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Indianapolis Downtown Heliport–Operations Analysis and Marketing History

Advanced System Design Service
Washington, D.C. 20591

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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. Four cities were selected for the FAA demonstration program. These were: New York, New Orleans, Los Angeles, and Indianapolis. In January 1985, the Indianapolis Downtown Heliport was the first of the demonstration heliports to open.

This study is an analysis of the operational characteristics of the Indianapolis Downtown Heliport from its opening in 1985 through March 1989, and an investigation of the marketing techniques used during the planning and development stages of the heliport as well as the continuing marketing effort used to retain and increase business. An analysis of operations at the heliport is performed using data collected by the heliport operators. The parameters examined concentrate on the types of missions, the variations and trends in the number of operations, the geographic distribution of the helicopters that use the facility, and the types of services required by the helicopter operators using the heliport.

Due to limitations in the amount and accuracy of data available, only generalized trends rather than detailed statistical conclusions could be developed.

A similar analysis is being performed for the Downtown Manhattan Heliport (Wall Street) in New York City.

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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 four full-service heliports in major urban areas were made available through this program. The cities selected for the prototype demonstration heliports were: New York, New Orleans, Los Angeles, and Indianapolis. The Indianapolis Downtown Heliport (IDH) was the first demonstration heliport to open in January 1985.

The IDH is a publicly owned, privately operated, public use facility situated on 5.5 acres of land near United States Route 40 in downtown Indianapolis, Indiana. It is a ground level heliport, although due to topography and design the landing and parking pads are technically one level above the street. Figure 1 is a picture of the heliport. It is located within six blocks of the City-County Building; the Convention Center and Hoosier Dome; one and one half blocks from the State Capital; and two to three blocks from the center of the downtown.

The heliport is owned by the Indianapolis Airport Authority (IAA) which is an independently operated branch of the city government. It is run by a private fixed-base operator (FBO), the Indianapolis Heliport Corporation (IHC), who leases the heliport from the IAA. The IHC is

Indianapolis Downtown Heliport

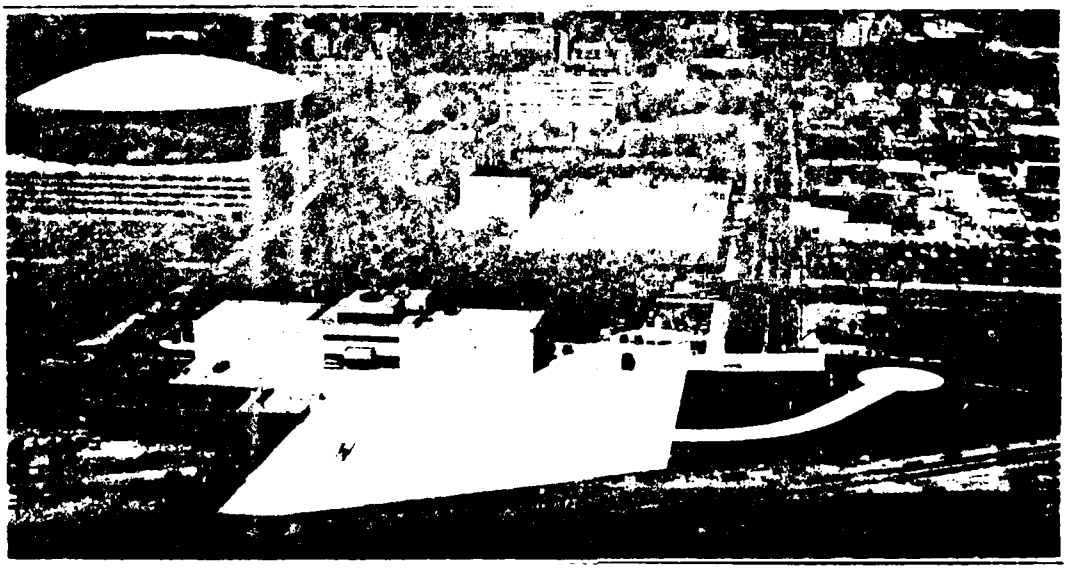

FIGURE 1
Source: "PLASI," Volume 4, No.1, Devore Aviation Corporation, Winter 1983.

solely responsible for the operation of the heliport except for major repairs and maintenance to the facility, which are handled by the IAA.

IDH is representative of the type of downtown public use heliport that will allow helicopter transportation to be readily integrated into the urban transportation infrastructure. The FAA and helicopter transportation proponents use it as an example of a successful downtown heliport, and it is considered a showpiece of the National Prototype Heliport Demonstration and Development Program.

The heliport is open 24 hours a day, 365 days a year. It has one touchdown pad which is 60 feet in diameter and an apron with painted parking positions for 7 helicopters, although there is space available for up to 20 helicopters. The complete facilities include a 6,000 square foot maintenance hangar and a 6,000 square foot storage hangar that are situated on either side of a three-story central tower building. This building is used for the administration of the heliport, for pilot services, and has office space available for other businesses whose rent produces revenue for the heliport. The top floor of the tower is a restaurant. A layout map of the heliport is shown in figure 2.

The region from which a heliport attracts its business is called a market/service area. Due to the operational capabilities of the helicopter, a market/service area is estimated to be within a 200-300 mile radius of a heliport. The estimated market/service area of the IDH is depicted in figure 3. This region contains some of the largest cities in the midwest, as well as major centers of heavy industry and agriculture. The heliport has a particular attraction, because it is the only maintenance center for many helicopter airframe, avionics, and engine manufacturers in that region.

1.1 PURPOSE

This operations study effort 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 prototype heliports. This will be accomplished through an investigation and evaluation of the operational characteristics of the IDH, the marketing techniques employed during its development, and the techniques used to promote its continued and increased use. This report documents the result of that investigation.

1.2 PROJECT ORGANIZATION

To accomplish the purpose, the effort was divided into two distinct but correlative tasks. The first task was the analysis of operational data on heliport activity from January 1985 through March 1989. The analysis was performed by analyzing the data and developing statistical summaries of parameters that were significant to the overall evaluation of heliport activity.

