These numbers characterize the overall use and location of the DMH.

The DMH is located in an area with a very high number of commercial and business enterprises and very few residences. These data imply that passengers using the heliport are most likely there to conduct business and then leave the area when their business is completed.

4.2.8.2 Number of Passengers by Month and Year

The number of passengers travelling through the DMH varies only slightly month to month. The numbers of passengers for each study year and for all 3 years are presented in figure 54. In 1987, January had the most passengers at the heliport and November had the least. In 1988, June had the most passengers handled and January had the least. In 1989, December had the most passengers at the DMH and February had the least.

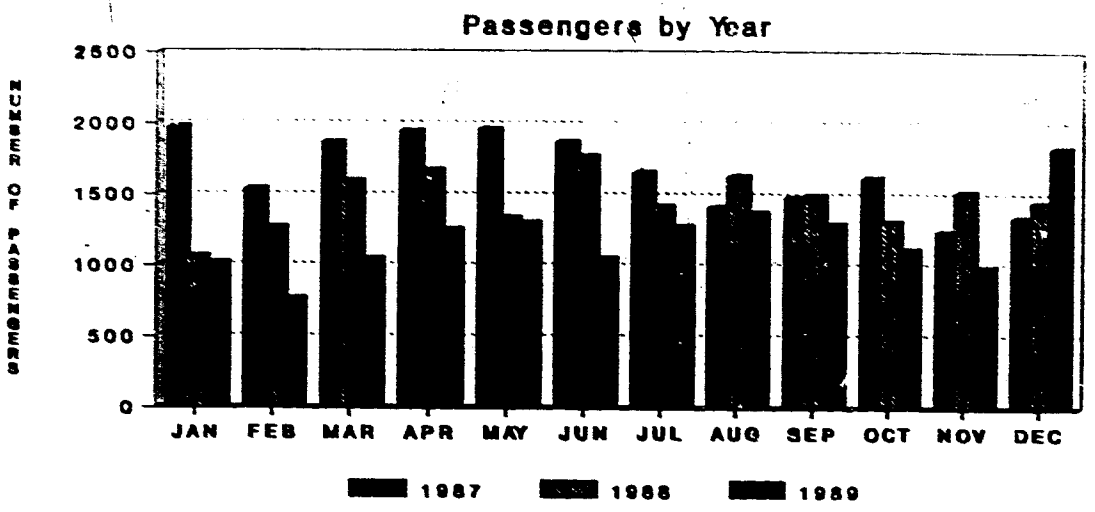
An interesting feature of figure 54 is that although the overall number of passengers decreases, the number of passengers does not decrease consistently by month. For instance, in August, September, and November of 1989, the number of passengers decreased below 1987 levels, while in December of 1989, the number increased over 1987 figures. This inconsistency is also apparent in 1988 when the number of passengers increased in August, September, November, and December over the 1987 numbers, yet the overall number of passengers decreased.

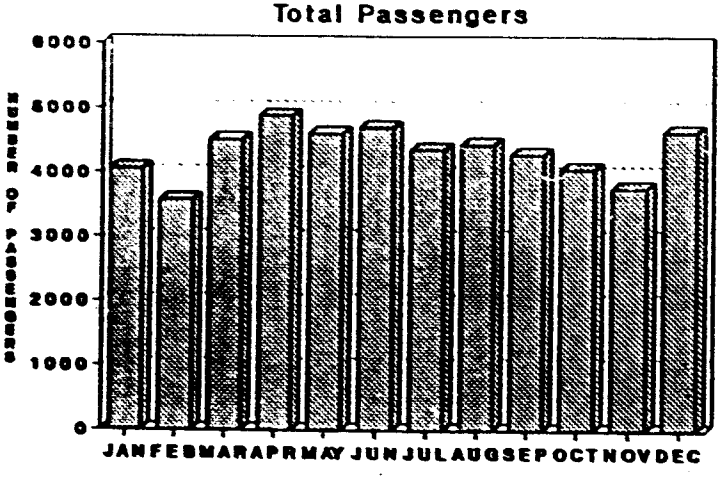
The total number of passengers for all 3 study years is also shown in figure 54. It shows that overall, April had the most passengers and February had the least.

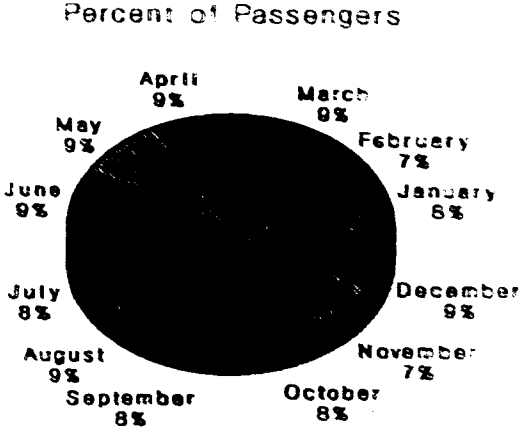
Figure 54 further depicts the percentage of the total number of passengers handled by the DMH every month for all 3 study years. The percentages were evenly distributed throughout the year, ranging from 7 to 9 percent.

4.2.8.3 Number of Passengers by Day of Week and Year

Figure 55 presents the number of passengers by day of the week for each of the 3 study years, for all 3 of the study years, and the percentages of passengers for all 3 years. The numbers of passengers in 1987 and 1988 closely followed the weekly operational pattern of the heliport seen in section 4.2.3. That is, the highest numbers of passengers used the DMH Tuesday through Thursday, with 4,331, 4,323, and 3,980, respectively for 1987; and 3,860, 3,626, and 4,046 for 1988. The fewest number used the heliport on Monday and Friday, with 3,354 and 3,960, respectively in 1987; and 2,735 and 3,313 in 1988. But in 1989 the pattern was quite different. There was a slow increase from Monday to Thursday, with 2,767, 2,856, 2,994, and 3,027, respectively, with a drop to 2,635 on Friday.

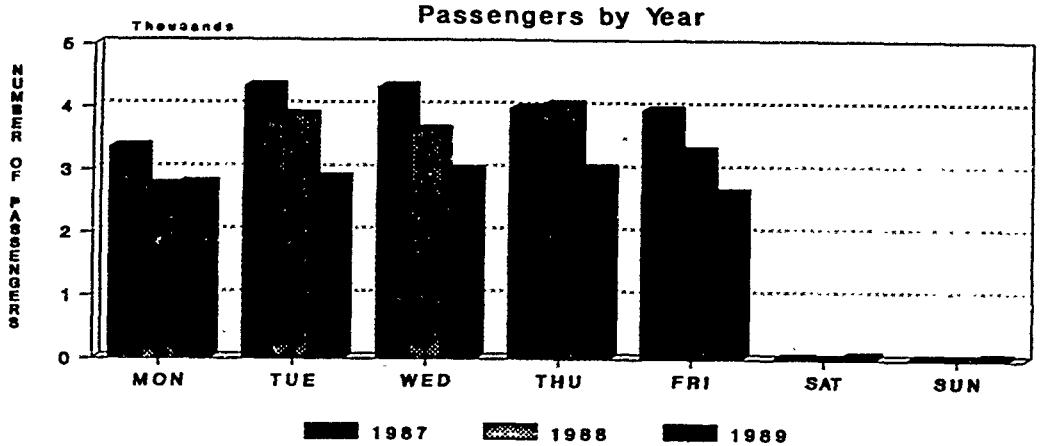


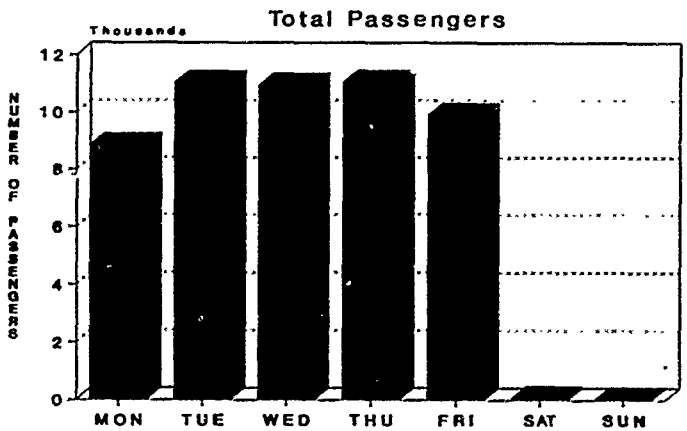


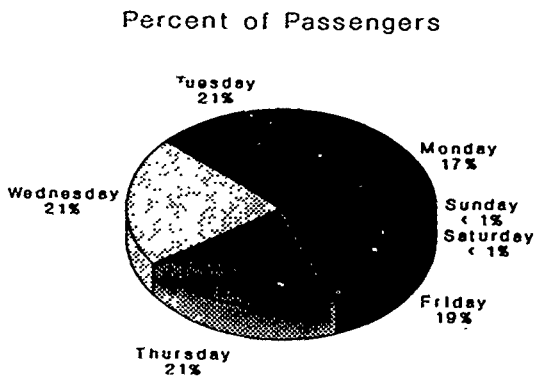


Note: Does not include PANYNJ operations.

FIGURE 54 TOTAL NUMBER AND PERCENT OF PASSENGERS BY MONTH AND YEAR, 1987 THROUGH 1989







Note: Does not include PANYNJ operations.

FIGURE 55 TOTAL NUMBER OF PASSENGERS BY DAY OF WEEK AND YEAR, 1987 THROUGH 1989

Figure 55 also shows a small amount of passenger service on the weekends. In 1987, the highest number was on Saturday with 19. In 1988, there were few passengers on weekends, a total of nine for both days. There were higher numbers on both Saturday and Sunday in 1989, with 51 and 26, respectively.

When passengers were totalled for all years, the pattern once again looked like the operational pattern in section 4.2.3. However, the highest number of passengers was on Thursday, followed very closely by Tuesday, and the lowest number was on Monday. The highest number of weekend passengers was on Saturday with 75. Total passengers on Sunday for all 3 years was 37.

The percentages show that Tuesday, Wednesday, and Thursday each had 21 percent of all passengers at the DMH, Monday had 17 percent, and Friday had 19 percent. Both Saturday and Sunday had less than 1 percent each.

4.2.8.4 Number of Passengers by Time of Day and Year

The number of passengers by time of day and year for each of the 3 study years and for all 3 study years is shown in figure 56. As would be expected, the passenger flow follows the same trends as that of overall operations seen in section 4.2.4.

The highest number of passengers occurs at 0800 hours, tapering off through out the day. Between 1000 and 1500 hours, the number of passengers stays relatively flat, with slight increases at 1100 hours and 1400 hours. The number of passengers increases during the afternoon rush hour between 1600 and 1800 hours. This pattern is the same for each individual year and for the total number of passengers for all 3 years.

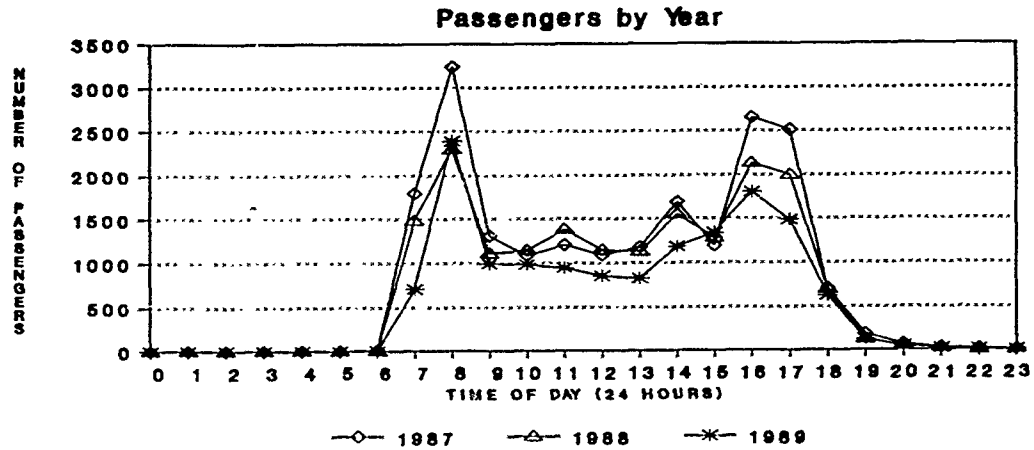
4.2.8.5 Number of Passengers by Mission Type

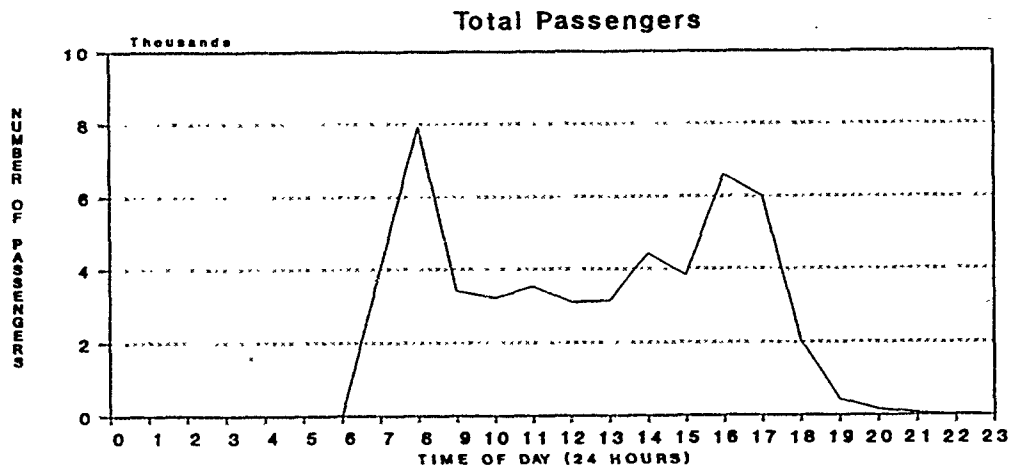
Passengers carried by individual missions show the same overall pattern of passenger activity. Figure 57 shows the number of passengers by mission type for each study year.

In 1987, the mission that carried the most passengers, both because of the mission's function and because this mission has the highest number of operations at the DMH, was corporate/executive with 14,340. The least number of passengers was carried by military with 531. Government, air taxi, and courier carried 1,620, 1,865, and 1,618, respectively.

In 1988, again corporate/executive carried the most passengers with 12,369. Government and military operations, with 2,327 and 539 passengers respectively in 1988, each carried more passengers in 1988 than in 1987. Courier and air taxi passengers dropped significantly to 345 and 959, respectively.

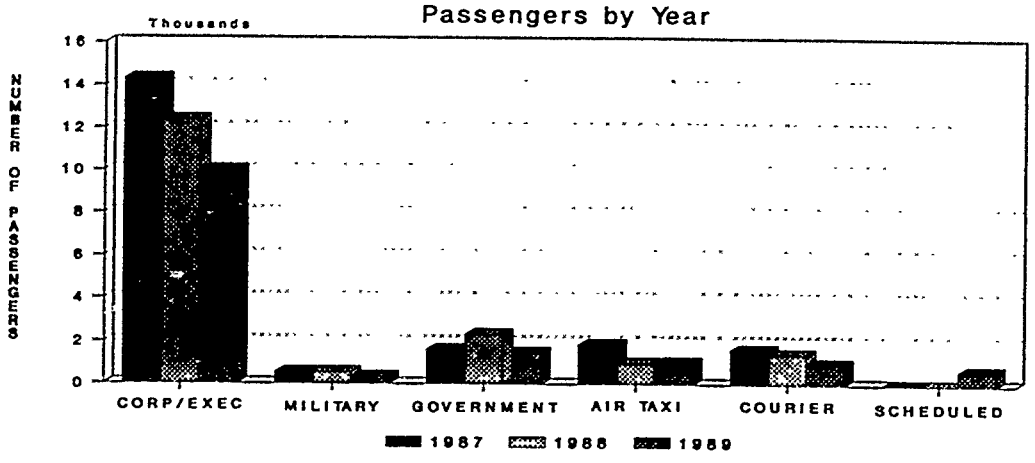
In 1989, the highest number of passengers was carried by corporate/ executive with 9,992, then government with 1,451, air taxi with 1,009, courier with 930, and military with 329. Scheduled commuter (for 1 month of operation) carried 645. The only mission to increase the number of passengers carried in 1989 was air taxi.

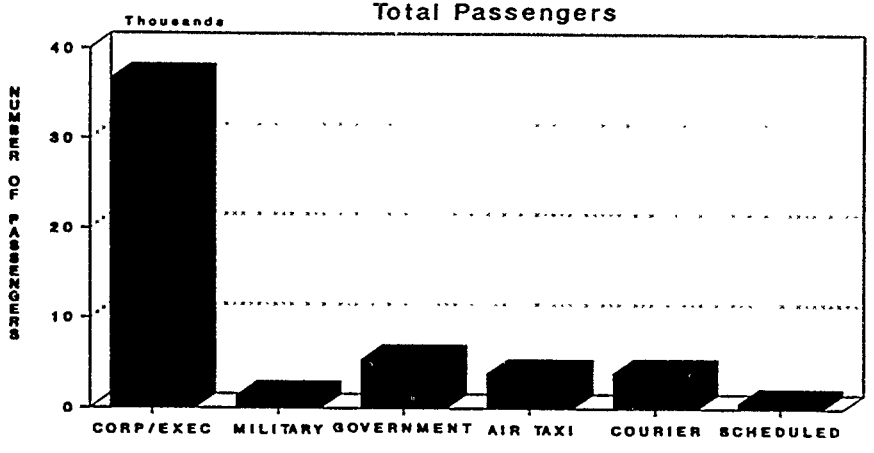


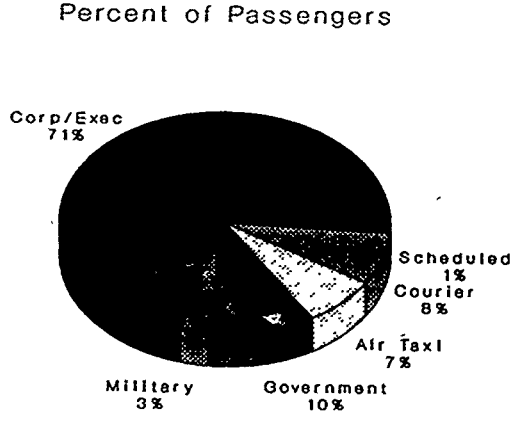


Note: Does not include PANYNJ operations.

FIGURE 56 TOTAL NUMBER OF PASSENGERS BY TIME OF DAY AND YEAR, 1987 THROUGH 1989







Note: Does not include PANYNJ operations.

FIGURE 57 TOTAL NUMBER AND PERCENT OF PASSENGERS BY MISSION TYPE AND YEAR, 1987 THROUGH 1989

Figure 57 also presents the total number of passengers by mission type for all 3 study years. The highest number of passengers are carried by corporate/executive helicopters, then government, air taxi, courier, and military. Although scheduled commuter operations register in these charts, the 1 month of operations is not comparable to the other numbers. The last graph in this figure shows the percentages of passengers by engine type. Singles carry 52 percent of the passengers and twins 47 percent, while pistons carry less than 1 percent.

4.2.8.6 Number of Passengers by Engine Type

Figure 58 shows the number of passengers carried by engine type. In both 1987 and 1988, singles carried more passengers than twins, but in 1989 twins carried more. In 1987, singles carried 11,152, while twins carried 8,814. In 1988, these figures were 9,225 and 8,330, respectively. In 1989, singles carried 6,880 passengers and twins carried 7,451 passengers. Piston helicopters carried very few passengers, 8 in 1987, 34 in 1988, and 25 in 1989.