INDIANAPOLIS DOWNTOWN HELIPORT

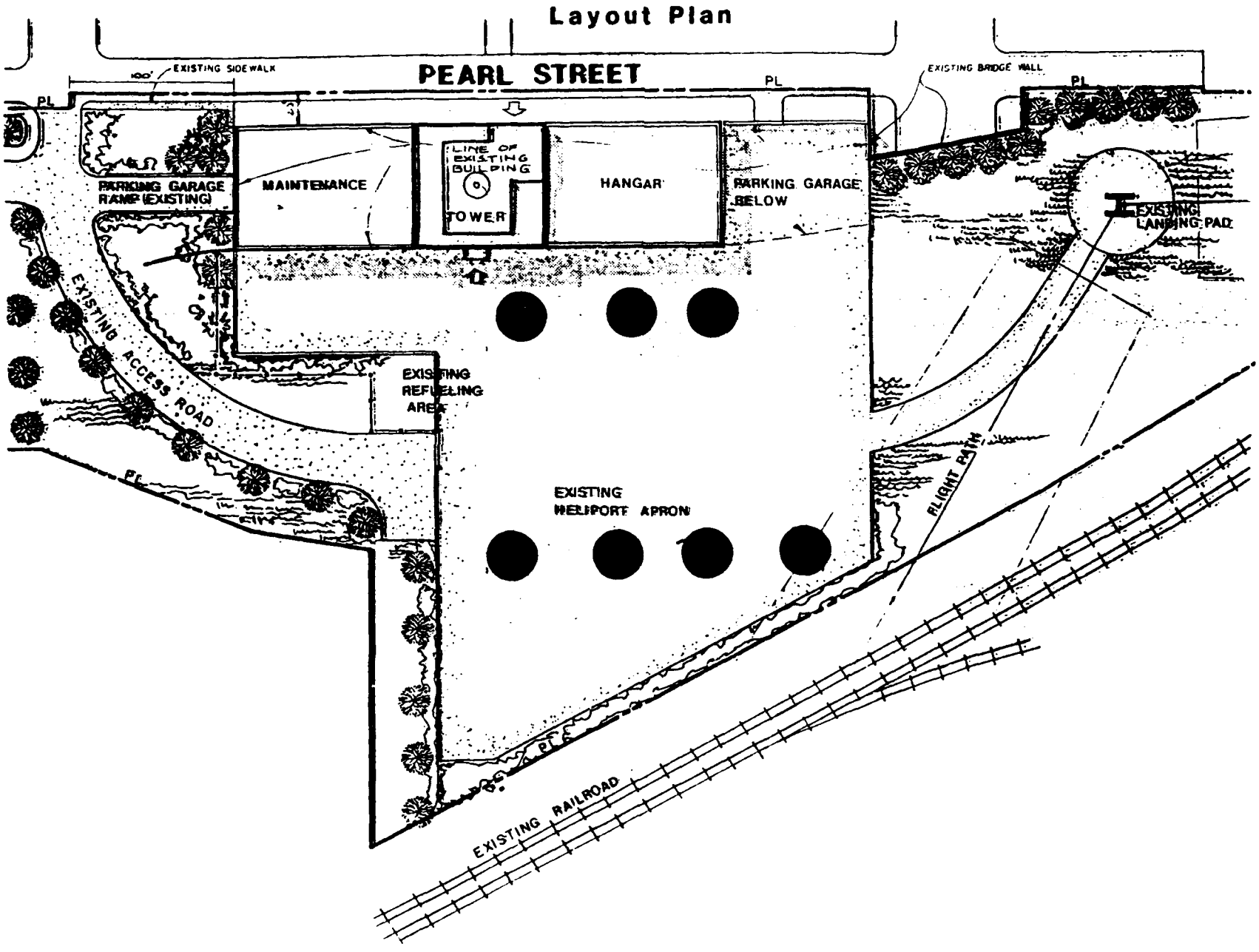

FIGURE 2

MARKET/SERVICE AREA OF THE INDIANAPOLIS DOWNTOWN HELIPORT

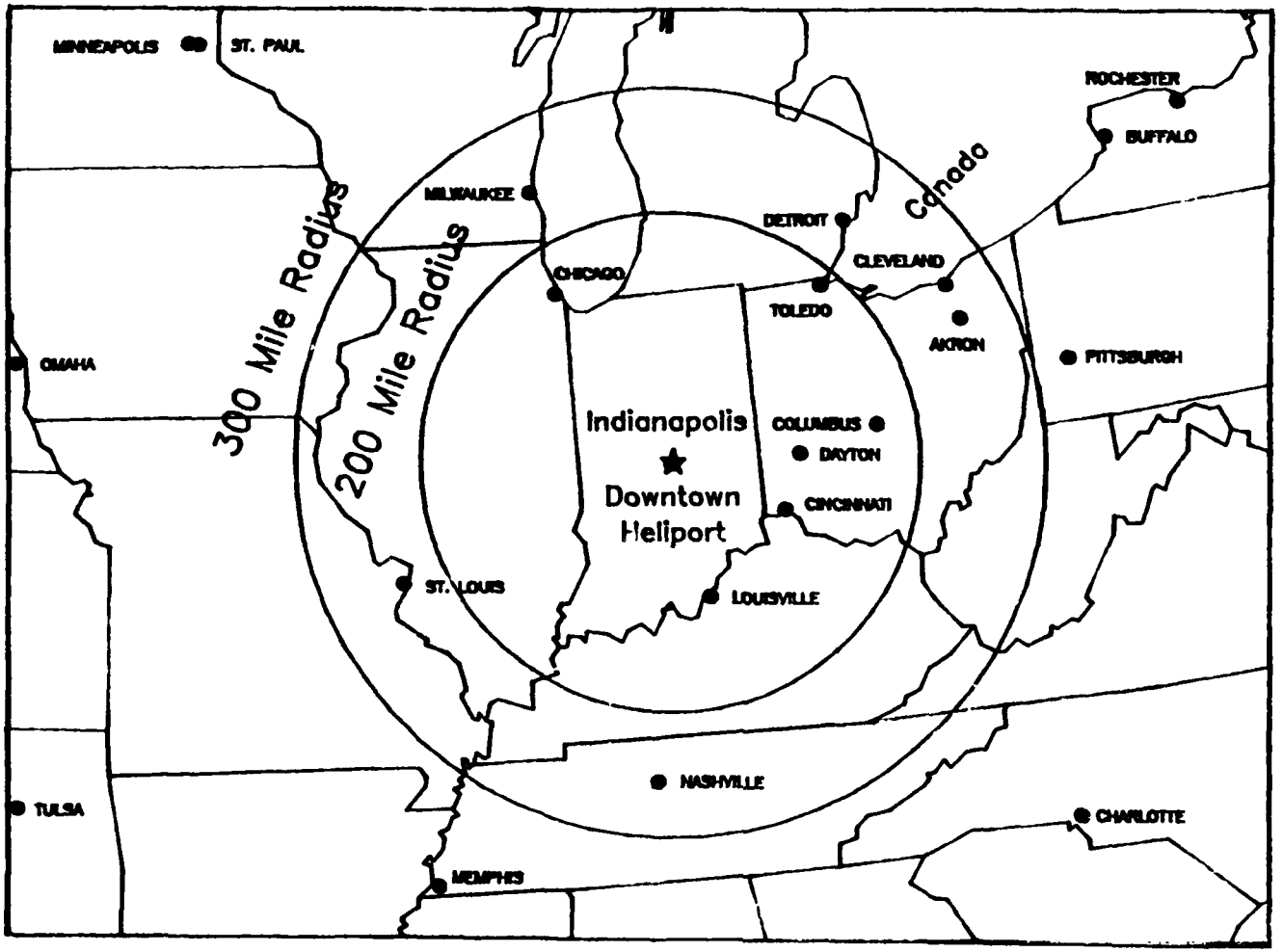

FIGURE 3

The second task was to describe the marketing processes used to persuade various authorities to support the construction of a public use heliport in the city of Indianapolis, and the current promotional techniques employed to encourage continued and increased activity.

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

1.2.1 Operations Analysis

The operations analysis made use of available data on the heliport's activity betw[illegible] January 1985, when the heliport opened as a prototype, and March 1989. These data were used to describe numerous operational characteristics of the heliport pertaining to aircraft categories, mission types, and services required. These data elements were, as much as possible, differentiated by hourly, daily, monthly, and annual variations. The data parameters to be examined and the methodologies applied are described in section 2.0. Section 3.0 presents the results of the operations analyses.

Complete records of helicopter operations during this period were not available. Due to a miscommunication between the IHC and the FAA regarding retention of the activity records, records equalling months of data were lost. In addition, not every day of every month of the remaining data was complete, or was every record per operation complete. The available activity records used for this analysis are discussed in section 2.0.

1.2.2 Marketing Analyses

The analysis of marketing techniques addressed two areas. It first described and evaluated the approaches used to persuade the community, both individuals and institutions, to back the heliport throughout the planning and development processes. It then investigated the elements of the heliport's continuous marketing strategies, that is, the effort taken to induce people to use the heliport once it was opened as a prototype and those methods used to retain and increase the heliport's business after the heliport was established. The evaluation of marketing techniques is presented in section 4.0.

Sources of information on marketing techniques included articles written about the heliport, promotional information, investigative material, interviews with the IAA and the IHC, and telephone discussions with frequent users of the heliport.

1.2.2.1 Planning and Development Marketing

The investigation of planning and development marketing included a short history of the heliport, enumerating its developmental stages. It addressed the roles of the agencies involved in the heliport's evolution from 1954 to the present, the impetus behind applying for FAA National Prototype Heliport Demonstration and Development Program funding, and how community backing and financial support were ac[illegible]eved.

Once the prototype heliport was completed, there was a need to notify potential users of its availability. The marketing effort needed to encourage initial use was explored.

1.2.2.2 Continuing Marketing

The analysis of continuing marketing focused on the methods used to maintain and to increase activity at the IDH. This included an investigation of the services offered for the users of the heliport, as well as those strategies used to maintain support for the heliport in the community.

2.0 OPERATIONAL DATA PROCESSING

The data parameters examined in this report concentrate on the types of missions, the number of operations, and the types of services required by the helicopter operators using the IDH. The operational parameters evaluated in this study are discussed in this section, along with how they were developed from the operational database.

2.1 DATA QUALITY AND QUANTITY

An explanation of the type of data gathered and the data gathering technique used by the IDH is provided. Figure 4 shows a blank data collection worksheet that identifies the types of data collected. Each row shows one operation of an individual helicopter. All operations are recorded in chronological order. The abbreviations used for the data fields (columns) are shown at the bottom. The data used in this report were collected by various personnel of the IDH with little standardization and no quality control measures. The data were provided to the FAA at no cost. There are large gaps in the dates for which the data were collected. Figure 5 shows the months for which data were available and the percentage of days for which data were collected each month.

Incomplete or no data were recorded on weekends and between approximately 5:00 p.m. and 8:00 a.m. weekdays, because there is no person specifically assigned to collect data during these times. Data were recorded during these times if time and other duties permitted. No real data was collected during May of any year during the collection period because of the extreme workload at the heliport during that month due to the Indianapolis 500 automobile race and other local events. These factors made it necessary to use the "best guess" of the heliport's FBO managers to fill in the number of operations during these times. These guesses, while considered reliable and conservative, are used sparingly to preclude biasing the data.

Another difficulty with the source data is that, in many cases, data fields were left blank (i.e., no entry for mission type); many different abbreviations were used for the same field (i.e., BO105, MBB 105, MBB, 105, ...); there is no way to know if all operations for a given day were recorded; or in some instances an entry was made twice (i.e., showing fueling once for the arrival and once for the departure). Recording errors were corrected where possible. For example, when a helicopter was recorded as having refueled for both arrival and departure, refueling was counted only once. Also, the various abbreviations were sorted and replaced with standardized notations.

The gaps in the data collection prevented year-to-year comparisons of the magnitudes of several parameters because of the difference in the amount of data available for each year and because of the incompleteness of data entry on days when it was collected. However, parameter comparisons based on percentages after the data had been normalized were analyzed.

INDIANAPOLIS HELIPORT FLIGHT ACTIVITY FOR - MONTH_____ YEAR_____

DATE	D/N TIME	A/C N#	MAKE/ MODEL	DEPART. POINT	NEXT DEST.	IFR/ VFR	NAV CAPAB. V/L/R	SERV REQ'D F/M/RON	TYPE OF OPR PVT/ATCO/TNG MIL/GOVT/EMS	#CREW #PASS	HOME BASE	REMARKS
	DN											
	DN											
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LEGEND: P = PVT M = MIL/GOVT L = LIFT R = AREA NAV(RNAV) T = TNG L = LORAN
A = ATCO(135) P = POLICE V = VOR AP = AUTO PILOT E = EMS

Note: More than one navigation capability function may be listed.

F = FUEL M - Maintenance(@IHC) RON = Remain Overnight D = Drop Pax PU = Pick Up Pax

FIGURE 4

PERCENTAGE OF DAYS RECORDED PER MONTH

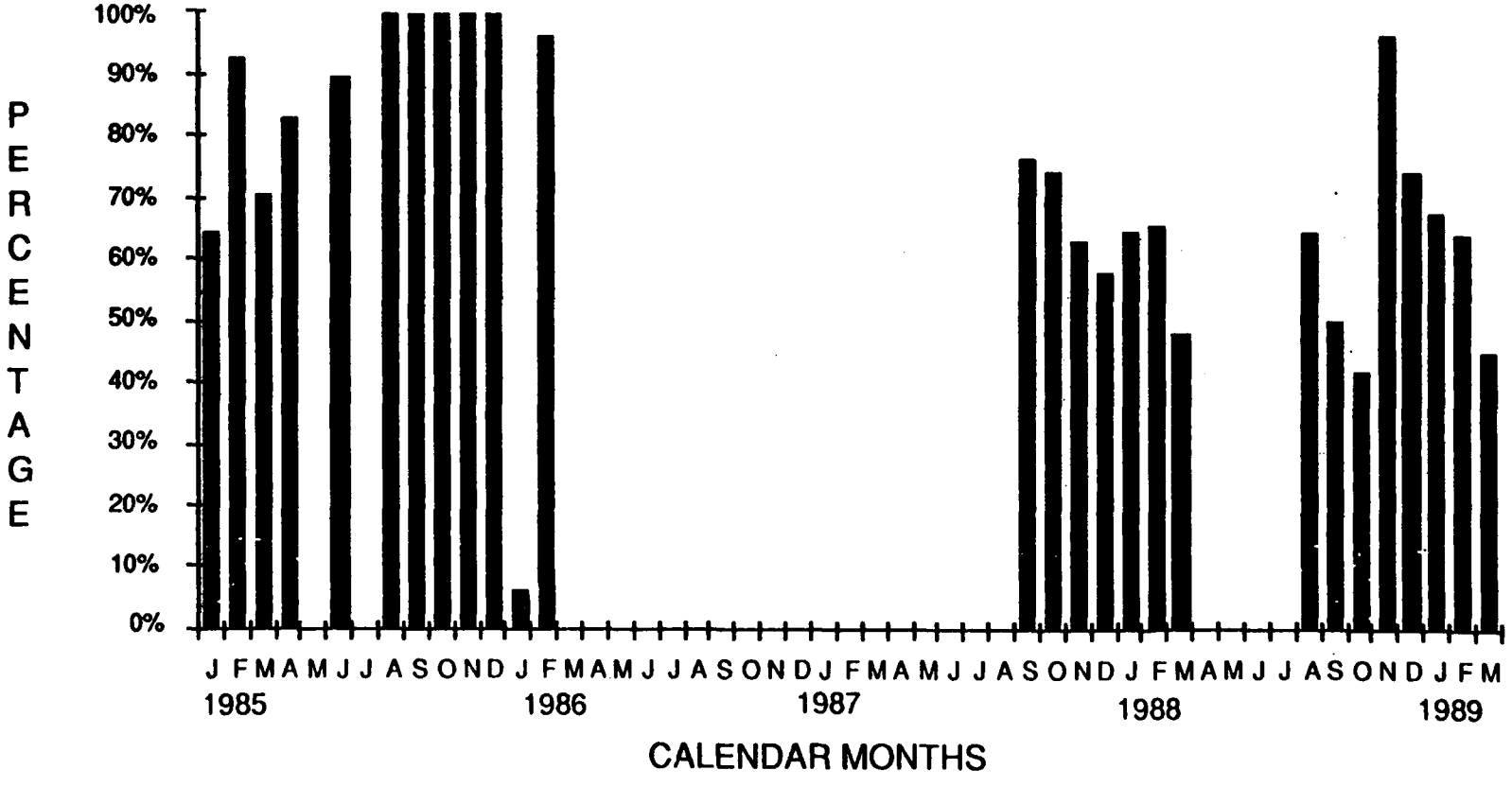


FIGURE 5

All analytical results in this report are reported numerically and in graphic form. Operational parameter counts taken from the source database are reported as bar charts. Normalized data are reported as pie charts. This was done consistently in order to emphasize the difference in the data type used to construct the graphs. The results of the data analysis are presented in section 3.0.

2.2 METHODOLOGIES

The following paragraphs describe the methods used to process each of the summary data parameters.