The total number of passengers carried for all 3 years shows that overall, singles carried more passengers than did twin helicopters. Piston helicopters carried a total of 67 passengers for all 3 years.

The final graph in figure 58 shows the percentage of total passengers by engine type for all 3 years. Singles carried 52 percent of all passengers, twins carried 47 percent, and piston helicopters carried less than 1 percent.

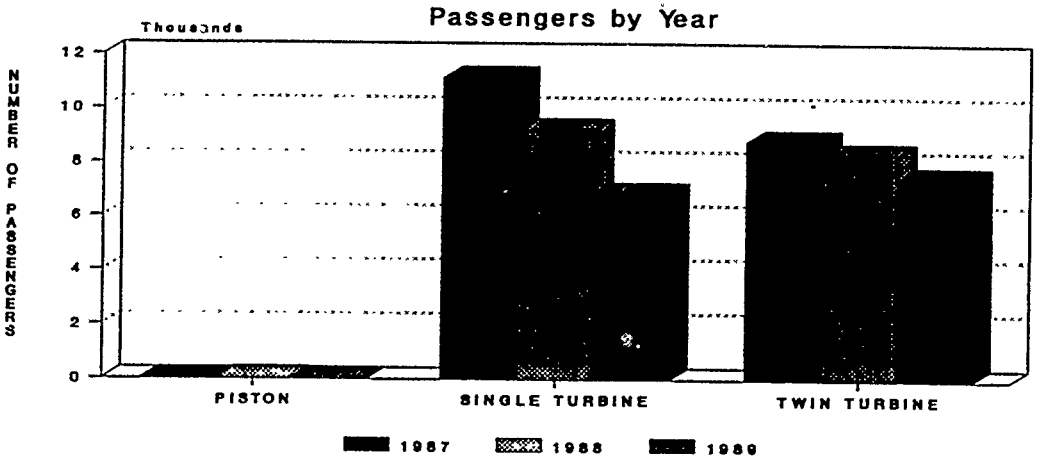
4.2.9 Fees Collected

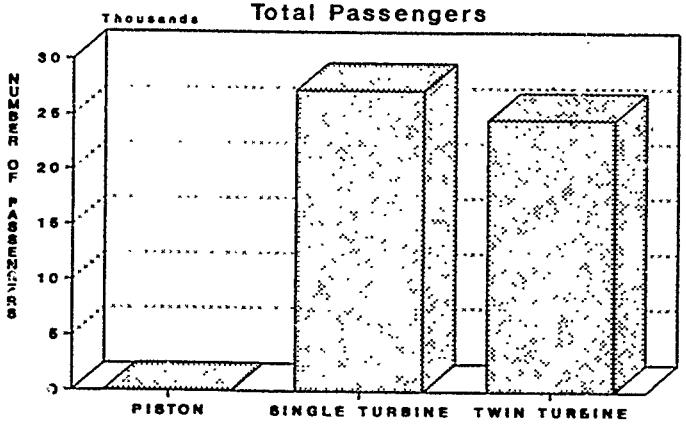
The fees on the daily log sheet are listed only for those operators who do not have "bulk rate" accounts with PANYNJ (see section 3.2.9). The fees represented in subsequent figures are those recorded on the daily log sheets and do not represent the total revenue collected by the DMH. Furthermore, fees are only collected for the corporate/executive, air taxi, courier, and scheduled commuter missions. None are charged to government or military operations.

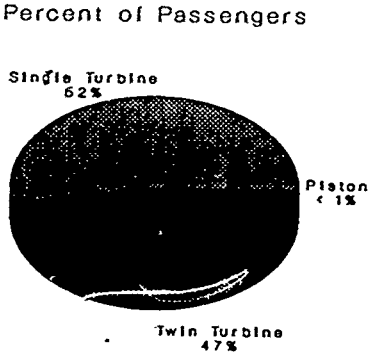
A list of the fees charged for takeoff and parking that were in effect from July of 1987 to July of 1990 are listed in table 2. The total revenues generated for the DMH, including the bulk rate accounts, are shown in table 3. The amount of fees shown on this report's figures represent a percentage of the total revenue generated by the heliport. These percentages, also shown in table 3, were derived by comparing the total yearly fees indicated on the daily log sheets with the total annual revenue generated by the DMH. These are 37 percent for 1987, 43 percent for 1988, and 48 percent for 1989.

4.2.9.1 Fees Collected by Year

The amount of fees recorded on the daily log sheets for each of the 3 study years and for all 3 study years is shown in figure 59. The amount of money collected for takeoff increased from the 1987 total of $103,483 to $119,631 in 1988, then decreased slightly in 1989 to $117,220. Parking fees increased sharply from a 1987 figure of $30,378 to $55,527 in 1988,







Note: Does not include PANYNJ operations.

FIGURE 58 TOTAL NUMBER AND PERCENT OF PASSENGERS BY ENGINE TYPE AND YEAR, 1987 THROUGH 1989

TABLE 2
SCHEDULE OF CHARGES
July 1987-1990

Takeoff Fees

Helicopter Weight	Fee
Up to 4,000 lbs.	$25.00
4,001 to 6,000	32.00
6,001 to 8,000	37.00
8,001 to 10,000	45.00
10,001 to 12,000	50.00
12,001 to 16,000	55.00
Over 16,000	60.00

Parking Fees

Helicopter Weight	1st 15 Minutes	1st Hour	Additional Hour
Up to 8,000	No fee	$15.00	$10.00
8,001 to 16,000	No fee	40.00	25.00
Over 16,000	No fee	45.00	35.00

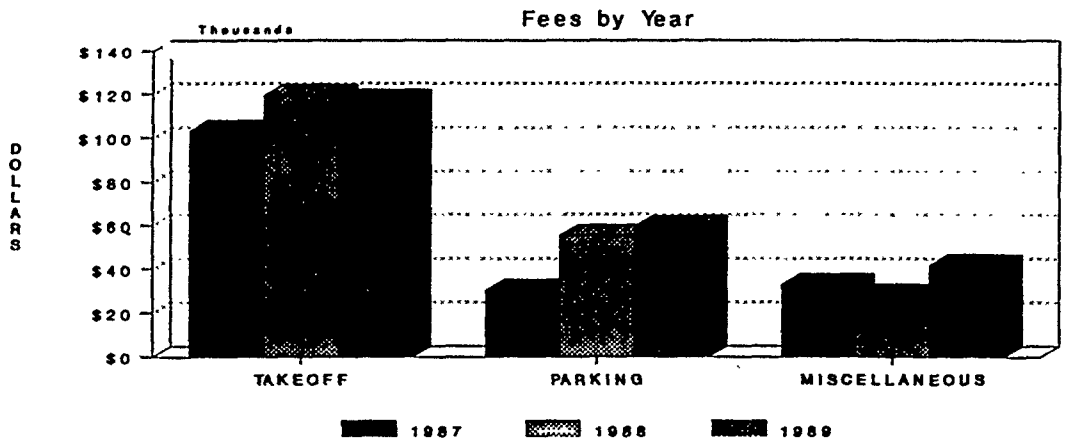
Source: Port Authority of New York and New Jersey.

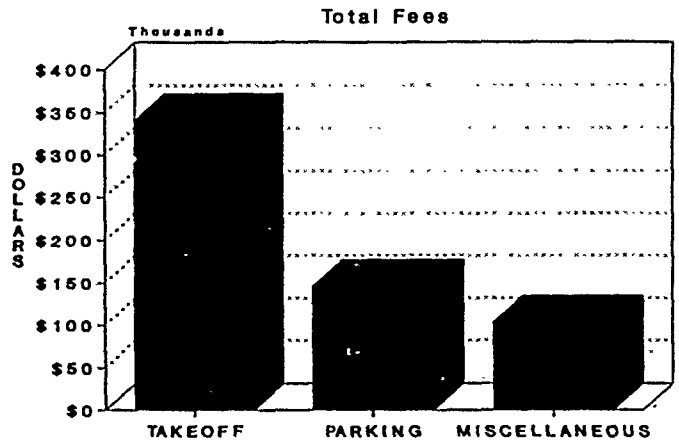
TABLE 3
TOTAL REVENUE COLLECTED

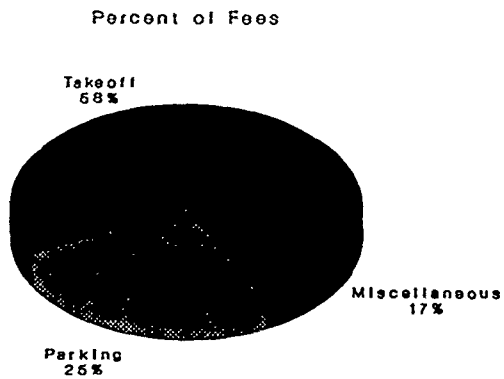
Year	Bulk Rate Accounts	Individual* Fees	Total Revenue (in thousands)	Individual Fees as a Percent of Total Revenue
1987	$ 288.1	$ 166.9	$ 455.0	37 percent
1988	273.6	203.3	476.9	43 percent
1989	237.2	218.8	456.0	48 percent

* Fees indicated on log sheets.

Source: Port Authority of New York and New Jersey.







Note: Does not include fees collected from customers with bulk rate accounts.

FIGURE 59 FEES COLLECTED BY YEAR, 1987 THROUGH 1989

and increased slightly again in 1989 to $59,797. Miscellaneous fees dropped slightly from $33,125 in 1987 to $28,115 in 1988, then increased sharply in 1989 to $41,838.

The total amount of fees recorded on the log sheets for all 3 study years show that the most money was collected for takeoff fees, then for parking fees, and the least was collected for miscellaneous fees.

These amounts are reflected in the percentages of fees recorded on the log sheets; takeoff fees amounted to 58 percent, parking 25 percent, and miscellaneous 17 percent.

4.2.9.2 Fees Collected by Month

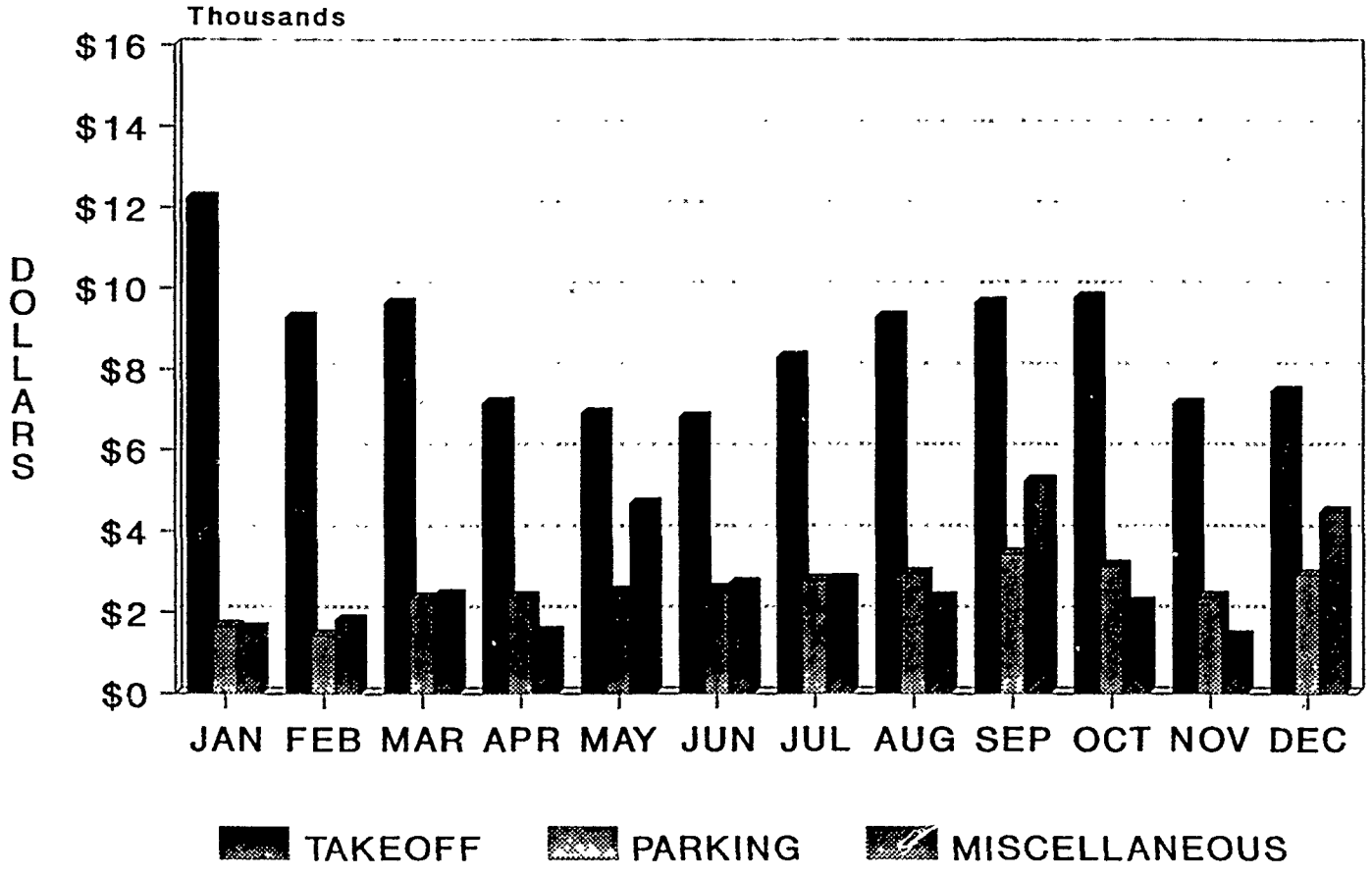
Monthly fee amounts from the log sheets for 1987 are seen in figure 60. In 1987, takeoff fees represented the most money collected every month. The highest amount received was in January and the lowest in June. The January high tapered off to the June low with only a slight rise in March. Starting in July, takeoff fees increased slowly through October, dropped off in November, and rose slightly in December. Parking fees were highest in September and lowest in February. They dropped very slightly in February but increased slowly but steadily until September, dropped a small amount in October and again in November, and rose slightly in December. Miscellaneous fees were greatest in September and lowest in November. The miscellaneous fees collected did not follow any particular monthly pattern.

In 1988, figure 61 shows that takeoff fees did not follow a specific pattern through out the year. The highest month was June and the lowest was January, with much variation throughout the year. Parking fees were highest in March and lowest in January, also with no pattern. Miscellaneous fees were highest in April and showed a steady increase to this high from January, which was one of the two low points; the other was in September. After April, however, there was no pattern.

Figure 62 shows that takeoff fees in 1989 were highest in April and lowest in February. There was a peak in August almost as high as April, then a steady decrease in the amount through December. Parking fees were highest in August and lowest in February. Miscellaneous fees were highest in May.

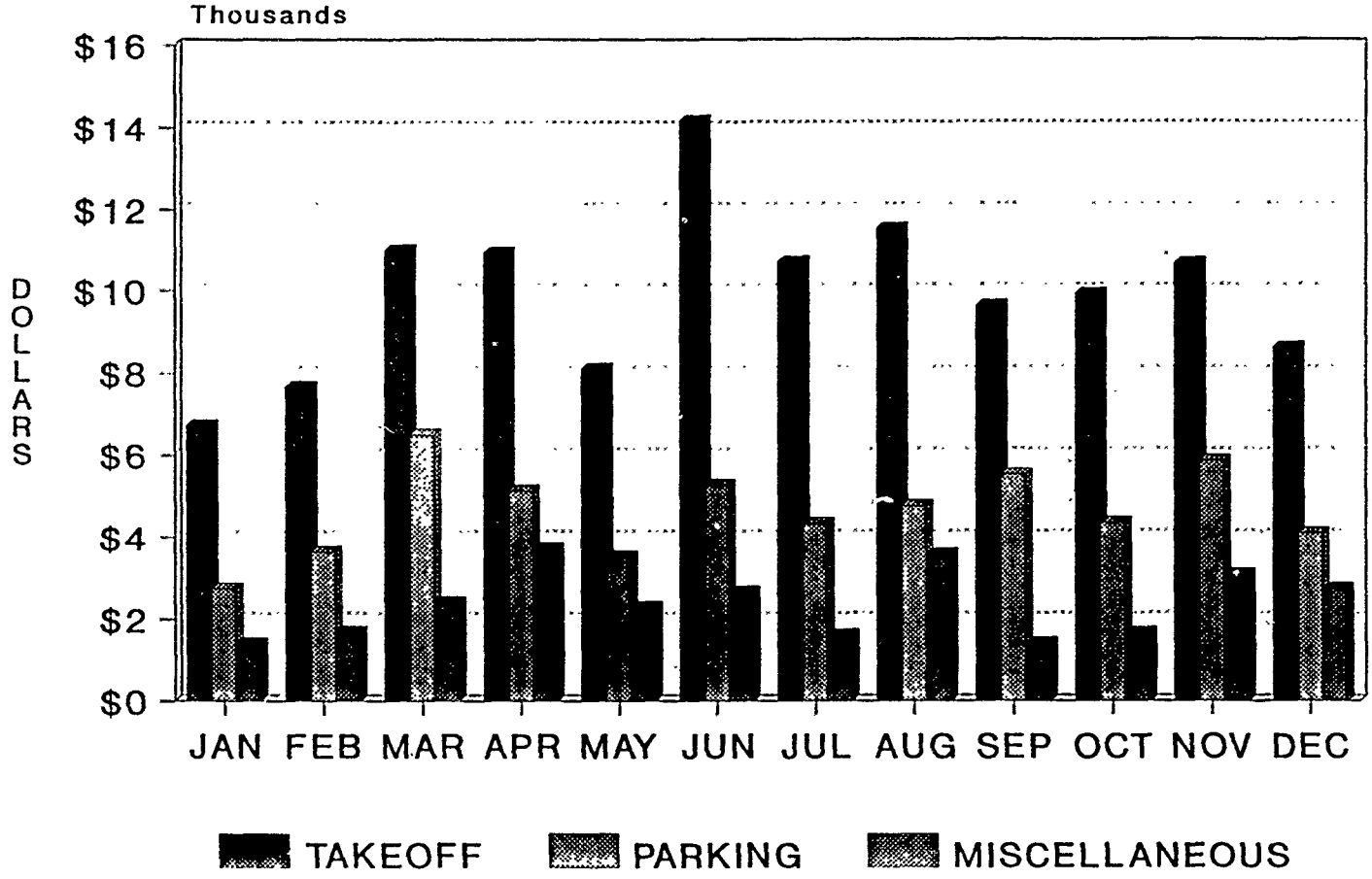
In all 3 years the log sheet numbers show that takeoff fees were the highest of any of the three types of fees in every month, as indicated in figure 63. Although parking fee revenues were generally higher than miscellaneous fees, this was not always true; however, in 1988 parking revenues were always higher.

The percentage of total fees shown on the log sheet for all 3 study years is shown in figures 64 and 65. January showed the highest percent of takeoff fees at 66 percent. The lowest month for this fee was May with only 50 percent. Parking fees were highest in November at 27 percent of total fees, and lowest in January at 21 percent. Miscellaneous fees were highest in May at 28 percent and lowest in February at 11 percent of the total.



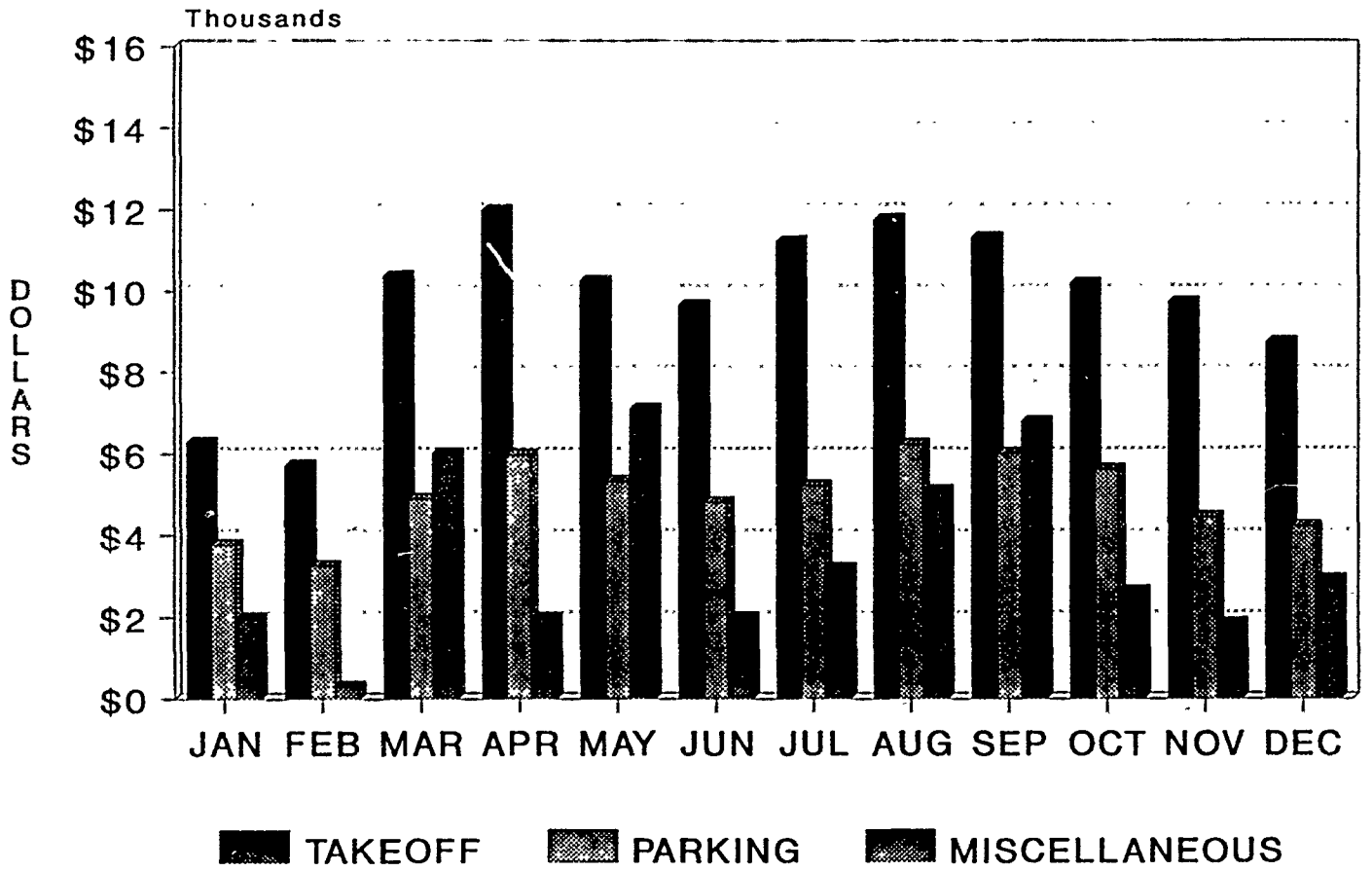
Note: Does not include fees collected from customers with bulk rate accounts.

FIGURE 60 AMOUNT MONTHLY FEES COLLECTED, 1987



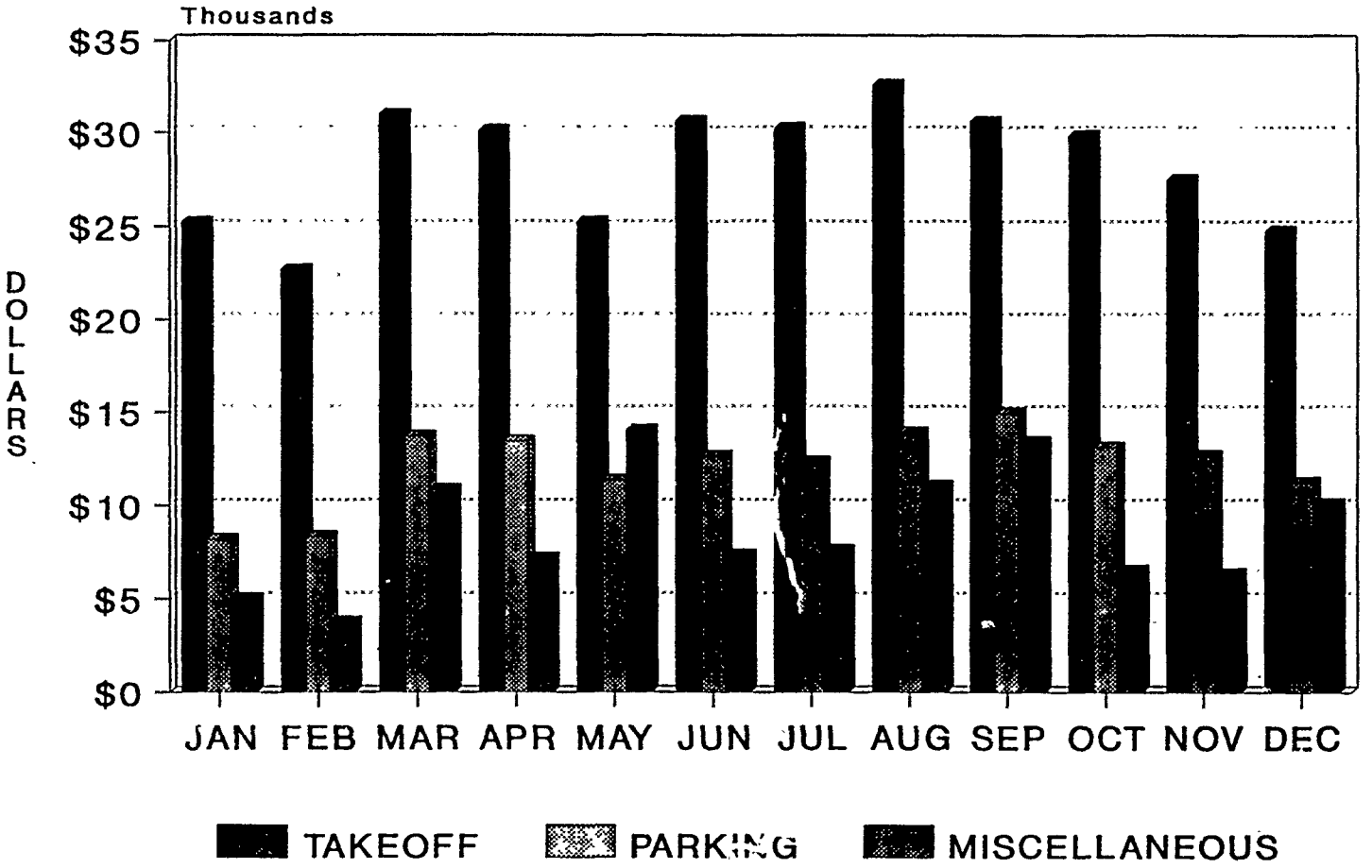
Note: Does not include fees collected from customers with bulk rate accounts.

FIGURE 61 AMOUNT MONTHLY FEES COLLECTED, 1988



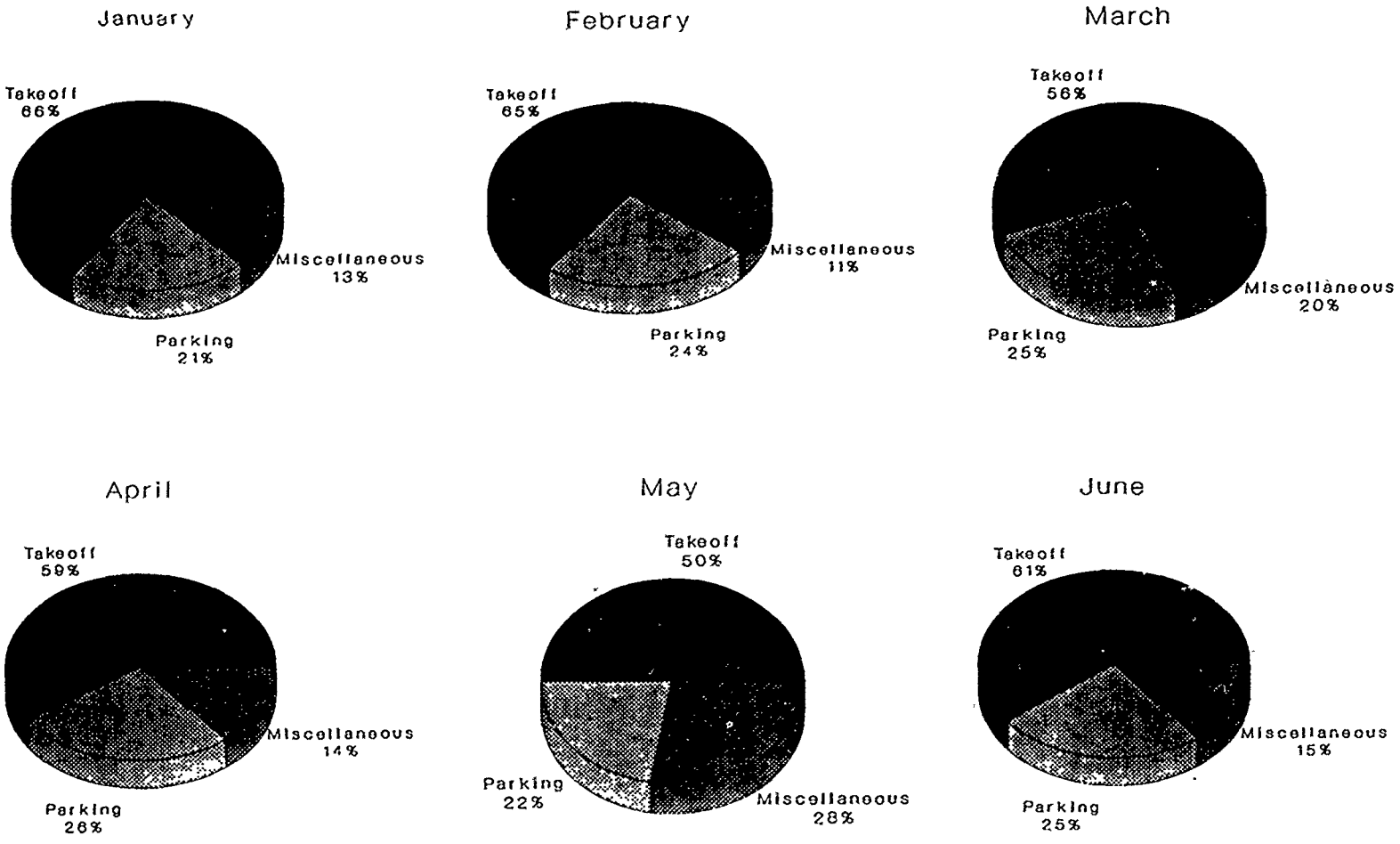
Note: Does not include fees collected from customers with bulk rate accounts.

FIGURE 62 AMOUNT MONTHLY FEES COLLECTED, 1989



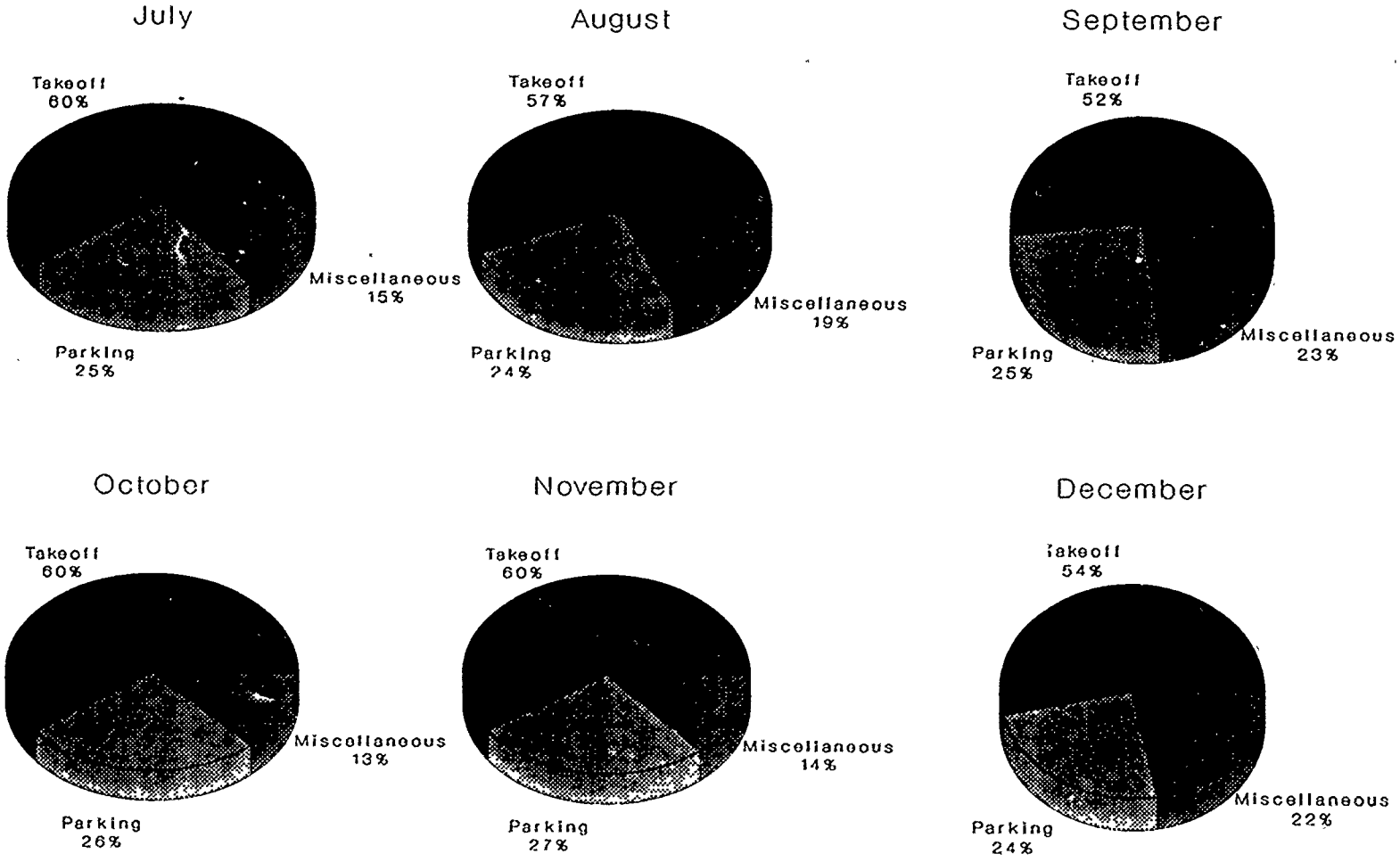
Note: Does not include fees collected from customers with bulk rate accounts.

FIGURE 63 TOTAL AMOUNT OF MONTHLY FEES COLLECTED, 1987 THROUGH 1989



Note: Does not include fees collected from customers with bulk rate accounts.

FIGURE 64 PERCENT OF FEES COLLECTED, JANUARY TO JUNE, 1987 THROUGH 1989



Note: Does not include fees collected from customers with bulk rate accounts.

FIGURE 65 PERCENT OF FEES COLLECTED, JULY TO DECEMBER, 1987 THROUGH 1989

4.2.9.3 Fees Collected by Day of Week

Due to the incomplete data regarding the amount of total revenue collected on a daily basis, an analysis of fees by day of week was considered statistically irrelevant (see section 3.2.9).

4.2.9.4 Fees Collected by Time of Day

Due to the incomplete data regarding the amount of total revenue collected by time of day, an analysis of fees by time of day was considered statistically irrelevant (see section 3.2.9).

4.2.9.5 Fees Collected by Mission Type

Figure 66 shows fees by mission type that were recorded on the daily log sheets. Takeoff fees increased from $75,377 in 1987 to $97,532 in 1988 for corporate/executive but dropped to $96,094 in 1989. Takeoff fees also increased from $12,470 in 1987 to $14,063 in 1988, for air taxi, and further increased in 1989 to $15,196. Takeoff fees collected for courier operations dropped each year from $15,561, to $7,908, to $5,905.

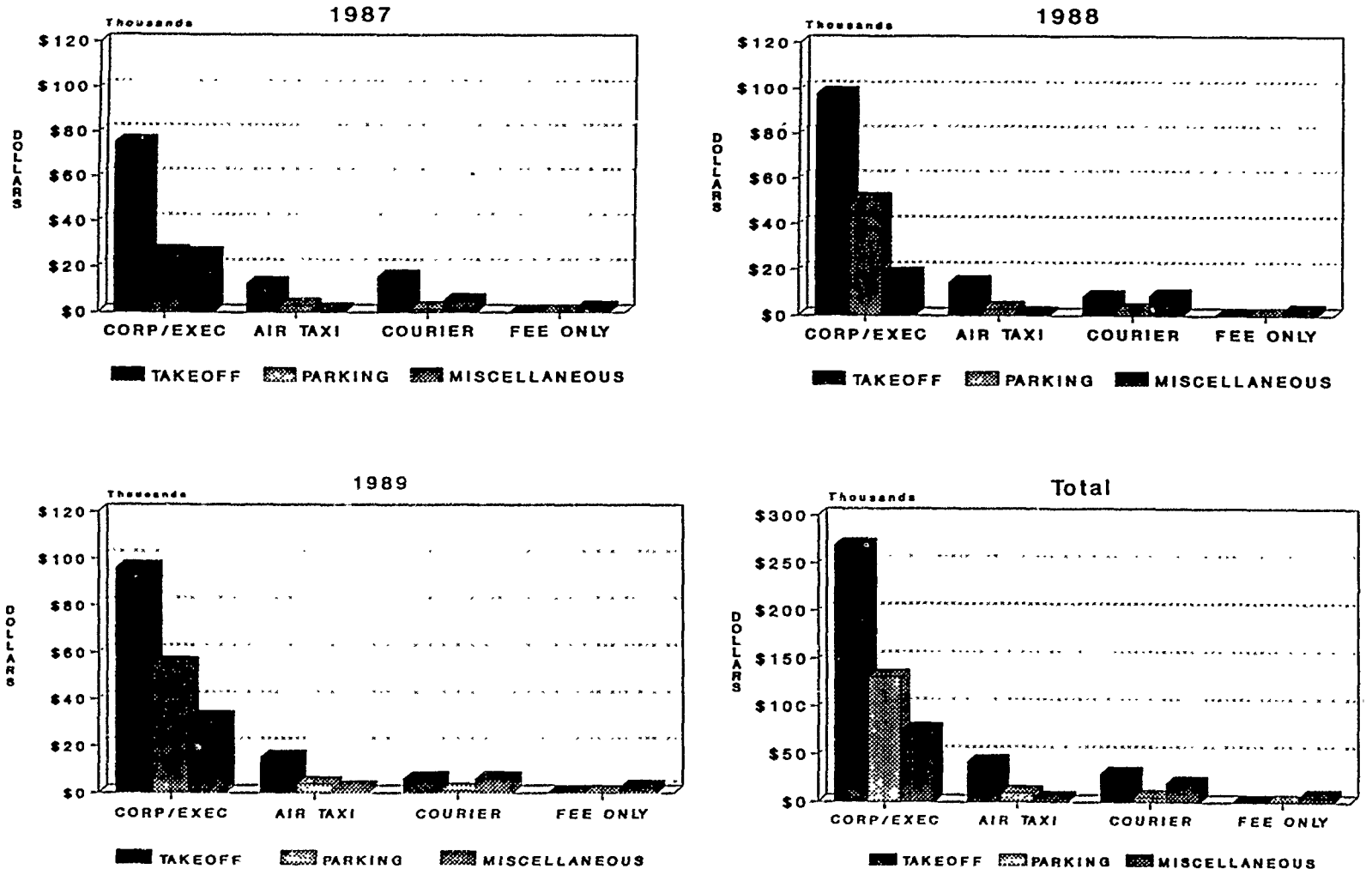
In analyzing fees by mission type, an additional category "fee only" is used. This is a miscellaneous fee that cannot be charged to a specific mission. An example of this type of fee is a charge for taking still pictures of the heliport. This fee is not connected to any specific helicopter operation. Since it is not involved with helicopter activity, the "fee only" category is not analyzed in this report other than in the total amount of fees collected from the amounts shown on the daily log sheets. Government and military operations are not shown in the figures for this parameter, because they were not charged a fee, as discussed in section 4.2.9.