2.2.1 Total Annual Operations

As shown in figure 5, no year in the data collection period (January 1985 to March 1989) had complete data. Two databases were developed. One was the raw data taken from the IDH records, and the other used data adjusted to include an estimate of data gaps. Due to the data gaps, the total number of annual operations was estimated by using the average number of operations for each day of the week to fill in all missing days of data. A detailed discussion of the methods used to account for data gaps is found in appendix A.

Since so much of the data had to be analyzed from the daily averages, the data were not analyzed for variation from year to year. Any conclusion based on these averages could be heavily biased by monthly variations in activity and therefore may be unreliable.

The FBO managers also estimated that there were 10,000 to 12,000 total operations per year at IDH. This estimate was compared with the totals as a check of accuracy.

2.2.2 Total Monthly Operations

The total monthly operations were calculated for the months for which data were available. Missing data were filled in by using the methods described in appendix A.

The average number of monthly operations was also calculated, along with the standard deviation of the number of monthly operations to determine if there were monthly variations in the number of operations at the heliport. A comparison of the average total monthly operations was made.

2.2.3 Comparison with Towered Airports

The FAA publishes FAA Aviation Forecasts that contains data on the number of operations at all towered airports in the United States. The number of operations are reported both as total numbers of operations per month and as a 12 month moving average. This study compared the operations at the IDH in 1985 with the towered airport data provided by the FAA forecasts to determine if airport and heliport facilities have the same seasonal variations and to pinpoint peak traffic at the heliport. Only 1985 heliport data were used because it is the most complete year of data, with only May and July missing.

An estimate of the total monthly operations for both May and July 1985 was made to fill these gaps. Operations for May were based on a conservative estimate by the FBO managers. July operations were based on an average of the combined daily averages for June and August to create data for July.

For the months January through April 1985, which have some missing days of data, the daily average of the respective month was used to fill in the missing data. These data were compared to the towered airport data from the FAA.

2.2.4 Total Daily Operation Variation

Daily variations were analyzed for each day of the week, by hour of the day, and by daylight versus night operations. Results based on the entire database were analyzed.

2.2.4.1 Day of the Week

To analyze the number of operations by day of the week the number of operations for each day of the week were determined for each month in the database. The same data were also sorted by mission type to determine distribution by day of the week.

2.2.4.2 Time of Day

An analysis was performed on the distribution of the number of operations by time of day by calculating the average number of operations per hour for weekdays. The same analysis was also applied to weekends. Weekdays and weekends were calculated separately to identify possible correlations between weekday business patterns and time of operations.

2.2.4.3 Daylight/Night Operation Estimates

The total number of daylight and night operations and the percentage of daylight/night operations were analyzed. Appendix B contains an explanation of how hours of daylight were determined. Most of the data provided by the heliport was collected between 8 a.m and 5 p.m. These numbers, or normalized versions of these numbers, were used for evaluating daytime operations.

The nighttime data provided by the heliport were incomplete since most of the night operations are not recorded after 5 p.m. To compensate for this, data for night operations were handled two ways, depending on the type of analysis being performed. The first method used the actual recorded data for night operations. This method was used in most of the analyses and, unless otherwise stated, it is the method of choice. For the second method, conservative estimates provided by the FBO managers for night operations were used. When this method was used in an analysis, it was identified as the FBO manager's estimate of nighttime operations.

The FBO estimates of night operations were as follows:

Nights

- 4 emergency medical service (EMS) operations per night
- 4 police operations per night
- 1.78 military operations per night
- 0.27 corporate operations per night

This adds up to 10.05 operations per night. To use the FBO estimates for analysis, the actual data were analyzed to determine the number of after hour operations per night for each year. Then the number of night operations necessary to bring the number up to the average of 10.05 were calculated and added to the actual data for each year.

2.2.5 Operations by Aircraft Categories

For the purposes of this report, all helicopters identified as using the IDH were classified into three categories by engine type: piston (P), single-engine turbine (ST), and twin-engine turbine (TT). Table 1 identifies the helicopter models categorized under each engine type classification. The number and percentage of each helicopter type were determined and evaluated as a total of the entire database.

TABLE 1
CATEGORIES OF HELICOPTERS USING THE IDH
BY ENGINE TYPE/NUMBER

Piston	Single Turbine	Twin Turbine
Robinson 22	Bell 206 (Jet Ranger)	Bell 222
Hiller 12	Aerospatiale 350	Bell 214
Bell 47	Aerospatiale 360	Boeing Vertol 107
Sikorsky 58	McDonnell Douglas 500D	Aerospatiale 355
Schweitzer/ Hughes 300 C	AH1 (Bell Cobra)	Aerospatiale 365
	UH1 (Bell Huey)	Messerschmitt-Boelkow-Blohm 117
	OH58 (Bell 206)	Messerschmitt-Boelkow-Blohm 105
		Sikorsky 58T
		Sikorsky 76
		Sikorsky 61
		Sikorsky 64
		UH60 (Sikorsky Blackhawk)

In addition, the percentage of operations for each helicopter type were calculated by year to show any trends in the types of aircraft using the heliport. Here again, the relative number of operations per year did not provide any relevant data because of the gaps in the data. However, the relative percentages were calculated to determine any significant differences.

2.2.5.1 Numbers of Operations

The number of operations conducted by each helicopter classification was calculated by both the total number of operations and by the yearly totals. The yearly totals were calculated and reported for the purpose of calculating percentages, but no evaluation was made due to gaps in the data.

2.2.5.2 Percentage of Operations

The percentage of operations conducted by each classification of helicopter was calculated both for the total database and for the yearly totals.

2.2.6 Operations by Departure Point

To evaluate the geographical distribution of operations at the heliport by departure point, all arrivals were sorted by their departure points, counted, and the percentage of operations from each departure point was calculated. The distance from each departure point to IDH was determined, and the departure points were grouped together by their distance from IDH. From this analysis, the percentages of operations landing at IDH from various distances were determined.

2.2.6.1 Numbers of Operations

The number of operations originating from each departure point was found by sorting the total database and counting the number of entries from each departure point.

2.2.6.2 Percentage of Operations

The percentage of operations originating from the most frequently used departure points was calculated for the total database.

2.2.7 Operations by Next Destination

To further evaluate the geographical distribution of helicopters using the heliport, the departures were analyzed by their next destination. All operations were sorted by their next destination, counted, and the percentage of operations for each next destination was calculated.

2.2.7.1 Numbers of Operations

The number of departures to the most frequently used next destination was found by sorting the data and counting the number of entries of each next destination for the total database.

2.2.7.2 Percentage of Operations

The percentage of departures to each next destination was calculated, both for the total database and by year.

2.2.8 IFR Operations as a Function of Various Parameters

Currently the IDH has a (VOR/DME) nonprecision approach. However, the missed approach point (MAP) is 4.2 nm from the pad and 521 feet above ground level. These high minimums at the MAP discourage instrument flight rules (IFR) operations. Only 48 IFR operations were reported for the entire data collection period (1985 to 1989). This represents only 0.56 percent of the total available operations. Therefore, it was not possible to analyze IFR operations at the IDH in detail due to the small sample size. Section 3.1.8 contains further discussion on the issue.

2.2.9 VFR Operations as a Function of Various Parameters

Since there were so few IFR operations, 99.44 percent of all operational parameters evaluated were visual flight rules (VFR). Therefore, essentially all analyses in this report pertain to VFR operations.

2.2.10 Aircraft with Various Navigation Capabilities

Operations of aircraft with various navigation capabilities were analyzed. Navigation aids, including VOR, area navigation (RNAV), automatic direction finder (ADF), microwave landing system (MLS), instrument landing system (ILS) were sorted, counted, and their respective percentages calculated.

2.2.10.1 Numbers of Aircraft

The number of aircraft with various navigation capabilities was sorted and counted.

2.2.10.2 Percentage of Aircraft

The percentages of aircraft with the navigation capabilities were calculated.