Parking fees increased sharply for corporate/executive from $26,055 in 1987 to $50,557 in 1988. In 1989 the amount of parking fees again rose but only slightly to $54,957. Parking fees decreased for air taxi each year from $2,911 in 1987, to $2,710 in 1988, to $3,815 in 1989. Parking fees collected for courier operations also dropped dropped each year from $1,412 in 1987, to $2,170 in 1988, to $1,025 in 1989.

Corporate/executive miscellaneous fees dropped significantly from $25,375 in 1987 to $17,575 in 1988, then rebounded in 1989 to $31,678, higher than the 1987 figure. The pattern of air taxi miscellaneous fees was the same, $1,000 in 1987, $600 in 1988, and $1,960 in 1989. The courier mission showed just the opposite pattern, $5,000 in 1987, $8,400 in 1988, and $5,900 in 1989.

The total amount of fees collected as recorded on the daily log sheets reflects the same patterns. Takeoff fees showed the highest amount of fees collected for every mission, except for the courier mission in 1988.

There was only one operator performing scheduled commuter operations. No fees are reflected because this operator had a bulk rate account with the PANYNJ.



Note: Does not include fees collected from customers with bulk rate accounts.

FIGURE 66 FEES COLLECTED BY MISSION TYPE, 1987 THROUGH 1989

Figure 67 shows the percentages of fees recorded on the daily log sheets by mission type. Of the three missions analyzed, air taxi had the highest percentage of takeoff fees at 76 percent and courier the lowest at 55 percent. Corporate/executive collected the highest percentage of parking fees at 28 percent and courier the lowest at 9 percent. These percentages are logical due to the nature of each mission. Corporate/executive operations would be expected to wait for passengers, while courier operations would not be expected to wait because of the deadlines they must meet. Courier operations had the highest percentage of miscellaneous fees at 36 percent, and air taxi the lowest at 7 percent.

4.2.9.6 Fees Collected by Engine Type

Due to the incomplete data regarding the amount of total revenue collected by engine type, an analysis of fees by engine type was considered statistically irrelevant (see section 3.2.9).

4.2.10 Parking

Parking is the only service provided by the DMH; there is no refueling or maintenance. About one third of all helicopters use this service. Operations by PANYNJ helicopters are not included in this analysis, because this information was not available for those operations, as discussed in section 3.1.

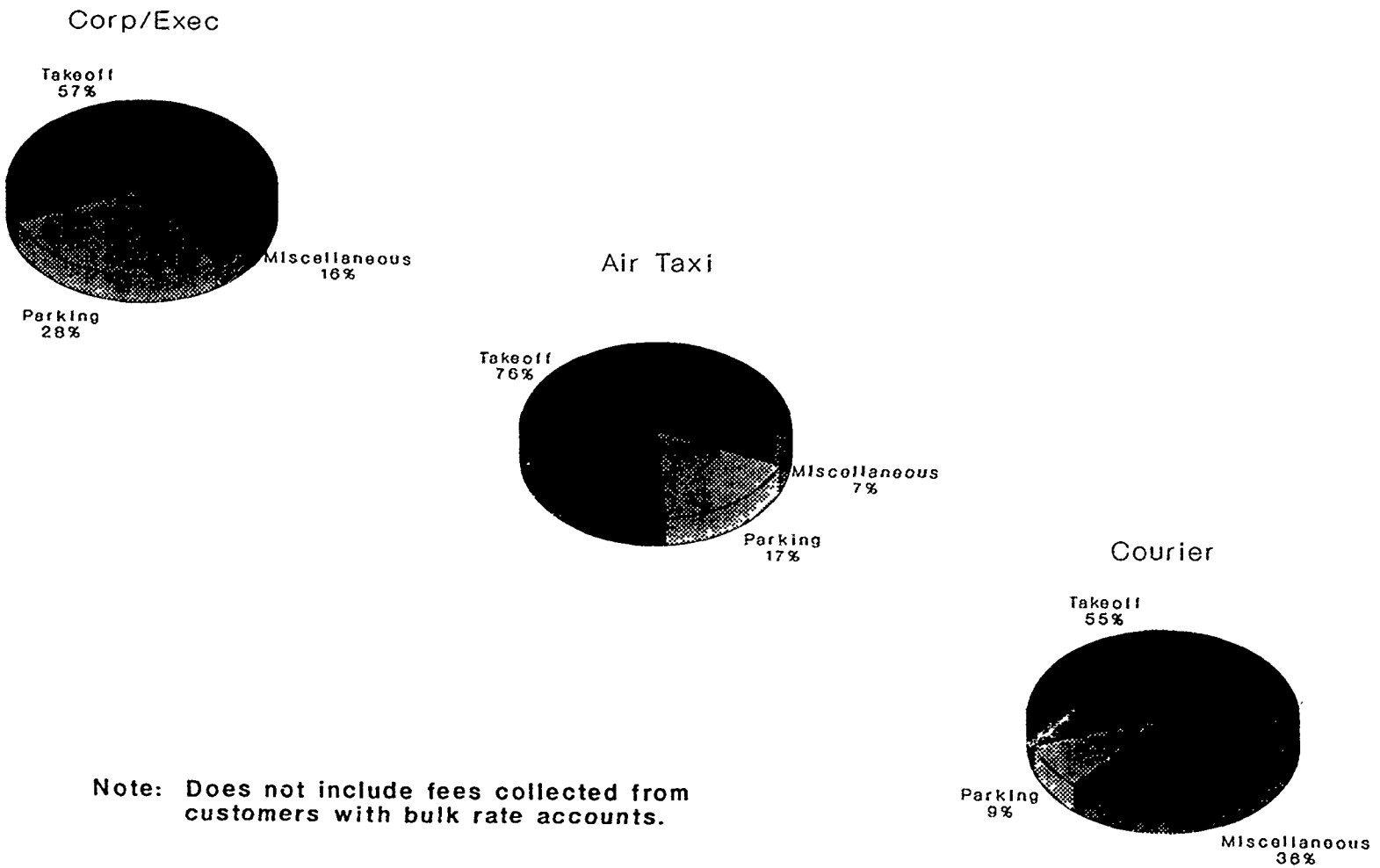
4.2.10.1 Parking by Year

Figure 68 shows that about the same number of helicopters parked in 1987 and 1988, 3,684 and 3,429, respectively, even though the overall number of operations dropped between these years. In 1989 the number of helicopters parked dropped to 3,055. The same pattern can be seen for transient helicopters at the DMH. In 1987, 7,718 operations were transient, in 1988, 7,711 were transients, and in 1989 the number of transients dropped to 6,045. The totals for all 3 study years show that 10,168 helicopters parked and 20,974 did not. The percentages show that over the 3 study years 32 percent of all operations involved parking.

4.2.10.2 Parking by Month

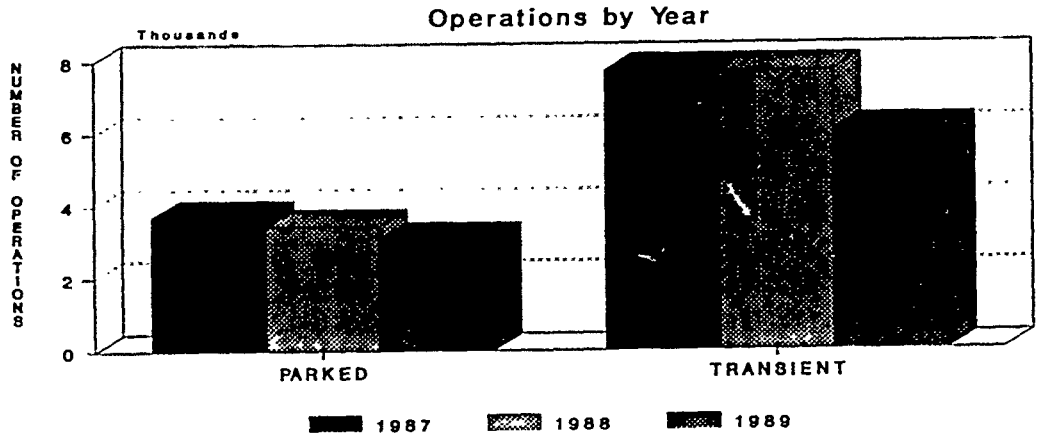
Figure 69 shows that in 1987 the highest number of helicopters parked in May, and the least in November; in 1988, the highest number parked in June and the least in January; and in 1989 the highest number parked in August and the least in February. As with many other monthly data parameters, there is no set pattern between years for monthly parking. However, considering the total numbers for all 3 study years, the highest number of helicopters parked in September and the least in February, just slightly fewer than the January number.

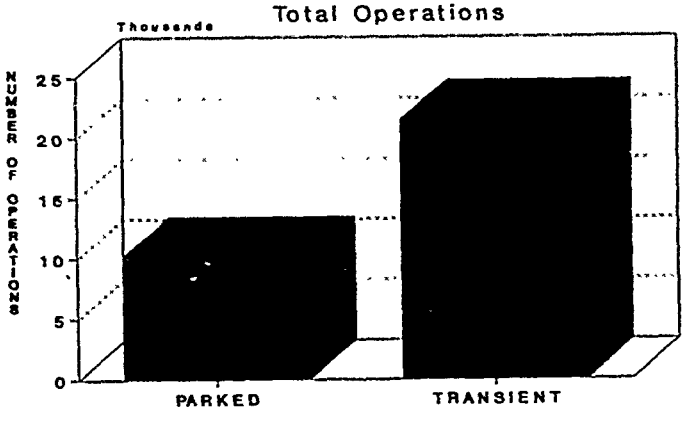
The percentages, also shown in figure 69, reflect the same overall pattern. September shows the highest percentage of parked helicopters at 10 percent, and January and February show the least with 7 percent each.

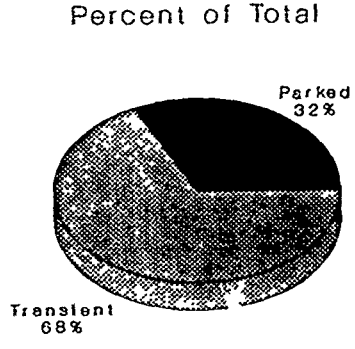


Note: Does not include fees collected from customers with bulk rate accounts.

FIGURE 67 PERCENT OF FEES COLLECTED BY MISSION TYPE, 1987 THROUGH 1989

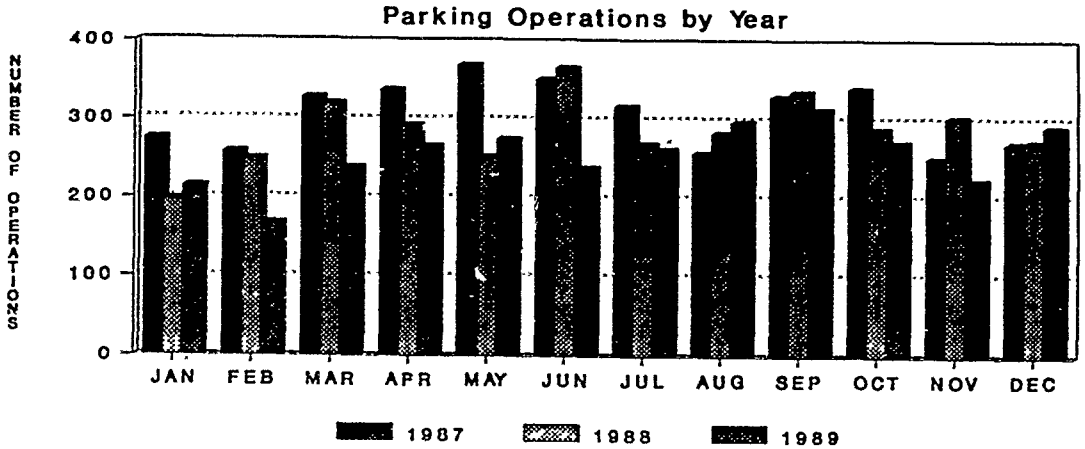


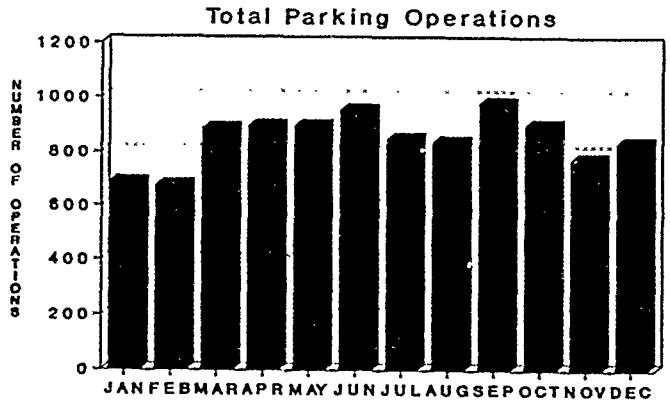


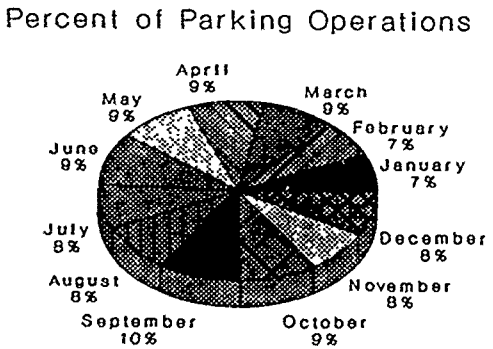


Note: Does not include PANYNJ operations.

FIGURE 68 NUMBER AND PERCENT OF TRANSIENT AND PARKED HELICOPTERS, 1987 THROUGH 1989







Note: Does not include PANYNJ operations.

FIGURE 69 NUMBER AND PERCENT OF PARKING OPERATIONS BY MONTH AND YEAR, 1987 THROUGH 1989

4.2.10.3 Parking by Day of Week

Parking by day of week is presented in figure 70. These figures follow the overall pattern of weekly operation, with higher numbers Tuesday through Thursday and lower numbers on Monday and Friday. In 1987, the most helicopters parked on Wednesday and the least on Monday; in 1988 and 1989, the most helicopters parked on Thursday, and the least on Monday. Considering the total numbers for all 3 years, the most helicopters parked on Thursday and the least on Monday, the same as the daily pattern for 1988 and 1989.

On weekends very few helicopters parked. In 1987 Saturday had the most operations that parked with 13; in 1988 the number dropped to 2, and only rose to 6 in 1989. In 1987, only 12 helicopters parked on Sunday; in 1988, this number dropped to 4, and in 1989, the number rose above the 1987 total to 14.

The percentage of helicopters operations that park by day of week ranges from 16 percent on Monday to 22 percent on Thursday. Tuesday and Wednesday each have 21 percent, and Friday has 19 percent.

4.2.10.4 Parking by Time of Day

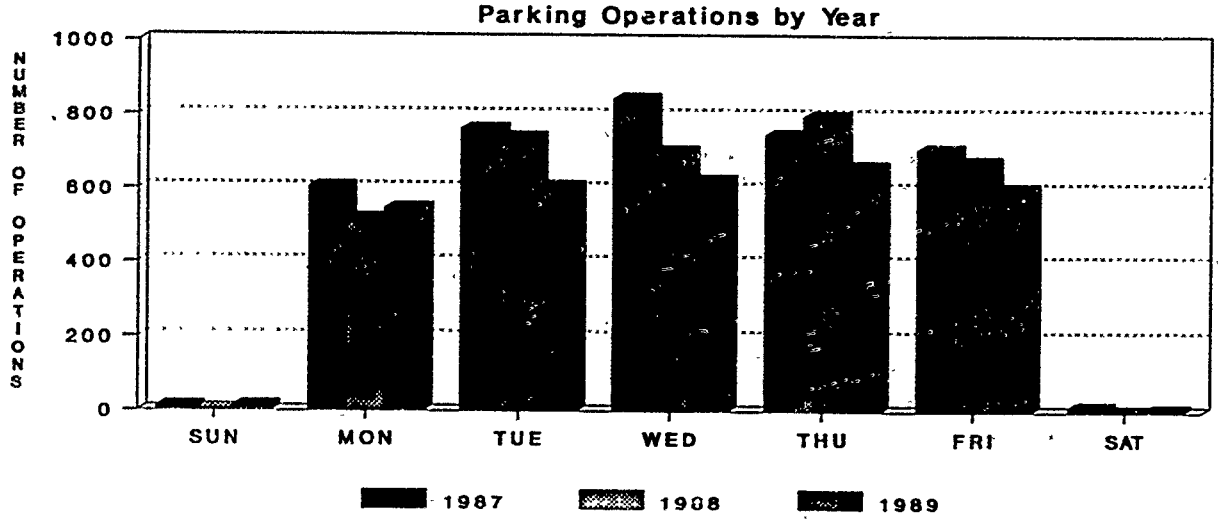
The graphs used to analyze the number of helicopter operations that park by time of day, shown in figure 71, also reflect the traffic flow at the DMH. The line with the "stars" on each graph shows the number of helicopters parked for each time of day. The line with the "double triangles" represents the time of day that parked helicopters departed the heliport. This process is shown for each study year and for all 3 study years.