2.2.11 Numbers of Aircraft Requiring Various Types of Services

To evaluate the number and types of services used by helicopter operators, the data were sorted based on the services provided by the heliport. IDH offers maintenance facilities, storage, fuel, and a restaurant at its facility. Each of these services was analyzed both in terms of the total database and by home base.

2.2.11.1 Numbers of Aircraft

The numbers of aircraft requiring service were determined both for all services combined and for each specific service such as fuel, maintenance, and restaurant use.

2.2.11.2 Percentage of Aircraft

The percentage of aircraft requiring service was calculated both for all services combined and for each specific service.

2.2.11.3 Services Required as a Function of Home Base

The services required were also sorted by home base to determine what effect the home base has on the types of services required, and to determine the geographic distribution of the helicopters requiring various services.

2.2.12 Operations by Mission Types

The data were sorted based by mission type. The number and percentage of each mission type was calculated both for the entire database and by each day of the week. Operators at the IDH perform a variety of missions that were indicated by the heliport on the record sheets as private (Part 91), air taxi (Part 135), EMS, government, military, and training.

2.2.12.1 Number of Operations

The number of operations by mission type was counted, both for the total database and for each day of the week.

2.2.12.2 Percentage of Operations

The percentage of operations by mission type was calculated for the total database.

2.2.12.3 Mission Type as a Function of Home Base

Mission types were also sorted by home base to determine the relationship between the home base and the types of mission flown, and to determine the geographic distribution of operators using the heliport.

2.2.13 Number of Crew

The average number of crewmembers per mission type was calculated and analyzed for trends. Also, the average number of crewmembers for different aircraft types was calculated and analyzed for trends.

Due to the way the data were recorded, some entries showed zero crew or were left blank. These entries have been filled with an entry of "1." In other records, specifically for military helicopters and public service aircraft, the number of crew was recorded as high as six. However, this does not accurately depict the number of crew responsible for flying the helicopter. In these cases, the number of crew was reduced to two and the number of passengers was changed from zero to the original value minus two crew.

2.2.14 Number of Passengers

The average number of passengers per mission type was calculated and analyzed for trends.

2.3 SUMMARY

Due to the loss of a great deal of the data that were collected and the inconsistency of the available data, a detailed statistical analysis of the operational characteristics of the IDH was not feasible. However, the available data did allow a generalized description of the heliport's activity to be developed. The parameters that were investigated and the methodologies used were outlined in this section. A presentation of the results of the operational analysis follows in section 3.

3.0 ANALYSIS OF IDH OPERATIONS

The wide variation in the quantity of data provided by the IDH on its activity between 1985 and 1989 is shown in figure 6. This figure graphically portrays the problems encountered with the available data. First, there are gaps in the data due to the many months when data were either not collected or were lost. Second, the quantity of data collected is inconsistent on a daily, monthly, and annual basis. Note that the number of operations recorded in later years is approximately half that of 1985. These two factors constitute sampling error and have a detrimental effect on the statistical analysis of the heliport data.

3.1 ANALYSIS OF THE DATA DISTRIBUTION

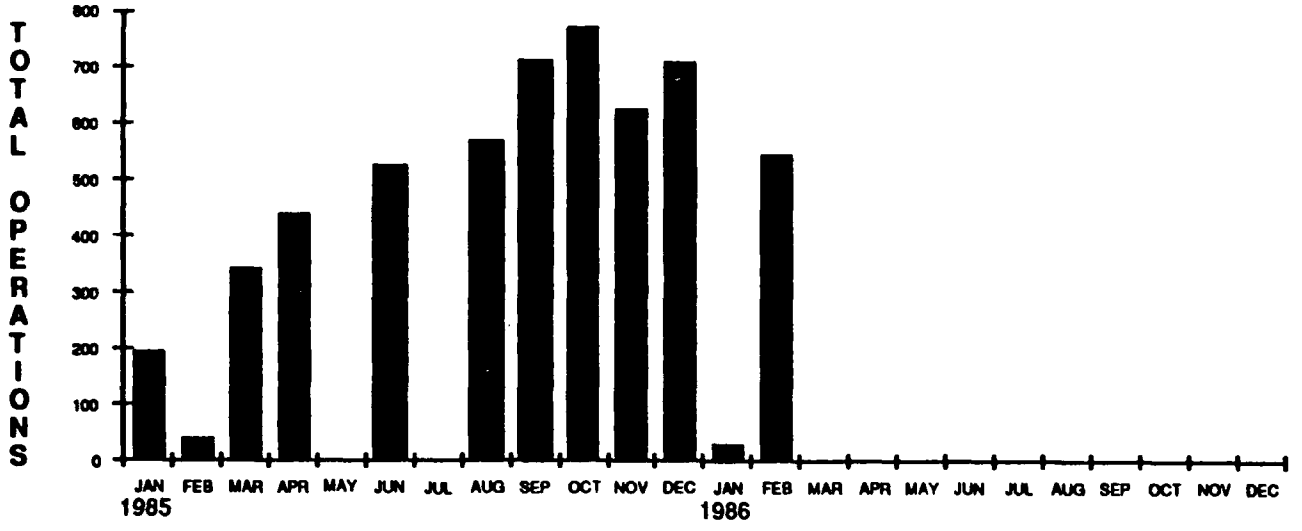
The daily operations data collected at IDH does not have a frequency distribution that fits a normal (Poisson) distribution, as illustrated in figure 7. A non-normal distribution can result from sampling error, from a population that actually has a non-normal distribution, or both. The available data from the IDH shows both sampling error and non-normal population characteristics. Figure 7 shows the frequency distribution of the number of weekday and weekend operations at IDH and their respective normal distributions. The horizontal axes give the number of operations per day, and the vertical axes give the frequency with which that number of operations per day occurs.

The purpose of fitting a normal distribution to any distribution of events is to test whether the events occur independently with respect to each other. If they do, they will follow the Poisson distribution. However, if the occurrence of one event enhances the probability of another event like itself, then the events will have a clumped distribution. A clumped distribution has more events bunched together at one or more places than expected of independent events. Consequently, the mean of a clumped population distribution has fewer events than would be expected from a normal distribution. Both graphs in figure 7 exhibit this effect.

For both the weekday and the weekend graphs, the frequency of occurrence of one or two class marks (groupings of data) stands out as being higher than expected. On the weekend, it is the class mark of 1 which is obviously much larger than would be expected, although there are also many more occurrences of a high number of operations (class marks 15 to 27) than would be expected. On the weekdays, the class mark of 7 is obviously much larger than would normally be expected and, again, there are many more occurrences of a high number of operations (class marks 23 to 37) than would normally be expected.

Some of the non-randomness of the distribution is caused by sampling error, and some is a true reflection of the actual nature of the distribution of operations at IDH. The high occurrence rate of the class mark of 1 on the weekend chart is likely the result of inconsistent data collection. The high occurrence rate of the class mark of 7 on the weekday chart probably reflects a strong trend in the number of operations the IDH handles on a typical day, in this case 6 to 8. In both cases, the larger number of class marks in the right tail of the distribution with a greater frequency than would be expected is probably the result of holidays and