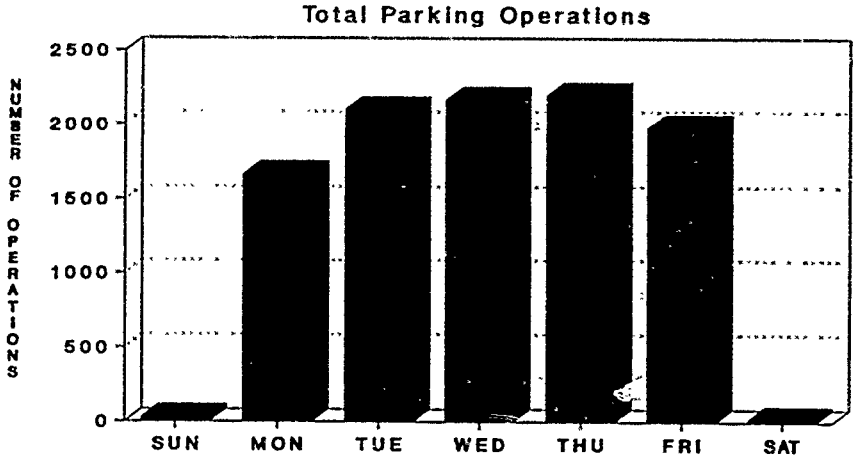
In 1987, helicopters that parked were more numerous in the morning at 0800 hours and the afternoon between 1500 and 1800 hours. The time of day that the parked helicopters left shows that most of these departed in the afternoon. There was a small afternoon rise in the number of departing helicopters at 1400 hours, then a drop before a late afternoon peak of activity between 1500 and 1800 hours. In 1988 and 1989, the same general pattern was evident. One difference in 1989 was an increase of departing helicopters at 1500 hours and not during the usual afternoon rush hour.

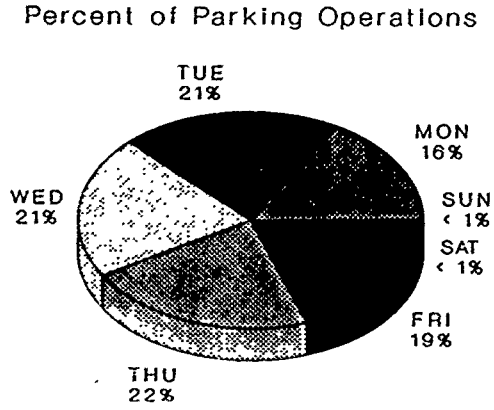
The graph depicting total operations for all 3 study years shows that the general pattern is the same. Helicopters that park follow the overall operational trends during peak hours. More helicopters departed in the afternoon.

4.2.10.5 Parking by Mission Type

The number of operations that parked decreased for corporate/executive, courier, and military operations between 1987, 1988, and 1989, as shown in figure 72. Parking for corporate/executive operations dropped from 2,604 in 1987, to 2,423 in 1988, to 2,193 in 1989. Parking for

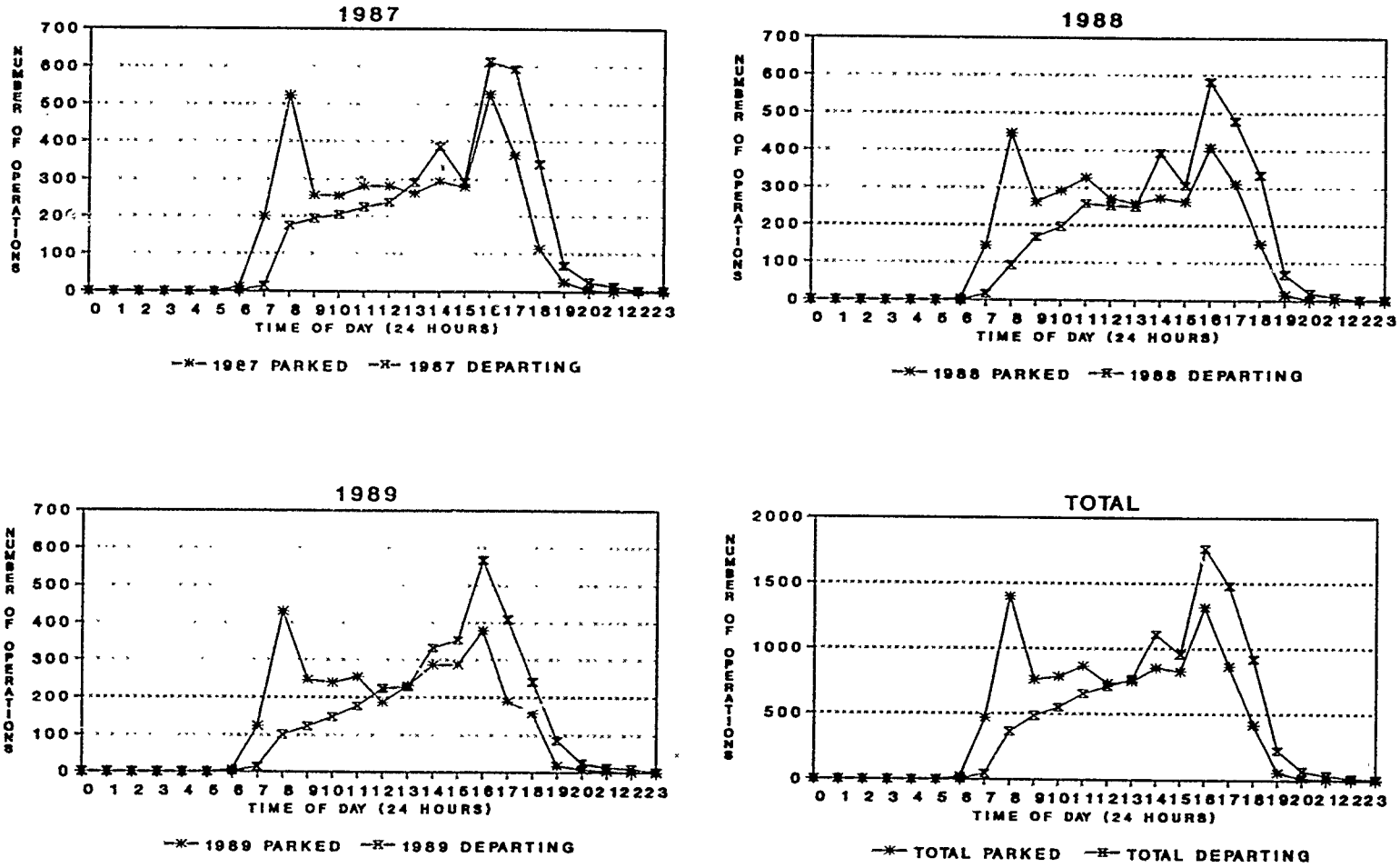






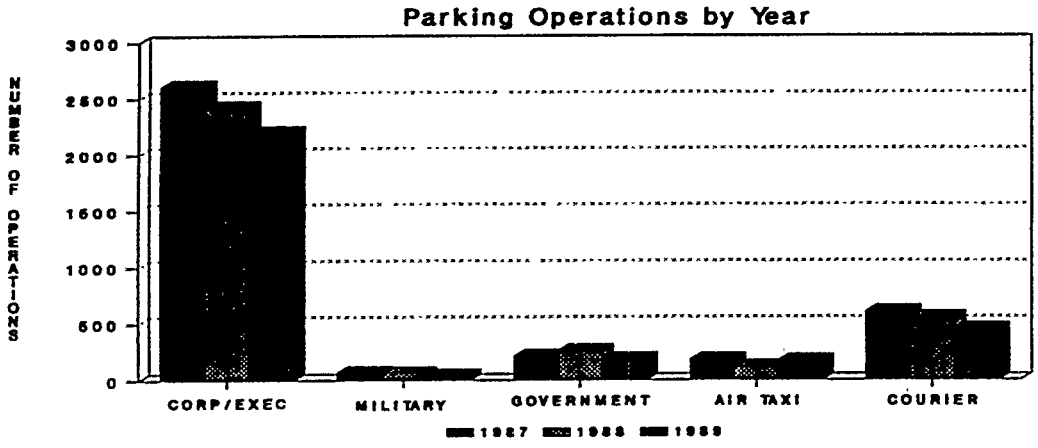
Note: Does not include PANYNJ operations.

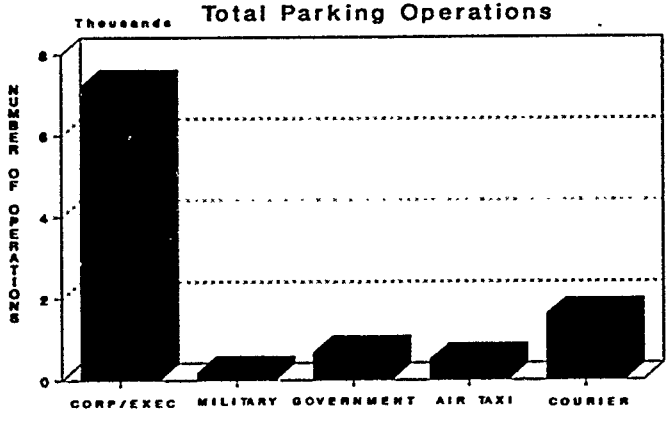
FIGURE 70 NUMBER AND PERCENT OF PARKING OPERATIONS BY DAY OF WEEK AND YEAR, 1987 THROUGH 1989

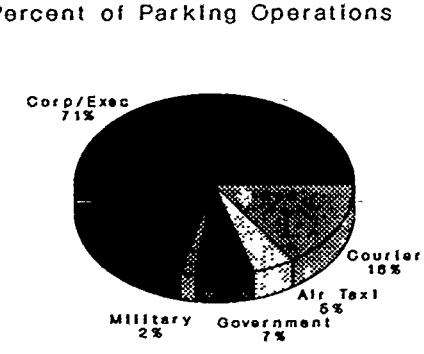


Note: Does not include PANYNJ operations.

FIGURE 71 NUMBER OF PARKING OPERATIONS AND DEPARTURE TIME OF PARKED HELICOPTERS, 1987 THROUGH 1989







Note: Does not include PANYNJ operations.

FIGURE 72 NUMBER AND PERCENT OF PARKING OPERATIONS BY MISSION TYPE AND YEAR, 1987 THROUGH 1989

courier operations decreased from 601, to 549, to 444 over the 3 study years. Parking for military operations dropped from 71 in 1987, to 66 in 1988, to 41 in 1989. For government operations, there was a increase in the number of helicopters that parked in 1988 over 1987, from 219 to 266, respectively; then the number dropped to 194 in 1989. The opposite was true for the air taxi mission. Operations decreased in 1988 from 189 to 124, then increased to 179, almost to the 1987 level, in 1989. The number of helicopters parked by mission type generally followed the number of operations by mission type. However, the number of courier operations using parking facilities did not exhibit this characteristic, which can be explained by the characteristics of the mission itself. By definition, courier operations must deliver their cargo and depart as soon as possible, with newly picked up cargo. Conversely corporate/executive operators are more likely to wait while their passengers complete their business.

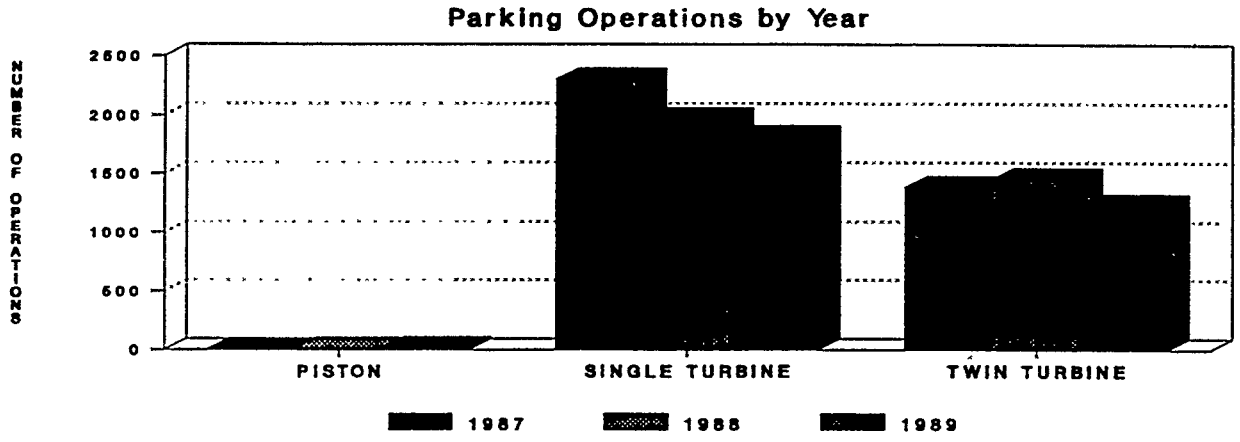
The total number for the 3 study years of helicopters that park shows that, by far, the corporate/executive mission uses the parking facilities the most, followed by courier, government, air taxi, and military. This is primarily a function of the number of operations and the parking requirements dictated by each mission.

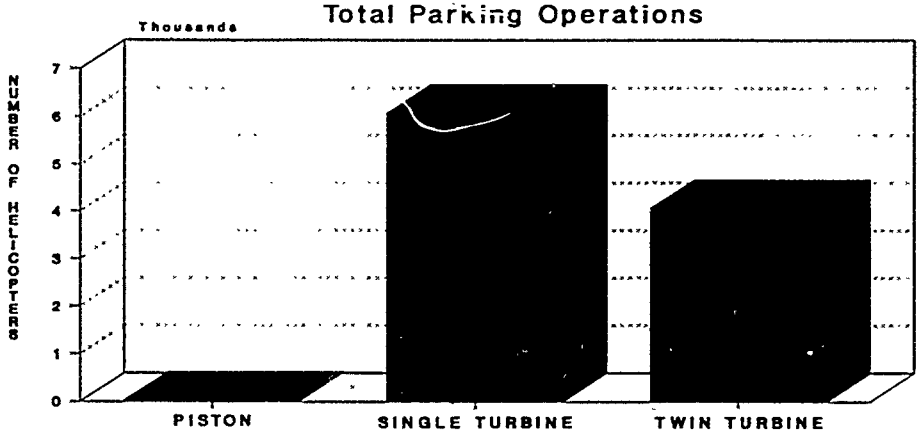
The percentages of operations parking, by mission type, is also shown in figure 72. These percentages also reflect mission characteristics. For instance, corporate/executive operations account for 71 percent of all helicopters that park, yet represent only 45 percent of all operations see section 4.2.5.1). The corporate/executive mission is primarily a transportation service. It is logical that these helicopters would need to park and wait for their passengers to return. Courier operations account for 16 percent of helicopters that park, yet represent as much as 29 percent of all operations, reflecting that mission's need for fast delivery and movement of cargo. The percentages of helicopters that park for the other missions, government with 7 percent, air taxi with 5 percent, and military with 2 percent, are more representative of their share of overall operations of 5 percent, 4 percent, and 1 percent, respectively.

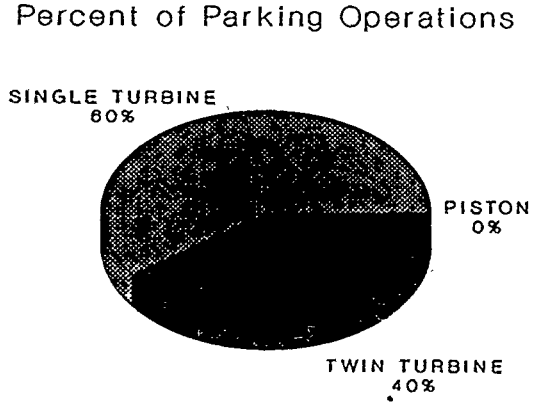
4.2.10.6 Parking by Engine Type

The number of helicopters that parked at the DMH are sorted by engine type in figure 73. The number of singles that park at the heliport reflects the decreasing operations from 1987 to 1989, with 2,300, 1,963, and 1,813 for each of the 3 study years, respectively. However, for twins, more parked in 1988 than in either of the other 2 years. The numbers show that twins parked 1,380 times in 1987, 1,453 times in 1988, but decreased to 1,227 in 1989, below the 1987 level. Pistons that parked at the DMH were few in number, but showed a consistent increase from 4 times in 1987, to 12 times in 1988, to 14 times in 1989.

Overall, more singles parked at the DMH, most likely due to the fact that more singles use the heliport. This is born out by the percentages of operations that involved parked helicopters. The split between single and twin helicopters was 60 percent to 40 percent, respectively. There were so few pistons that that figure is less than 1 percent.







Note: Does not include PANYNJ operations.

FIGURE 73 NUMBER AND PERCENT OF PARKING OPERATIONS BY ENGINE TYPE AND YEAR, 1987 THROUGH 1989

5.0 CONCLUSIONS

This report presents an analysis of the operational activity of the DMH since it first opened in 1960. Due to the nature of the available data, this analysis is presented on two levels. The first level, from 1960 through 1986, is simply a report on the amount of annual activity experienced at the heliport during these years. The second level provides a detailed analysis of the operational characteristics at the DMH between 1987 and 1989, coinciding with the time the DMH opened as the second FAA/Industry National Prototype Demonstration Heliport.

Since the DMH had been an established public-use heliport in New York City for 17 years before becoming part of the national prototype program, it was considered more of an existing part of the transportation system than perhaps any other heliport. As such, no major marketing program to promote its need and construction was necessary. Therefore, this section of this report focuses more on the history of the DMH, rather than on the marketing techniques that would have been required if it had been a new heliport in a new area.

5.1 DATA ANALYSIS SUMMARY

5.1.1 Data Quality

Complete data on the DMH's operation were provided by the PANYNJ, the managing authority of the heliport. A record of annual operations was provided from 1960. From January 1987 through December 1989, operations had been recorded on a daily log sheet by time of day. There were no missing data in the detailed activity records. Consequently, the analysis of the daily operations can be assumed to be an accurate depiction of the heliport's operational characteristics between 1987 and 1989. The exception would be data on PANYNJ helicopter flights.

Separate data on activity by those helicopters operated by the PANYNJ were also available from 1987 albeit not to such detail as the non-PANYNJ flights. In 1987, PANYNJ helicopter activity was only available in monthly summaries. For 1988 and 1989 the number of operations by PANYNJ flights were reported only in daily cumulative totals that reported the number of flights per day with no additional information. Although a generalized portrayal of PANYNJ activity can be made, it cannot be considered as accurate as the non-PANYNJ activity.

5.1.2 Operational Characteristics

Since its opening in 1960, the number of annual operations at the DMH has shown an overall increase, although the amount of activity in each individual year has shown wide fluctuation--years with consistent increases in annual activity and years with consistent decreases in operations as was seen in figure 11. Since 1985, the total number of annual operations has decreased every year. However, it is expected that the fluctuation will continue in the future.

There is no recurring pattern of monthly operational characteristics; in fact, considering all three years the number of operations in each month is very consistent, ranging from 7 to 9 percent of the annual operations.

The heliport is closed on weekends, so no operations take place on Saturday and Sunday except with prior permission. The busiest days are Tuesday through Thursday. The busiest times of day are at 0800 hours and between 1600 and 1700 hours. There are secondary peaks at 1100 hours and at 1400 hours. The lowest number of operations occurs at 1000 hours, 1300 hours, and at 1500 hours.

During 1987 through 1989, by far, the mission type that most often uses the DMH is corporate/executive, followed by courier, then PANYNJ, air taxi, government, and military. Turbine helicopters predominate at the DMH with slightly more singles than twins. A few piston helicopters do use the DMH.

The majority of flights do not carry passengers. Of those that do, there has been a general decrease in the number of passengers carried over the last 3 years. The number of passengers who arrive at the DMH is evenly balanced by the number of passengers departing. The corporate/executive mission carries the most passengers. The mission carrying the least number of passengers is military.