AVAILABLE OPERATIONAL DATA AT IDH



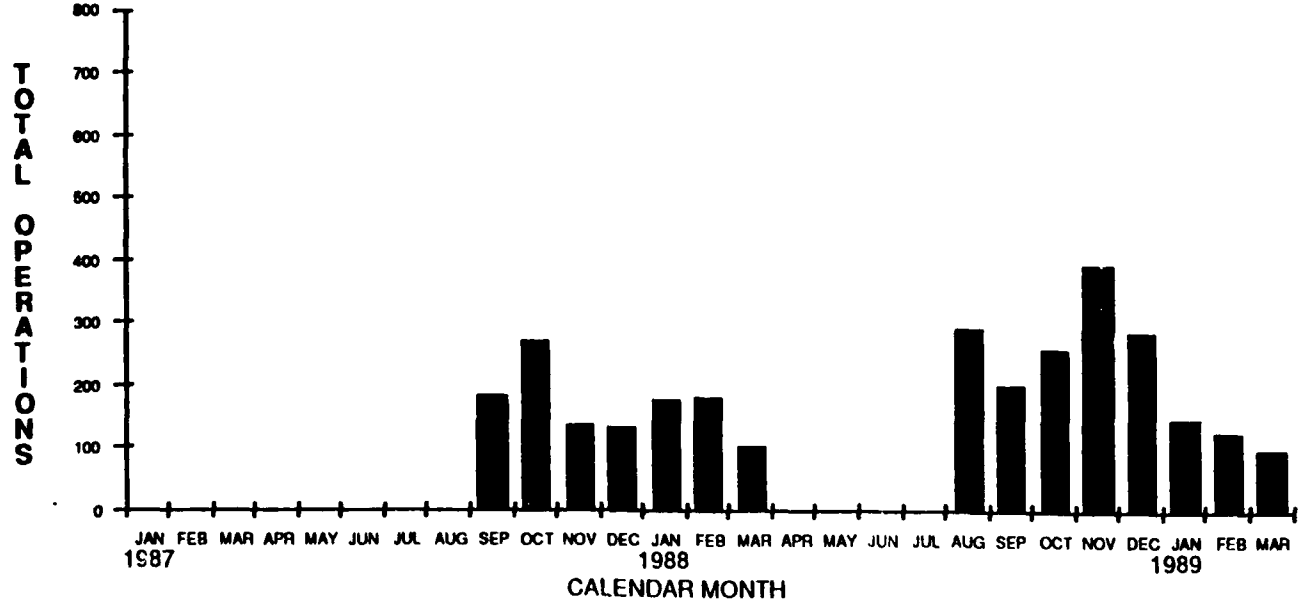


FIGURE 6

FREQUENCY DISTRIBUTION OF IDH DATA

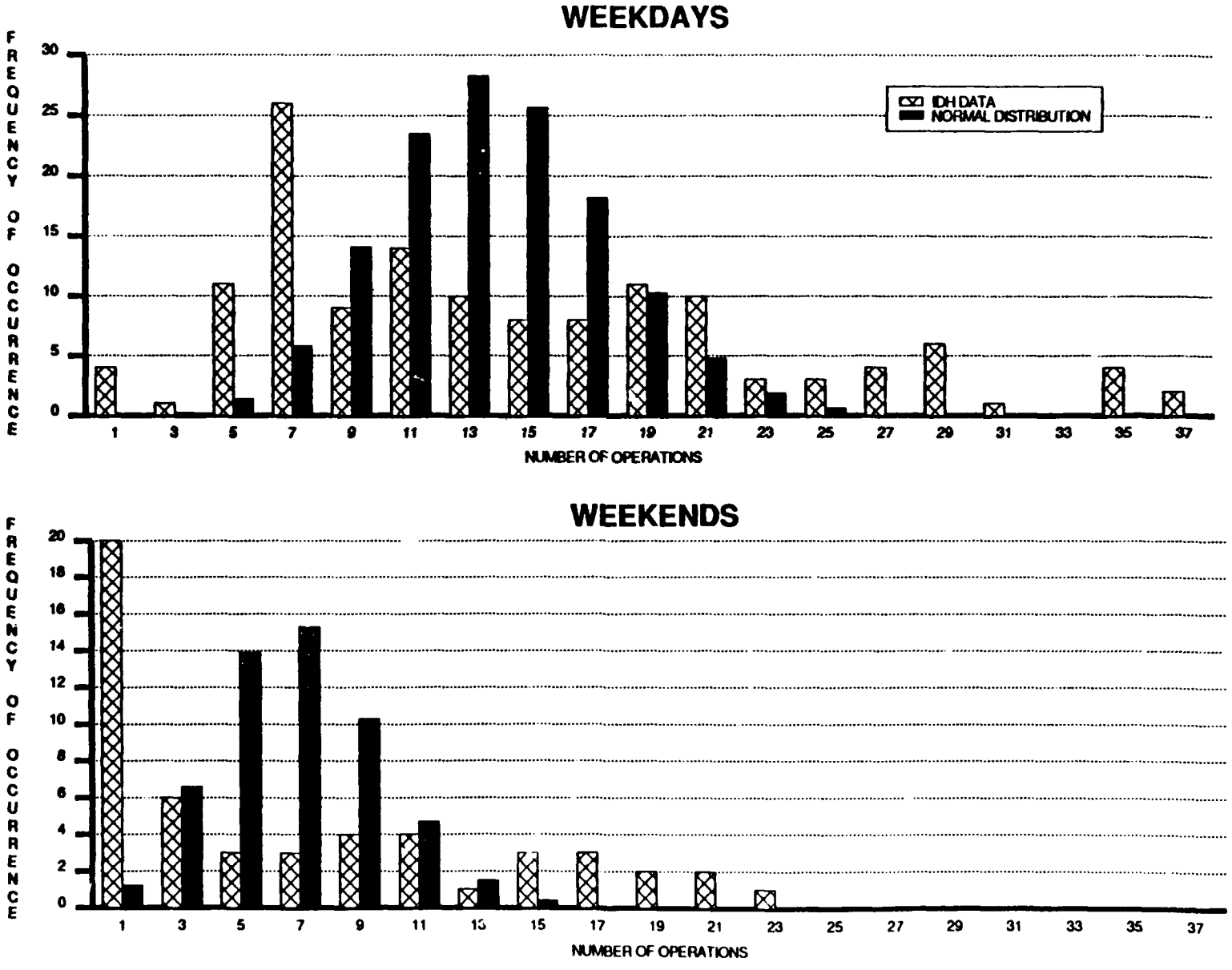


FIGURE 7

special local events that cause increased operations on a few days each year.

In addition, the data shows large variations by time of day and month of the year suggesting that these parameters are non-normal. In other cases the non-normal distribution must be attributed to the gaps in the data due to loss of records or failure to consistently input data even during the periods when it was recorded. Unfortunately, the large gaps prohibit any attempt at correcting the sampling error. Data analysis and forecasts made in this report necessarily reflect the sampling error in the available data. In any case the non-normal distribution of the IDH data makes the application of confidence intervals to the statistics derived from it a meaningless exercise.

In each case the standard deviation was always of approximately the same magnitude as the mean. When this is the case, it is impossible to determine, with any certainty, the true value of the parameter under investigation. For example, to apply even a 50% confidence level to a range of values requires an interval that is 0.671 times the standard deviation (S) on each side of the calculated mean value (Y), i.e., $Y \pm .671S$. To achieve a 95 percent confidence level requires a range on either side of the mean value that is twice the standard deviation ($Y \pm 2S$). Therefore, when the standard deviation is approximately of the same order as the mean, the estimation interval can easily encompass the entire sample range.

The following sections present the results of the data analysis by parameter. Each sub-section in section 3.0 corresponds to the explanation in section 2.0 of how the data were to be analyzed.

3.2 DATA ANALYSIS AND RESULTS

To estimate the number of annual operations, extensive data manipulation was necessary to fill in the gaps in the heliport data. The reasons for this data manipulation were discussed briefly in section 2.1.1. For a more extensive explanation and a presentation of the actual data before and after manipulation, see appendix A.

3.2.1 Total Annual Operations

Table 2 presents two estimates of the annual operations at the IDH. The first estimate corrects for missing days of data. The second estimate corrects for missing night data.

TABLE 2
TOTAL ANNUAL OPERATIONS

Year	Without Night Estimates	With Night Estimates*
1985	8,393	10,382
1986	8,608	10,780
1987	5,322	8,895
1988	6,773	6,773

* See section 2.2.4.3 and appendix A

Night operations between 6:00 p.m. and 6:00 a.m. were estimated by counting the number of operations actually recorded during the after-hours period of each year and then averaging this number. These averages were compared to the 10.05 average estimated by the FBO managers for this same timeframe (see section 2.1.4.3). If the average was less than the 10.05 operations, the number was adjusted upward. (See appendix A for a complete discussion on how the night correction was made and the actual data manipulated). These corrections make a significant difference to the data between 1985 and 1987. In 1988, however, the recorded night activity was slightly higher than the estimates made by the FBO managers, so no adjustment was made. The total number of annual operations decreased from 10,382 to 6,723 between 1985 and 1988 with the night estimates, and from 8,393 to 6,773 without the adjusted night data.

Due to limited available data and estimates of "10,000 to 12,000 operations per year" from the FBO managers, this decrease is not believed to reflect the actual number of heliport operations. Further investigation of the records of fuel sales were analyzed to verify activity trends.

The IAA's records of fuel sales at the heliport between 1985 and 1989 supports management's estimate of a constant level of activity since 1985. Figure 8 shows the number of gallons of fuel sold at the heliport both annually, and during the first quarter of each year for 1985 through 1989. Annual fuel sales have remained relatively constant around 170,000 gallons for the last three years. The total sales were lower in 1985, but this can be attributed to the newness of the heliport and the helicopter operator's unfamiliarity with the services it provided.

3.2.2 Total Monthly Operations

Table 3 presents the number of operations per month, corrected for missing days, in the entire data collection period. The correction for missing night operations is not included in this analysis. Significant variations are apparent both from month to month within the same year, and between the same months in different years. However, the fact that these variations do not indicate any trends must be attributed to sampling error in the IDH data.

Figure 9 illustrates the effect of the correction for missing days. It shows total monthly operations, comparing the raw data from the IDH to upwardly adjusted data. The corrected data allows comparison between months without the effect of skewing errors produced by the raw data.

The corrected data show a slight smoothing effect on the number of monthly operations. There was only a slight effect on data collected during most months of 1985, February 1985 being the exception, because there was a high percentage of days in each month for which data was collected. However, the correction had a much larger effect on data from 1988 and 1989 because of the low percentage of days on which data was actually collected.