Fees for takeoff, parking, and miscellaneous items are collected only for corporate/executive, air taxi, and courier operators. No money is collected at the heliport, all users are billed. Some frequent heliport users have bulk rate agreements which allows them a discount (see section 3.2.9). The fees charged for those using the bulk rate are not reflected on the daily log sheets. Therefore, the numbers presented in the figures of this report do not portray the total revenue of the heliport. The total amount of revenue collected by the PANYNJ from all accounts was $455.0 thousand in 1987, $476.9 thousand in 1988, and $456.0 thousand in 1989 (see section 4.2.9 and table 3). For the three year period 1987 to 1989, by category, the total amount of fees recorded on the log sheets show the amount collected for takeoff fees was $340,334, for parking fees $145,702, and for miscellaneous fees $103,078. These amounts represented 37 percent of the total revenue in 1987, 43 percent in 1988, and 48 percent in 1989.

Helicopter parking is the only service offered by the heliport. The corporate/executive mission is by far the major user of parking facilities. Other mission using parking services are courier, government, air taxi, and military, in that order.

5.2 HISTORICAL ANALYSIS

The DMH is a very highly successful publicly owned and managed public-use heliport. It has more operations per year than any other heliport in the United States, even though the number of operations has been declining for the last 4 years. It has experienced vast fluctuations in operations throughout its 30-year history, a phenomenon that can be expected to continue in the future, since helicopter activity is always

highly dependant on the financial cycles of industries that use helicopters. The only service provided to helicopter operators by the heliport is parking for their aircraft. However, the primary attraction, and the reason for its success, is its location near the major business and financial center of New York City.

The DMH charges fees for takeoff, parking, and other miscellaneous services, but is not self-supporting. Public management is therefore a significant advantage to this heliport. Because it is part of the system of airports managed by the PANYNJ, the deficiency in funding necessary to support the heliport is supplied through the PANYNJ pooled revenue concept. Revenues from all PANYNJ facilities are combined; those monies from facilities with excess revenue are used to make up deficits at locations where it is needed.

Unlike many heliports, the DMH has roots back in the 1950's, when the advantages of the helicopter in two recent wars and the subsequent commercial application seemed to point the way to helicopter use in urban areas. Within the last 40 years, this projection has proved to be true, albeit on a more limited scale than was then envisioned. It took until the late 1970's before the demand for helicopter transportation, and subsequently for heliports, began to have a considerable voice. However, the setting for the DMH was New York City, a city large enough to have felt the need to accommodate helicopter traffic before the demand for heliports was apparent in other areas.

The DMH was an established heliport long before it was accepted into the FAA's National Prototype Heliport Demonstration and Development Program in 1983. The need for and applicability of the DMH has been recognized over the years by the fact that it has been in operation since it opened as the Wall Street Heliport in 1960. In fact, it remained open even as the pier on which it was located deteriorated until operations had to be relocated due to reconstruction. Even during years when activity was at its lowest, the heliport experienced thousands of operations. It has become an acknowledged fixture of the urban transportation system of the New York metropolitan area.

As a result of its long history, the heliport has had many key supporters in the community. However, there was never a need to "market" the heliport with a formal public relations campaign as has been experienced at other locations, particularly in those places trying to establish a heliport for the first time. Public opposition to the DMH is generally nonexistent, which is not true for some of the other public-use Manhattan heliports. To a large degree, this lack of public opposition is due to the location of the heliport in an area almost entirely comprised of businesses. It does not depend on any social recognition of the heliport's value to the community. In addition, the ERHC (of which PANYNJ is a very active member) does a commendable job encouraging its members to "Fly Neighborly" and interacting with the public to address noise issues as they arise.

Another advantage the DMH has experienced is that it is owned and operated by the PANYNJ rather than by the City of New York. The PANYNJ

which operates outside realm of the city, is able to bypass much of the bureaucracy, permitting, and public hearing requirements that have limited development of other heliports.

In summation, the DMH was constructed in acknowledgment of the need for helicopter landing sites in urban areas. However, it was not the product of the relatively recent demand for heliports in urban areas seen since the early 80's, but from an envisioned evolution of the transportation system for New York City as seen from the 1950's. As a result, the heliport evolved along with an existing urban transportation system and became a dynamic element of that system.

Because of this extensive background stretching back 30 years, it is difficult to use the DMH as a model for developing future heliports. One vital lesson to be learned, however, other than selecting a similar strategic and non-offensive location, is establishing local government support. The criticality of local government support was established in "Four Urban Heliport Case Studies" (DOT/FAA/PM-87-32, DOT/FAA/PP-88/2), which stated:

> "...without local government support all efforts in heliport development could be stopped. Public support, or at least public neutrality, which in turn influences the level of support from the local government, is also essential. Even an operational heliport that is doing well and has all the other elements in place, can be closed if the local government wants it closed."

The DMH, while unique among heliports in the United States, typifies the concept of a downtown, public-use heliport situated in the major financial/business district of a major city.

5.3 RECOMMENDATIONS

This study was able to extract a reasonably complete picture of the operational characteristics of the DMH from 1987 to 1989 from the data provided by the PANYNJ. The data provided included: registration number; type (model) of aircraft; operator; pilot's name; time in, with the number of passengers carried; time out, with the number of passengers carried; any services the aircraft used (where available); fees charged; and type of account, either full fee or bulk rate.

The addition of three elements, home base, point of origin, and next destination, would have allowed a portrayal of the system-wide operational environment within the regional transportation network, thus providing a more accurate investigation of how helicopter transportation functions in metropolitan areas and its benefits to the region and the community.

As reflected in the excellent data recorded by the PANYNJ at the DMH, it must be stressed that comprehensive and accurate data collection is in a heliport's own best interest. Accurate records of the numbers of operations, the types of helicopters using the heliport, the mission types it attracts, revenues collected, etc., provide a vital record for heliport

management and future planning for the heliport itself and for others wishing to establish heliports. In addition, these records serve as vital documentation for Federal, state, and local grants, both for initial and for follow-on grants. Non-standardized data has limited the ability of the FAA to make equitable statistical evaluations among FAA-funded heliports at different locations.

As a result of this study and a companion study, the "Indianapolis Downtown Heliport - Operations Analysis and Marketing History" (DOT/FAA/DS-89/32), the following recommendations are suggested regarding future data collection and analysis at FAA-funded heliports:

1. The FAA should recommend that heliports receiving Federal grant money keep accurate and comprehensive operations records for a period of not less than 5 years.

2. Operators at public heliports should work with the FAA to establish a set of operational data collection standards that would be useful to both parties and, as much as possible, standardize heliport data collection for comparability of results based on statistical evaluation among heliports. A core set of valuable data elements would include the following:

   registration number,
   type (model) of aircraft,
   operator,
   mission performed by aircraft,
   departure point,
   next destination,
   time in, with number of passengers carried,
   time out, with number of passengers carried,
   any services the aircraft used (where available),
   fees charged,
   VFR/IFR (where applicable).

3. The heliport owners/operators should include operational statistics in the heliport's annual survey for the FAA's Airport Master Record Program (5010 form) in order to establish a permanent record. (This is an area where heliport operators should devote more time and attention. Sampling of 5010 forms indicated that heliport operational statistics are often under counted.)

4. At heliports where no landing fees are charged and which may not be staffed, the expense of employing salaried personnel for record keeping purposes may be too great a financial burden to the heliport owner/operator. In such cases, due to the importance of such records to the FAA and helicopter industry, a self-reporting requirement should be strongly recommended to the helicopter operators using the facility to provide the necessary records.

5. The FAA should analyze the operational data to determine the extent to which heliport planning and development grants are achieving public benefits.

6. Heliport marketing information relating to successes and failures of public-use heliports should be made readily available to airport/heliport planners.

Accurate records further serve the entire rotorcraft industry. Lack of heliports is often quoted as a leading cause for constricted growth of the industry. Lack of accurate data or, more often the lack of any data, has been a handicap in determining the need for heliports. In addition, adequate record keeping can establish a community purpose for the heliport by providing documentation regarding its benefits to the community, both real and potential. In this way, such information can be used to gain local government and public support.

APPENDIX A
DMH HELIPORT OPERATIONS ANALYSIS

Annual Operations Year	No. of Operations
1960	638
1961	1244[illegible]
1962	15194
1963	21054
1964	17854
1965	16945
1966	13815
1967	11931
1968	16110
1969	9119
1970	8662
1971	14964
1972	19050
1973	19112
1974	17744
1975	18660
1976	15782
1977	12390
1978	14364
1979	14858
1980	17412
1981	21302
1982	22796
1983	25790
1984	33872
1985	34480
1986	28664
1987	22932
1988	21264
1989	18342

(See figure 11.)

SOURCE: PANYNJ Heliport Aviation Department - Marketing & Economics Division

	1987	1988	1989	Total
Annual Operations	22804	21280	18200	62284
PANYNJ Annual Operations	4492	5076	3468	13036
Total Annual Operations	27296	26356	21668	75320
Operations by Month				
January	2232	1632	1710	5574
February	2120	2002	1314	5436
March	2388	2490	1864	6742
April	2466	2400	1896	6762
May	2488	1996	1896	6380
June	2482	2672	1744	6898
July	2298	2114	1898	6310
August	2112	2424	2086	6622
September	2234	2322	1920	6476
October	2470	2164	1754	6388
November	1942	2050	1592	5584
December	2064	2090	1994	6148
Operations by Day of Week				
Sunday	32	16	54	102
Monday	4580	4076	3778	12434
Tuesday	5950	5716	4436	16102
Wednesday	6056	5626	4668	16350
Thursday	5538	6014	4712	16264
Friday	5074	4902	3966	13942
Saturday	66	6	54	126

(See figures 12, 13, and 14.)

PANYNJ Operations by Month	1987	1988	1989	Total
January	336	288	336	960
February	400	420	260	1080
March	440	498	328	1266
April	460	480	310	1250
May	360	364	308	1032
June	440	508	358	1306
July	308	414	332	1054
August	292	500	334	1126
September	378	452	296	1126
October	396	402	248	1046
November	360	356	170	886
December	322	394	188	904
PANYNJ Operations by Day of Week				
Sunday	0	0	0	0
Monday	852	910	554	2316
Tuesday	926	988	694	2608
Wednesday	926	1092	742	2760
Thursday	904	1102	810	2816
Friday	870	984	664	2518
Saturday	14	0	4	18

(See figures 13 and 14.)

Annual Operations by Time of Day

HOUR	1987			1988			1989			TOTAL		
	ARRIVE	DEPART	TOTAL	ARRIVE	DEPART	TOTAL	ARRIVE	DEPART	TOTAL	ARRIVE	DEPART	TOTAL
0	0	1	1	0	0	0	1	1	2	1	2	3
1	0	0	0	0	0	0	0	0	0	0	0	0
2	0	1	1	0	0	0	0	1	1	0	2	2
3	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	1	0	1	1	0	1
6	16	7	23	6	2	8	9	5	14	31	14	45
7	1009	823	1832	858	729	1587	574	463	1037	2441	2015	4456
8	1806	1458	3264	1453	1100	2553	1416	1087	2503	4675	3645	8320
9	850	788	1638	783	690	1473	669	545	1214	2302	2023	4325
10	633	582	1215	652	556	1208	586	492	1078	1871	1630	3501
11	816	758	1574	868	797	1665	698	617	1315	2382	2172	4554
12	640	595	1235	599	579	1178	487	526	1013	1726	1700	3426
13	600	630	1230	579	570	1149	448	444	892	1627	1644	3271
14	706	798	1504	710	831	1541	639	685	1324	2055	2314	4369
15	558	572	1130	540	585	1125	597	664	1261	1695	1821	3516
16	1483	1569	3052	1384	1559	2943	1197	1384	2581	4064	4512	8576
17	1390	1619	3009	1288	1454	2742	926	1146	2072	3604	4219	7823
18	785	1011	1796	812	997	1809	765	851	1616	2362	2859	5221
19	85	129	214	92	146	238	61	128	189	238	403	641
20	14	34	48	8	26	34	13	28	41	35	88	123
21	5	18	23	4	12	16	7	17	24	16	47	63
22	5	6	11	3	3	6	6	14	20	14	23	37
23	1	4	5	1	4	5	0	2	2	2	10	12

(See figures 15, 16, and 17.)

Annual Operations by Mission Type

	CORP/EXEC	MILITARY	GOVERNMENT	AIR TAXI	COURIER	SCHEDULED	PANYNJ
1987	12172	404	1292	1328	7608	0	4492
1988	10606	422	1660	964	7628	0	5076
1989	9144	268	1104	1016	6386	282	3468
TOTAL	31922	1094	4056	3308	21622	282	13036

Annual Operations by Mission Type and Engine Type

	CORP/EXEC	MILITARY	GOVERNMENT	AIR TAXI	COURIER	SCHEDULED	PANYNJ
1987							
PISTON	12	0	0	6	0	0	0
SINGLE TURBINE	6028	188	636	918	7096	0	0
TWIN TURBINE	6132	216	656	404	512	0	4492
1988							
PISTON	72	0	0	4	0	0	0
SINGLE TURBINE	4628	206	872	798	7192	0	0
TWIN TURBINE	5906	216	788	162	436	0	5076
1989							
PISTON	52	0	2	0	0	0	0
SINGLE TURBINE	3992	130	444	858	6170	0	0
TWIN TURBINE	5100	138	658	158	216	282	3468
TOTAL							
PISTON	136	0	2	10	0	0	0
SINGLE TURBINE	14648	524	1952	2574	20458	0	0
TWIN TURBINE	17138	570	2102	724	1164	282	13036

(See figures 18, 19, 46, 47, 48, 49, and 50.)

Operations by Mission Type and Month

	CORP/EXEC	MILITARY	GOVERNMENT	AIR TAXI	COURIER	SCHEDULED	PANYNJ
1987 JAN	930	20	80	246	620	0	336
FEB	942	24	70	116	568	0	400
MAR	1086	32	134	48	648	0	440
APR	1134	6	118	62	686	0	460
MAY	1214	46	96	64	708	0	360
JUN	1142	38	138	82	642	0	440
JUL	1050	24	100	132	684	0	308
AUG	868	30	128	170	624	0	292
SEP	986	42	112	118	598	0	378
OCT	1116	40	118	118	682	0	396
NOV	812	48	108	98	516	0	360
DEC	892	54	90	74	632	0	322
1988 JAN	678	18	74	78	496	0	288
FEB	792	38	150	36	566	0	420
MAR	1006	58	138	56	734	0	498
APR	962	52	168	26	712	0	480
MAY	828	26	162	62	554	0	364
JUN	1148	40	104	108	764	0	508
JUL	800	22	108	146	624	0	414
AUG	898	22	144	172	688	0	500
SEP	954	54	168	54	640	0	452
OCT	850	20	168	100	654	0	402
NOV	890	26	112	72	594	0	356
DEC	800	46	194	54	602	0	394
1989 JAN	642	34	92	50	556	0	336
FEB	512	12	56	24	450	0	260
MAR	742	10	132	58	594	0	328
APR	828	14	116	128	500	0	310
MAY	834	22	112	98	522	0	308
JUN	720	16	70	86	494	0	358
JUL	792	32	62	150	530	0	332
AUG	834	20	78	162	658	0	334
SEP	872	38	78	84	552	0	296
OCT	822	38	112	50	484	0	248
NOV	754	4	70	86	508	0	170
DEC	792	28	126	40	538	282	188
TOTAL JAN	2250	72	246	374	1672	0	960
FEB	2246	74	276	176	1584	0	1080
MAR	2834	100	404	162	1976	0	1266
APR	2924	72	402	216	1898	0	1250
MAY	2876	94	370	224	1784	0	1032
JUN	3010	94	312	276	1900	0	1306
JUL	2642	78	270	428	1838	0	1054
AUG	2600	72	350	504	1970	0	1126
SEP	2812	134	358	256	1790	0	1126
OCT	2788	98	398	268	1820	0	1046
NOV	2456	78	290	256	1618	0	886
DEC	2484	128	410	168	1772	282	904

(See figures 20, 21, 22, 23, 24, and 25.)

Operations by Mission Type and Day of Week

	CORP/EXEC	MILITARY	GOVERNMENT	AIR TAXI	COURIER	SCHEDULED	PANYNJ
1987 SUN	18	8	6	0	0	0	0
MON	2096	68	160	236	1168	0	852
TUE	2684	102	254	284	1700	0	926
WED	2670	72	270	294	1824	0	926
THU	2452	52	336	252	1542	0	904
FRI	2226	94	264	262	1358	0	870
SAT	26	8	2	0	16	0	14
1988 SUN	4	6	6	0	0	0	0
MON	1652	62	192	178	1082	0	910
TUE	2350	100	342	162	1774	0	988
WED	2224	94	358	166	1692	0	1092
THU	2414	94	450	226	1728	0	1102
FRI	1962	66	306	232	1352	0	984
SAT	0	0	6	0	0	0	0
1989 SUN	22	0	8	2	22	0	0
MON	1728	54	128	192	1068	54	554
TUE	1834	38	224	182	1404	60	694
WED	1978	46	222	204	1418	58	742
THU	1888	74	296	190	1388	66	810
FRI	1668	52	222	238	1078	44	664
SAT	26	4	4	8	8	0	4
TOTAL SUN	44	14	20	2	22	0	0
MON	5476	184	480	606	3318	54	2316
TUE	6868	240	820	628	4878	60	2608
WED	6872	212	850	664	4934	58	2760
THU	6754	220	1082	668	4658	66	2816
FRI	5856	212	792	732	3788	44	2518
SAT	52	12	12	8	24	0	18

(See figures 26, 27, 28, 29, and 30.)

Operations by Mission Type and Time of Day, 1987

HOUR	CORP/EXEC			MILITARY			GOVERNMENT			AIR TAXI			COURIER			SCHEDULED		
	ARRIVE	DEPART	TOTAL	ARRIVE	DEPART	TOTAL	ARRIVE	DEPART	TOTAL	ARRIVE	DEPART	TOTAL	ARRIVE	DEPART	TOTAL	ARRIVE	DEPART	TOTAL
0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	13	5	18	1	0	1	0	0	0	2	2	4	0	0	0	0	0	0
7	536	427	963	14	7	21	10	8	18	131	108	239	318	273	591	0	0	0
8	1122	769	1891	24	23	47	25	19	44	100	105	205	535	542	1077	0	0	0
9	488	430	918	22	25	47	69	53	122	35	29	64	236	251	487	0	0	0
10	375	339	714	27	30	57	84	66	150	28	22	50	119	125	244	0	0	0
11	379	337	716	22	20	42	101	105	206	49	29	78	265	267	532	0	0	0
12	346	332	678	15	16	31	78	73	151	36	28	64	165	146	311	0	0	0
13	346	364	710	23	17	40	72	70	142	28	40	68	131	139	270	0	0	0
14	509	570	1079	14	22	36	52	60	112	36	56	92	95	90	185	0	0	0
15	373	393	766	21	18	39	62	60	122	34	35	69	68	66	134	0	0	0
16	788	903	1691	11	13	24	43	43	86	80	82	162	561	528	1089	0	0	0
17	622	885	1507	4	4	8	22	34	56	87	97	184	655	599	1254	0	0	0
18	137	227	364	3	6	9	16	32	48	15	26	41	614	720	1334	0	0	0
19	34	59	93	1	0	1	8	13	21	1	2	3	41	55	96	0	0	0
20	11	27	38	0	0	0	1	3	4	1	2	3	1	2	3	0	0	0
21	3	11	14	0	1	1	2	5	7	0	0	0	0	1	1	0	0	0
22	3	3	6	0	0	0	1	2	3	1	1	2	0	0	0	0	0	0
23	1	4	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

(See figure 31.)

Operations by Mission Type and Time of Day, 1988

HOUR	CORP/EXEC			MILITARY			GOVERNMENT			AIR TAXI			COURIER			SCHEDULED		
	ARRIVE	DEPART	TOTAL	ARRIVE	DEPART	TOTAL	ARRIVE	DEPART	TOTAL	ARRIVE	DEPART	TOTAL	ARRIVE	DEPART	TOTAL	ARRIVE	DEPART	TOTAL
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	4	1	5	1	0	1	1	1	2	0	0	0	0	0	0	0	0	0
7	448	364	812	15	12	27	23	18	41	67	58	125	305	277	582	0	0	0
8	825	479	1304	28	23	51	45	36	81	60	57	117	495	505	1000	0	0	0
9	445	373	818	31	34	65	57	34	91	41	36	77	209	213	422	0	0	0
10	399	308	707	25	26	51	105	100	205	23	23	46	100	99	199	0	0	0
11	424	375	799	19	16	35	135	126	261	19	19	38	271	261	532	0	0	0
12	352	323	675	25	26	51	111	108	219	24	26	50	87	96	183	0	0	0
13	315	323	638	21	15	36	113	104	217	20	17	37	110	111	221	0	0	0
14	462	573	1035	13	17	30	62	73	135	34	32	66	139	136	275	0	0	0
15	359	404	763	11	19	30	72	76	148	28	29	57	70	57	127	0	0	0
16	580	741	1321	10	9	19	40	53	93	69	64	133	685	692	1377	0	0	0
17	523	733	1256	10	9	19	40	51	91	79	89	168	636	572	1208	0	0	0
18	136	245	381	2	3	5	19	32	51	15	28	43	640	689	1329	0	0	0
19	22	33	55	0	2	2	4	9	13	2	1	3	64	101	165	0	0	0
20	5	15	20	0	0	0	2	6	8	1	3	4	0	2	2	0	0	0
21	3	10	13	0	0	0	1	2	3	0	0	0	0	0	0	0	0	0
22	1	1	2	0	0	0	0	1	1	0	0	0	2	1	3	0	0	0
23	0	2	2	0	0	0	0	0	0	0	0	0	1	2	3	0	0	0

(See figure 32.)

Operations by Mission Type and Time of Day, 1989

	CORP/EXEC			MILITARY			GOVERNMENT			AIR TAXI			COURIER			SCHEDULED		
HOUR	ARRIVE	DEPART	TOTAL	ARRIVE	DEPART	TOTAL	ARRIVE	DEPART	TOTAL	ARRIVE	DEPART	TOTAL	ARRIVE	DEPART	TOTAL	ARRIVE	DEPART	TOTAL
0	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
6	5	2	7	2	0	2	0	0	0	0	0	0	2	3	5	0	0	0
7	277	198	475	6	8	14	7	4	11	54	50	104	226	199	425	4	4	8
8	821	496	1317	10	6	16	21	15	36	49	43	92	497	509	1006	18	18	36
9	393	287	680	10	12	22	54	41	95	45	37	82	149	150	299	18	18	36
10	377	302	679	12	11	23	80	63	143	32	27	59	70	74	144	15	15	30
11	326	261	587	10	6	16	87	88	175	26	17	43	233	230	463	16	15	31
12	268	289	557	13	14	27	62	70	132	29	31	60	115	121	236	0	1	1
13	314	317	631	17	14	31	44	41	85	37	36	73	36	36	72	0	0	0
14	413	469	882	11	15	26	70	59	129	40	46	86	91	82	173	14	14	28
15	417	486	903	14	16	30	50	65	115	51	44	95	51	39	90	14	14	28
16	448	643	1091	8	10	18	36	48	84	78	70	148	613	600	1213	14	13	27
17	366	565	931	10	4	14	17	21	38	42	67	109	477	474	951	14	15	29
18	115	199	314	4	5	9	13	16	29	24	34	58	596	584	1180	13	13	26
19	18	29	47	6	1	7	7	13	20	1	1	2	28	83	111	1	1	2
20	8	14	22	0	4	4	1	3	4	0	3	3	4	4	8	0	0	0
21	2	6	8	0	4	4	1	1	2	0	1	1	4	5	9	0	0	0
22	3	5	8	1	4	5	2	4	6	0	1	1	0	0	0	0	0	0
23	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

(See figure 33.)

Operations by Mission Type and Time of Day, Total

	CORP/EXEC			MILITARY			GOVERNMENT			AIR TAXI			COURIER			SCHEDULED		
HOUR	ARRIVE	DEPART	TOTAL	ARRIVE	DEPART	TOTAL	ARRIVE	DEPART	TOTAL	ARRIVE	DEPART	TOTAL	ARRIVE	DEPART	TOTAL	ARRIVE	DEPART	TOTAL
0	1	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
6	22	8	30	4	0	4	1	1	2	2	2	4	2	3	5	0	0	4
7	1261	989	2250	35	27	62	40	30	70	252	216	468	849	749	1598	4	4	8
8	2768	1744	4512	62	52	114	91	70	161	209	205	414	1527	1556	3083	18	18	36
9	1326	1090	2416	63	71	134	180	128	308	121	102	223	594	614	1208	18	18	36
10	1151	949	2100	64	67	131	269	229	498	83	72	155	289	298	587	15	15	30
11	1129	973	2102	51	42	93	323	319	642	94	65	159	769	758	1527	16	15	31
12	966	944	1910	53	56	109	251	251	502	89	85	174	367	363	730	0	1	1
13	975	1004	1979	61	46	107	229	215	444	85	93	178	277	286	563	0	0	0
14	1384	1612	2996	38	54	92	184	192	376	110	134	244	325	308	633	14	14	28
15	1149	1283	2432	46	53	99	184	201	385	113	108	221	189	162	351	14	14	28
16	1816	2287	4103	29	32	61	119	144	263	227	216	443	1859	1820	3679	14	13	27
17	1511	2183	3694	24	17	41	79	106	185	208	253	461	1768	1645	3413	14	15	29
18	388	671	1059	9	14	23	48	80	128	54	88	142	1850	1993	3843	13	13	26
19	74	121	195	7	3	10	19	35	54	4	4	8	133	239	372	1	1	2
20	24	56	80	0	4	4	4	12	16	2	8	10	5	8	13	0	0	0
21	8	27	35	0	5	5	4	8	12	0	1	1	4	6	10	0	0	0
22	7	9	16	1	4	5	3	7	10	1	2	3	2	1	3	0	0	0
23	1	8	9	0	0	0	0	0	0	0	0	0	1	2	3	0	0	0

(See figure 34.)

Annual Operations By Engine Type

	PISTON	SINGLE TURBINE	TWIN TURBINE
1987	18	14866	12412
1988	76	13696	12584
1989	54	11594	10020
TOTAL	148	40156	35016

Operations by Engine Type and Month

1987 JAN	2	1270	960
FEB	0	1068	1052
MAR	2	1258	1128
APR	0	1354	1112
MAY	4	1460	1024
JUN	0	1324	1158
JUL	0	1316	982
AUG	0	1232	880
SEP	0	1160	1074
OCT	10	1318	1142
NOV	0	998	944
DEC	0	1108	956
1988 JAN	2	814	818
FEB	0	994	1008
MAR	6	1278	1206
APR	2	1152	1246
MAY	4	1052	940
JUN	6	1420	1246
JUL	16	1144	954
AUG	8	1294	1122
SEP	14	1176	1132
OCT	8	1126	1030
NOV	10	1112	928
DEC	0	1136	954
1989 JAN	6	952	752
FEB	0	722	592
MAR	4	1002	858
APR	4	930	962
MAY	6	1012	878
JUN	6	900	838
JUL	6	1040	852
AUG	2	1204	880
SEP	4	994	922
OCT	16	958	780
NOV	0	898	694
DEC	0	982	1012
TOTAL JAN	10	3036	2530
FEB	0	2784	2652
MAR	12	3538	3192
APR	6	3436	3320
MAY	14	3524	2842
JUN	12	3644	3242
JUL	22	3500	2788
AUG	10	3730	2882
SEP	18	3330	3128
OCT	34	3402	2952
NOV	10	3008	2566
DEC	0	3226	2922

(See figures 35, 36, 37, 38, 39, 40, 41, and 42.)

Operations by Engine Type and Day of Week

	PISTON	SINGLE TURBINE	TWIN TURBINE
1987 SUN	0	0	32
MON	2	2516	2062
TUE	2	3214	2734
WED	2	3386	2668
THU	8	2966	2564
FRI	4	2758	2312
SAT	0	26	40
1988 SUN	0	4	12
MON	24	2062	1992
TUE	8	2996	2712
WED	14	2970	2642
THU	6	3156	2852
FRI	24	2508	2370
SAT	0	2	4
1989 SUN	0	34	20
MON	10	2096	1672
TUE	4	2360	2072
WED	4	2540	2124
THU	20	2444	2248
FRI	16	2094	1856
SAT	0	26	28
TOTAL SUN	0	38	64
MON	36	6674	5726
TUE	14	8570	7518
WED	20	8896	7434
THU	34	8566	7664
FRI	44	7360	6538
SAT	0	54	72

(See figures 43 and 44.)

Operations by Engine Type and Time of Day, 1987 and 1988

	1987									1988								
	PISTON			SINGLE TURBINE			TWIN TURBINE			PISTON			SINGLE TURBINE			TWIN TURBINE		
HOUR	ARRIVE	DEPART	TOTAL	ARRIVE	DEPART	TOTAL	ARRIVE	DEPART	TOTAL	ARRIVE	DEPART	TOTAL	ARRIVE	DEPART	TOTAL	ARRIVE	DEPART	TOTAL
0	0	0	0	0	0	0	0	1	1	0	0	0	1	1	2	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	7	5	12	9	2	11	0	0	0	2	2	4	4	0	4
7	0	0	0	864	705	1569	145	118	263	9	9	18	737	636	1373	112	84	196
8	0	0	0	1241	967	2208	565	491	1056	2	1	3	1050	763	1813	401	336	737
9	0	0	0	481	465	946	369	323	692	5	5	10	379	369	748	399	316	715
10	2	1	3	318	322	640	313	259	572	1	1	2	289	273	562	362	282	644
11	2	1	3	496	504	1000	318	253	571	0	0	0	488	475	963	380	322	702
12	1	1	2	376	334	710	263	260	523	2	0	2	314	286	600	283	293	576
13	2	1	3	344	374	718	254	255	509	1	0	1	295	308	603	283	262	545
14	0	2	2	316	336	652	390	460	850	0	3	3	323	342	665	387	486	873
15	0	0	0	259	272	531	299	300	599	1	0	1	234	264	498	305	321	626
16	0	0	0	959	1042	2001	524	527	1051	4	3	7	982	1134	2116	398	422	820
17	1	2	3	1072	1218	2290	317	399	716	5	6	11	986	1069	2055	297	379	676
18	0	0	0	645	800	1445	140	211	351	7	9	16	696	802	1498	109	186	295
19	1	1	2	51	74	125	33	54	87	1	0	1	68	108	176	23	38	61
20	0	0	0	2	7	9	12	27	39	0	1	1	3	12	15	5	13	18
21	0	0	0	0	5	5	5	13	18	0	0	0	1	3	4	3	9	12
22	0	0	0	2	3	5	3	3	6	0	0	0	0	0	0	3	3	6
23	0	0	0	0	0	0	1	4	5	0	0	0	1	2	3	0	2	2

(See figures 45, 46, and 47.)

Operations by Engine Type and Time of Day, 1989 and Total

	1989									TOTAL								
	PISTON			SINGLE TURBINE			TWIN TURBINE			PISTON			SINGLE TURBINE			TWIN TURBINE		
HOUR	ARRIVE	DEPART	TOTAL	ARRIVE	DEPART	TOTAL	ARRIVE	DEPART	TOTAL	ARRIVE	DEPART	TOTAL	ARRIVE	DEPART	TOTAL	ARRIVE	DEPART	TOTAL
0	0	0	0	0	0	0	1	1	2	0	0	0	1	1	2	1	2	3
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	1
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	1	0	1
6	0	0	0	2	0	2	7	5	12	0	0	0	11	7	18	20	7	27
7	2	1	3	468	388	856	104	74	178	11	10	21	2069	1729	3798	361	276	637
8	1	1	2	1037	784	1821	378	302	680	3	2	5	3328	2514	5842	1344	1129	2473
9	3	2	5	353	295	648	313	248	561	8	7	15	1213	1129	2342	1081	887	1968
10	1	1	2	252	222	474	333	269	602	4	3	7	859	817	1676	008	810	1818
11	1	0	1	402	366	768	295	251	546	3	1	4	1386	1345	2731	993	826	1819
12	0	0	0	265	278	543	222	248	470	3	1	4	955	898	1853	768	801	1569
13	3	1	4	215	219	434	230	224	454	6	2	8	854	901	1755	767	741	1508
14	4	3	7	286	327	613	349	355	704	4	8	12	925	1005	1930	1126	1301	2427
15	4	4	8	280	285	565	313	375	688	5	4	9	773	821	1594	917	996	1913
16	2	1	3	891	1029	1920	304	354	658	6	4	10	2832	3205	6037	1226	1303	2529
17	4	8	12	664	818	1482	258	320	578	10	16	26	2722	3105	5827	872	1098	1970
18	2	4	6	647	680	1327	116	167	283	9	13	22	1988	2282	4270	365	564	929
19	0	0	0	32	90	122	29	38	67	2	1	3	151	272	423	85	130	215
20	0	0	0	0	11	11	13	17	30	0	1	1	5	30	35	30	57	87
21	0	1	1	3	4	7	4	12	16	0	1	1	4	12	16	12	34	46
22	0	0	0	0	1	1	6	13	19	0	0	0	2	4	6	12	19	31
23	0	0	0	0	0	0	0	2	2	0	0	0	1	2	3	1	8	9

(See figures 45, 48, and 49.)

Passenger/No Passenger Operations

	1987	1988	1989	TOTAL
DROP OFF NO PASSENGERS	7076	6586	5690	19352
PICKUP NO PASSENGERS	7043	6717	5811	19571
TOTAL NO PAX	14119	13303	11501	38923
DROP OFF W/PASSENGERS	4326	4054	3410	11790
PICKUP W/PASSENGERS	4359	3923	3289	11571
TOTAL W/PASSENGERS	8685	7977	6699	23361
DROP OFF ONLY	3323	3099	2586	9008
DROP OFF & PICKUP	2006	1910	1648	5564
PICKUP ONLY	3356	2968	2465	8789
NO PASSENGERS	14119	13303	11501	38923
TOTAL PASSENGER OPS	22804	21280	18200	62284

(See figures 51 and 52.)

Total Annual Passengers

	1987			1988			1989			TOTAL		
	ARRIVE	DEPART	TOTAL	ARRIVE	DEPART	TOTAL	ARRIVE	DEPART	TOTAL	ARRIVE	DEPART	TOTAL
	10008	9956	19974	8854	8735	17589	7241	7115	14356	26103	25816	51919
Number of Passengers by Month												
JAN	1015	964	1979	506	557	1063	515	504	1019	2036	2025	4061
FEB	752	790	1542	639	628	1267	403	365	768	1794	1783	3577
MAR	974	896	1870	777	821	1598	511	537	1048	2262	2254	4516
APR	995	958	1953	855	823	1678	588	664	1252	2438	2445	4883
MAY	992	975	1967	689	651	1340	677	628	1305	2358	2254	4612
JUN	903	972	1875	904	875	1779	511	542	1053	2318	2389	4707
JUL	792	870	1662	706	719	1425	627	651	1278	2125	2240	4365
AUG	718	702	1420	800	838	1638	686	695	1381	2204	2235	4439
SEP	762	726	1488	762	743	1505	647	650	1297	2171	2119	4290
OCT	790	835	1625	694	620	1314	555	566	1121	2039	2021	4060
NOV	626	620	1246	757	770	1527	503	492	995	1886	1882	3768
DEC	689	658	1347	765	690	1455	1018	821	1839	2472	2169	4641
Number of Passengers by Day of Week												
SUN	1	6	7	4	0	4	13	13	26	18	19	37
MON	1812	1542	3354	1465	1270	2735	1481	1286	2767	4758	4098	8856
TUE	2198	2133	4331	2005	1855	3860	1499	1357	2856	5702	5345	11047
WED	2181	2142	4323	1864	1762	3626	1539	1455	2994	5584	5359	10943
THU	2055	1925	3980	2031	2015	4046	1544	1483	3027	5630	5423	11053
FRI	1745	2215	3960	1482	1831	3313	1127	1508	2635	4354	5554	9908
SAT	16	3	19	3	2	5	38	13	51	57	18	75

(See figures 53, 54 and 55.)

Number of Passengers by Time of Day

	1987			1988			1989			TOTAL		
	ARRIVE	DEPART	TOTAL	ARRIVE	DEPART	TOTAL	ARRIVE	DEPART	TOTAL	ARRIVE	DEPART	TOTAL
0	0	1	1	0	0	0	0	0	0	0	1	1
1	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	2	2	0	2	2
3	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
6	7	6	13	2	1	3	0	4	4	9	11	20
7	1707	89	1796	1374	110	1484	635	72	707	3716	271	3987
8	2886	346	3232	2073	229	2302	2106	287	2393	7065	862	7927
9	959	351	1310	813	297	1110	768	224	992	2540	872	3412
10	714	373	1087	726	422	1148	658	328	986	2098	1123	3221
11	696	512	1208	763	620	1383	530	413	943	1989	1545	3534
12	574	518	1092	590	561	1151	431	422	853	1595	1501	3096
13	510	671	1181	510	622	1132	341	482	823	1361	1775	3136
14	568	1123	1691	524	1028	1552	368	818	1186	1460	2969	4429
15	457	741	1198	512	771	1283	488	854	1342	1457	2366	3823
16	465	2184	2649	393	1744	2137	325	1480	1805	1183	5408	6591
17	259	2253	2512	312	1689	2001	304	1182	1486	875	5124	5999
18	135	569	704	199	498	697	210	418	628	544	1485	2029
19	49	136	185	53	73	126	53	72	125	155	281	436
20	6	62	68	3	45	48	10	38	48	19	145	164
21	9	18	27	0	21	21	12	7	19	21	46	67
22	7	9	16	2	2	4	2	10	12	11	21	32
23	0	4	4	5	2	7	0	2	2	5	8	13

(See figure 56.)

	1987			1988			1989			TOTAL		
	ARRIVE	DEPART	TOTAL	ARRIVE	DEPART	TOTAL	ARRIVE	DEPART	TOTAL	ARRIVE	DEPART	TOTAL
Number of Passengers by Mission Type												
CORP/EXEC	7116	7224	14340	6110	6259	12369	4853	5139	9992	18079	18622	36701
MILITARY	259	272	531	265	274	539	203	126	329	727	672	1399
GOVERNMENT	884	736	1620	1218	1109	2327	731	720	1451	2833	2565	5398
AIR TAXI	1045	820	1865	477	482	959	518	491	1009	2040	1793	3833
COURIER	704	914	1618	784	611	1395	546	384	930	2034	1909	3943
SCHEDULED	0	0	0	0	0	0	390	255	645	390	255	645
Number of Passengers by Engine Type												
PISTON	3	5	8	19	15	34	9	16	25	31	36	67
SGL TUR	5628	5524	11152	4814	4411	9225	3569	3311	6880	14011	13246	27257
TWIN TUR	4377	4437	8814	4021	4309	8330	3663	3788	7451	12061	12534	24595

(See figures 57 and 58.)

Total Annual Fees Collected

	1987			1988			1989			TOTAL		
	TAKEOFF	PARK	MISC	TAKEOFF	PARK	MISC	TAKEOFF	PARK	MISC	TAKEOFF	PARK	MISC
	$103,483	$30,378	$33,125	$119,631	$55,527	$28,115	$117,220	$59,797	$41,838	$340,334	$145,702	$103,078
Fees Collected by Month												
JAN	$12,230	$1,646	$1,600	$6,710	$2,740	$1,400	$6,269	$3,770	$1,980	$25,209	$8,156	$4,980
FEB	9,220	1,420	1,800	7,663	3,630	1,680	5,719	3,260	300	22,662	8,310	3,780
MAR	9,609	2,324	2,420	11,011	6,485	2,400	10,372	4,900	6,011	30,992	13,709	10,831
APR	7,160	2,356	1,500	10,950	5,115	3,710	11,978	5,970	1,985	30,088	13,441	7,195
MAY	6,900	2,499	4,670	8,096	3,500	2,280	10,256	5,335	7,094	25,252	11,334	14,044
JUN	6,795	2,557	2,700	14,162	5,250	2,650	9,642	4,815	2,000	30,599	12,622	7,350
JUL	8,284	2,781	2,790	10,708	4,320	1,600	11,233	5,215	3,200	30,225	12,316	7,590
AUG	9,289	2,950	2,350	11,537	4,750	3,555	11,772	6,220	5,108	32,598	13,920	11,013
SEP	9,630	3,425	5,220	9,628	5,505	1,400	11,330	6,020	6,772	30,588	14,950	13,392
OCT	9,757	3,140	2,215	9,914	4,335	1,650	10,196	5,625	2,630	29,867	13,100	6,495
NOV	7,120	2,360	1,400	10,664	5,832	3,070	9,713	4,447	1,850	27,497	12,639	6,320
DEC	7,429	2,920	4,460	8,588	4,065	2,720	8,740	4,220	2,908	24,757	11,205	10,088
Fees Collected by Mission Type												
CORP/EXEC	$75,377	$26,055	$25,375	$97,532	$50,557	$17,575	$96,094	$54,957	$31,678	$269,003	$131,569	$74,628
AIR TAXI	12,470	2,911	1,000	14,063	2,710	600	15,196	3,815	1,960	41,729	9,436	3,560
COURIER	15,561	1,412	5,000	7,908	2,170	8,400	5,905	1,025	5,900	29,374	4,607	19,300
SCHEDULED	0	0	0	0	0	0	0	0	100	0	0	100
FEE ONLY	75	0	1,750	0	0	1,540	0	0	2,200	75	0	5,490

(See figures 59, 60, 61, 62, 63, 64, 65, 66, and 67.)

Annual Number of Parked Helicopters

	1987	1988	1989
PARKED	3684	3429	3055
NOT PARKED	7718	7211	6045
TOTAL	11402	10640	9100
Parked Helicopters by Month			
JAN	275	197	214
FEB	258	249	167
MAR	328	320	238
APR	337	292	266
MAY	369	252	275
JUN	351	366	238
JUL	317	269	262
AUG	257	283	297
SEP	330	336	313
OCT	340	288	271
NOV	251	303	222
DEC	271	273	291
Parked Helicopters by Day of Week			
SUN	12	4	14
MON	604	516	546
TUE	761	737	605
WED	843	702	623
THU	745	795	659
FRI	706	672	601
SAT	13	2	6
Parked Helicopters by Mission Type			
CORP/EXEC	2604	2423	2193
MILITARY	71	66	41
GOVERNMENT	219	266	194
AIR TAXI	189	124	179
COURIER	601	549	444
SCHEDULED	0	0	3
Parked Helicopters by Engine Type			
PISTON	4	12	14
SINGLE TURBINE	2300	1963	1813
TWIN TURBINE	1380	1453	1227

(See figures 68, 69, 70, 72 and 73.)

Number of Parked Helicopters by Time of Day

	1987			1988			1989			TOTAL		
	ARRIVE	DEPART	TOTAL	ARRIVE	DEPART	TOTAL	ARRIVE	DEPART	TOTAL	ARRIVE	DEPART	TOTAL
0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	1	0	1	1	0	1
6	12	3	15	4	0	4	6	2	8	22	5	27
7	200	14	214	145	16	161	124	13	137	469	43	512
8	523	175	698	445	92	537	430	101	531	1398	368	1766
9	256	194	450	261	168	429	248	123	371	765	485	1250
10	255	204	459	292	196	488	241	147	388	788	547	1335
11	282	224	506	328	257	585	256	176	432	866	657	1523
12	282	237	519	271	251	522	186	225	411	739	713	1452
13	262	292	554	258	249	507	233	229	462	753	770	1523
14	294	386	680	272	393	665	287	333	620	853	1112	1965
15	279	293	572	262	307	569	287	354	641	828	954	1782
16	527	613	1140	408	583	991	380	567	947	1315	1763	3078
17	364	593	957	312	478	790	189	409	598	865	1480	2345
18	114	340	454	150	335	485	157	243	400	421	918	1339
19	25	69	94	15	69	84	17	85	102	57	223	280
20	5	25	30	2	20	22	8	23	31	15	68	83
21	1	14	15	1	9	10	3	13	16	5	36	41
22	3	4	7	2	2	4	1	9	10	6	15	21
23	0	4	4	0	3	3	0	2	2	0	9	9

(See figure 71.)

APPENDIX B
COMPANIES USING THE WALL STREET HELIPORT

OWNER/OPERATOR	MISSION TYPE
"J" Marine Flight	E
ABA Aviation	C
Advanced Heli	A
Advanced Materials Corp	E
Aerespatial	E
Aerial Films	E
Aetna	E
AG Rotors, Inc.	E
Agusta	E
Air Hi Ho	E
Air Metro	A
Air Pegasis	A
Allied Corp.	E
Allied Signal	E
American Banaco, Inc.	E
American Continental	E
American Express	E
American Helicopter	A
American Properties	E
Amex Corp.	E
Analar	E
As the World Turns	E
AT&T	E
Atlantic Aviation	E
Aviation Resources of VA	E
Bally's Grand	E
Bank of Boston	E
BC Helicopter	E
Bell Helicopter	E
Blackstone Aviation	E
Boardwalk Rog	E
Bocre Leasing	E
Box Air Flt.	A
Bristol Myers	E
Broyhill & Assoc.	E
Buchanan Marine	E
Burke & Burke	E
CAAR Enterprises	E
Cambridge Info Group	E
Camelot	C
Canadian Forces	M
Carson Helicopter	E
CBS News	E
Chalke Inc.	E
Cigna	E
Citadel Films	E
City Hospital	E
Clark Jet	E
Clean Harbors	E
CMC Aviation	E
Colgate Palmolive	E
Colonial Heli, Inc.	E
Combs-Bates	E
Commonwealth Jet	E
Conde Nast Publications	E
Conoco Inc.	E
Corp Air	E
Cross Country	E
CT Regional Police	G
Damin Aviation	C
Data Air Courier	C
Data General	E
Deka Corp.	E
Del Heli Services	E
Delaware Leasing	E
Delaware State Police	G
Delaware Valley	E
DeManttels Flight	E
Denville Aviation	A
DHL	C
Digital Equipment	E
Dillinger A/C	A
DN Air Charter	A

OWNER OPERATOR	MISSION TYPE
Dow Jones	E
Drury Design Dynamic	E
Duffy	C
DuPont Flight	E
Eagle Helicopter	E
East West Air	A
Eastern Helicotper	E
Empire Sanitary Landfill	E
EMS	G
EPA	G
Erkkon Air Corp.	E
Executive Air Fleet	E
Express Marine	C
FBI	G
Federal Express	C
Field Industries	E
Finamex Int. Corp.	E
First Citywide	E
First Jersey Securities	E
First Seasons	E
FL Industries	E
Fleet Helicopter	C
Forbes	E
Fourth Dimension	E
Fox Mount Air Inc.	A
G. C. Sanitation	E
Gannett	E
General Electric	E
General Transporation	A
GLF Air Services	A
Golden Nugget	E
GPI Aviation	A
Grand Central Station	E
Grande Corp.	E
Gulford Aviation	A
Halco Mail Service	C
Haral Leasing	E
Harsco Corp.	E
Harsham A/W	A
Harsham Valley	E
Hartford Helicopter	E
Heli Services, Inc.	E
Helicopter Management	E
Horizon Air	A
Hounanaian Aviation	E
Hustler Development	E
IBM Corp.	E
International Signal	E
Island Helicopters	C
Jet Copter	E
JFC Helicopter	E
Johnson & Johnson	E
Keystone Helicopter	E
Klwein Air Society	E
Laison Helicoapter	E
Lear Seigler	E
Leffler, Inc.	E
Life Flight	G
Lightning Bolt	E
LWL Leasing	E
Mack Truck	E
Main Aviation	E
Martin Dealership	E
Mass. Mutual	E
MBB Helicopter	E
McDonnell Douglas	E
McMahon Helicopter	E
Meridian Helicopter	E
Metromedia A/C	A
Metropolitan Helicopter	A
Mid-Jersey Helicopter	A
Mohawk Helicopter	E
Nassau Police	G

Mission Types:

A = Air Taxi
C = Courier
G = Government
M = Military
S = Scheduled
E = Corp/Exec

OWNER/OPERATOR	MISSION TYPE
New Hampshire Helicopter	A
Nicotra Corp.	E
Niel Selkirk, Inc.	E
NJ Bell Telephone	E
NJ State Police	G
Norl Air	A
NVI Corp.	E
NY Helicopters	A
NY Air	E
NY Police Dept.	G
NY Realty	E
NY State Police	G
O'Connell Mgmt.	E
Ogden Phipps	E
Omni Flight	A
Ox Box Corp.	E
Oxford Textile	E
PAB Aviation	E
Page Helicopter	E
Pan American	A
Paramount	E
Parker	E
Penn State	E
Penske Jet	E
Pfizer	E
Phillip Morris	E
Phillips Aviation	E
Phipps	E
Pioneer Valley	E
Pitcairn Finance	E
PMC	E
PNN Helicopter	E
Prime Production	E
PSE&G	E
R.B. Milligan, Jr.	E
RACO Helicopter	E
Reavcom	E
Reliance Insurance	E
Resorts	A
Rockland Aviation	E
Romar Aviation	E
Ronson Aviation	E
ROP Aviation	E
Rorer Group	E
S.G. Warburg & Co.	E
Sabastiani Heli	E
Schering Plough	E
Schiavone	E
Seagrams	E
Second Leasing Co.	E
Seven-Up Bottling Co.	E
Sikorsky	E
Simplex	E
Sky Jet Heli	E
Sony	E
Spectrum	C
Sperry Corp.	E
Stacy Corp.	E
State of Rhode Island	G
Steele Hill Resort	E
Sterling Helicopter	E
Suffolk County Police	G
Summit Aviation	E
Sundance Helicopter	E
T&S Leasing	E
Tennaco	E
Textron	E
Thompson Industries	E
Timex Corp.	E
TLI Charters	A
TNT Skypack	C
Tri-County Helicopter	E
Tricor	C

OWNER OPERATOR	MISSION TYPE
Trump Air	A/S
TTM	E
U.S. Jet Aviation	E
Unicorn World Coord.	E
Union Pacific	E
Unisys	E
Universal Television	E
US Air Force	M
US Army	M
US Coast Guard	M
US Customs	G
US Marines	M
US National Guard	M
US Navy	M
Viewtop Corp.	E
Villa Banfi	E
Wall Street	E
Warner Lambert	E
Waterfront A/W	A
Wayfarer Ketch	E
WICO Aviation	A
Wiggins Airways	A
Wm. Muggleston	E
WOR	E
Yonkers Construction	E

Mission Types:

A = Air Taxi
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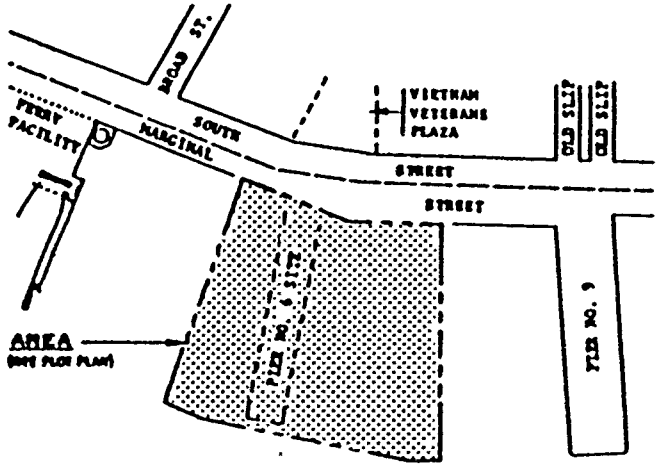
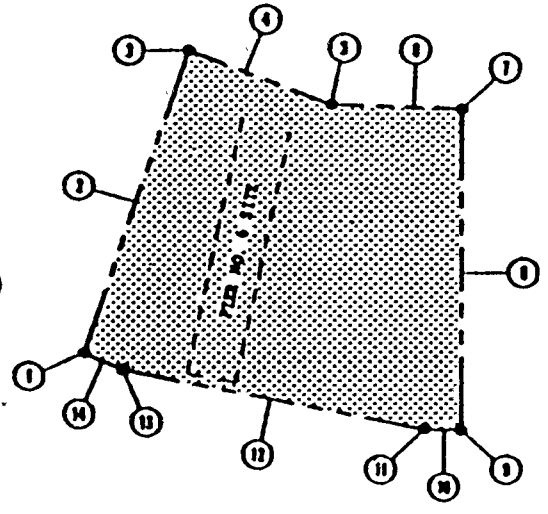
APPENDIX C
DOWNTOWN MANHATTAN HELIPORT - LAYOUT PLAN

LOCATION PLAN



PLOT PLAN



APPROVED

FOR THE PORT AUTHORITY

FOR THE CITY OF NEW YORK

DATA TABLE
(BEARINGS, CO-ORDINATES, ETC.)

NO.	DESCRIPTION	NO.	DESCRIPTION
1	N 1,360,396 W 7,010,513	8	S 69°-54'-24" E 391.043'
2	N 32°-10'-20" W 306.042'	9	N 2,115,663 W 6,659,001
3	N 1,927,010 W 7,473,404	10	S 22°-10'-36" W 66.189'
4	N 41°-59'-40" E 259.623'	11	N 2,064,370 W 6,683,903
5	N 2,120,763 W 7,299,700	12	S 32°-09'-21" W 321.764'
6	N 22°-10'-36" E 224.068'	13	N 1,832.64 W 6,961.606
7	N 2,328,991 W 7,214,823	14	S 41°-59'-40" W 72.990'

NOTE:

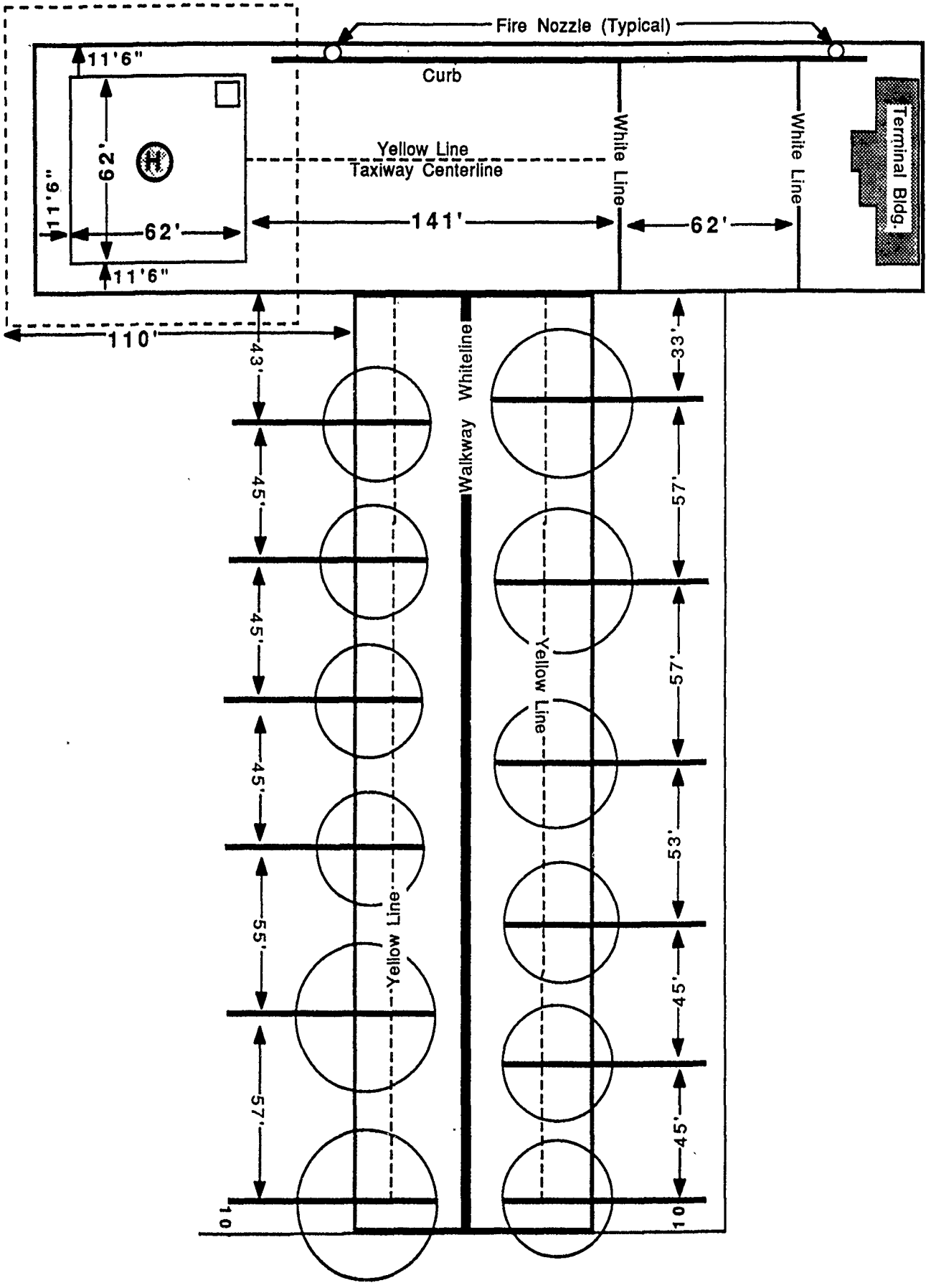
CO-ORDINATES, EXPRESSED IN FEET, AND BEARINGS REFER TO THE BUCHAN GRID SYSTEM ESTABLISHED BY THE PRESIDENT OF THE BOROUGH OF MANHATTAN. THE ORIGIN OF THIS SYSTEM IS APPROXIMATELY LOCATED AT THE INTERSECTION OF SMITH AND AMITY STREETS IN THE BOROUGH OF BROOKLYN.

THE PORT AUTHORITY OF
NEW YORK AND NEW JERSEY
DOWNTOWN MANHATTAN HELIPORT

4-4-83

6805-2

DMH HELIPORT DIMENSIONS



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