FUEL SALES AT IDH

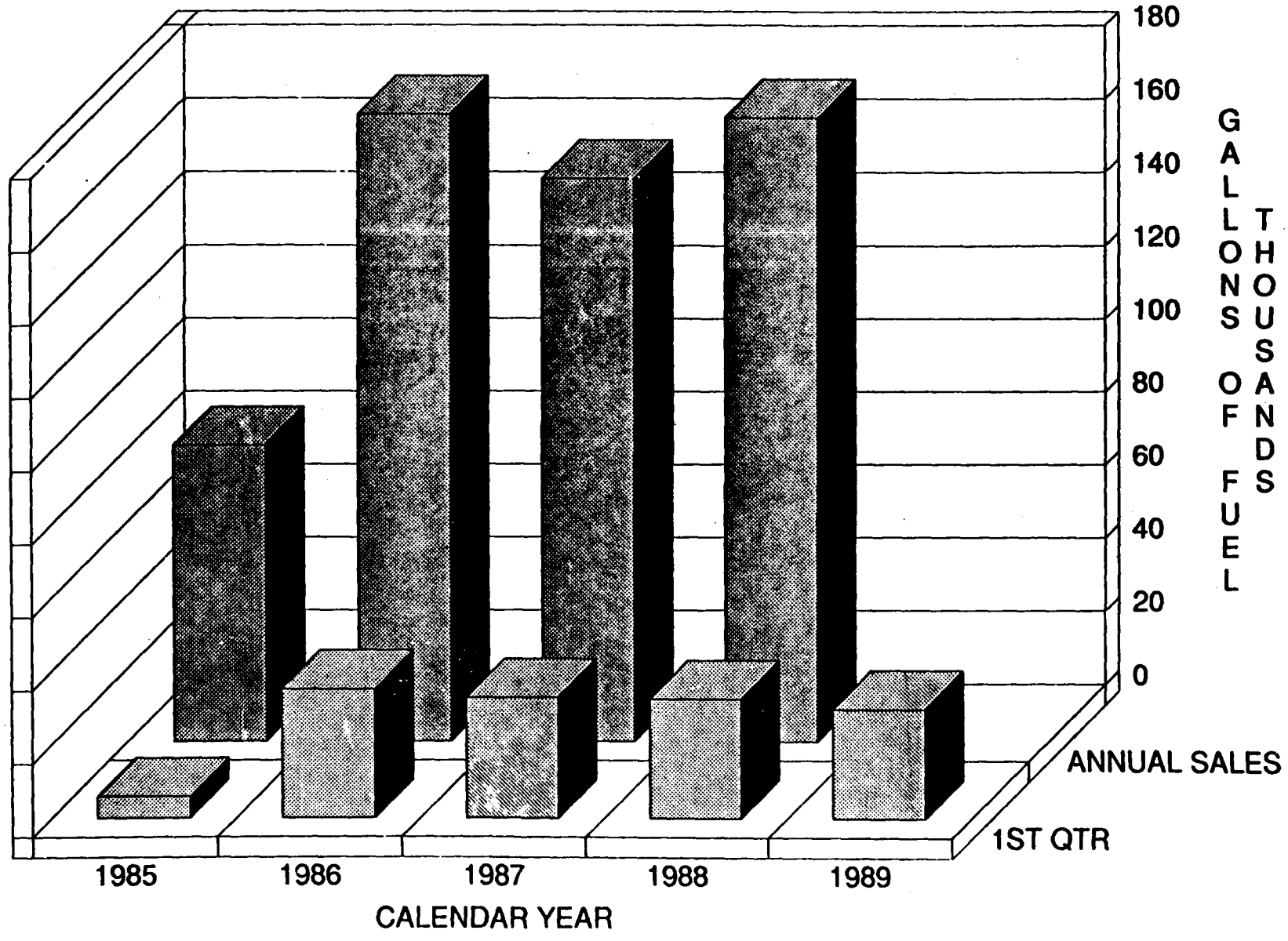


FIGURE 8

TOTAL MONTHLY OPERATIONS

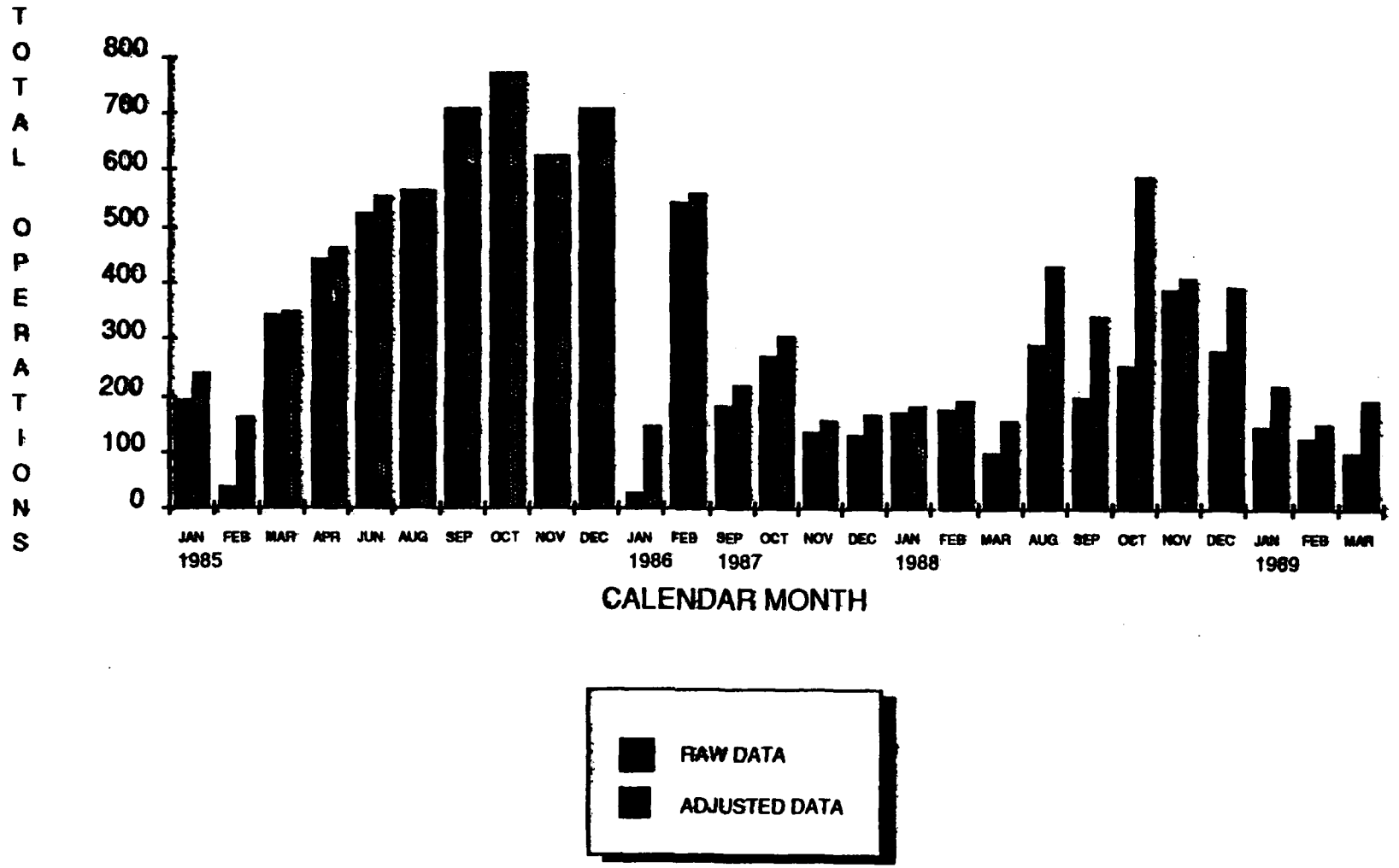


FIGURE 9

TABLE 3
NUMBER OF MONTHLY OPERATIONS
Based on Months with Available Data

Month/Year	Operations	Month/Year	Operations
JAN 85	244	NOV 87	162
FEB 85	168	DEC 87	171
MAR 85	353	JAN 88	188
APR 85	464	FEB 88	197
JUN 85	561	MAR 88	162
AUG 85	572	AUG 88	433
SEP 85	715	SEP 88	348
OCT 85	775	OCT 88	593
NOV 85	630	NOV 88	412
DEC 85	713	DEC 88	398
JAN 86	148	JAN 89	222
FEB 86	565	FEB 89	158
SEP 87	223	MAR 89	198
OCT 87	309		

Figure 10 compares the raw data with the adjusted data by month for 1985. A large variation can be seen for May. This is due to the large increase in heliport activity associated with the annual Indianapolis 500 automobile race held every May. The FBO estimates there are 2,600 to 3,000 operations every May. A general increasing trend is seen in the number of monthly operations for the entire year. The number of monthly operations increases from approximately 350 in the first quarter to approximately 750 in the last two quarters.

3.2.3 Comparison with Towered Airports

Each year the FAA publishes the FAA Aviation Forecasts (FAA-APO XX-1) by fiscal year. Included in this publication are the number of operations that take place at all towered airports in the United States per month. For this study specific numbers of operations per month were acquired from the FAA for 1985. Figure 11 compares the number of operations for all towered airports in 1985 to the number of operations at the IDH in 1985. The year 1985 was used for the comparison since it has the most complete and accurate data for the heliport.

The national airport data are shown both as number of operations per month and as a 12 month moving average. The heliport data are shown both as number of operations per month and as a 3 month moving average. A 12 month moving average for the heliport is not possible because there is never more than 7 months of consecutive data. The previously determined estimates for the two missing months in the 1985 data, May and July, were used to complete the data (see section 2.2.3).

A comparison of national towered airport data and IDH data is shown by the two graphs in figure 11. The top graph shows the number of operations per month at the heliport in thousands. The bottom graph shows the number of operations per month at towered airports in millions. A comparison of

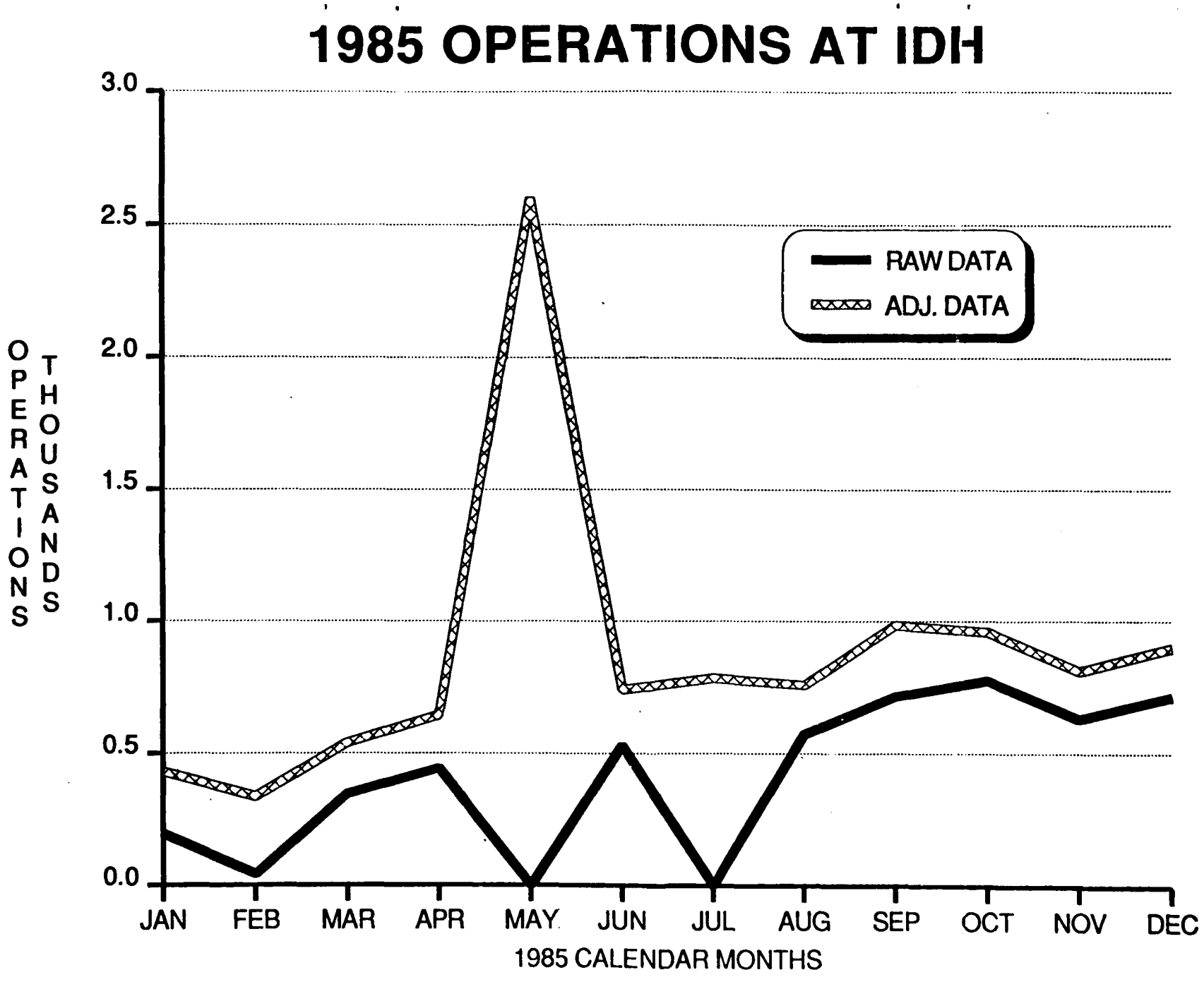

1985 OPERATIONS AT IDH
OPERATIONS THOUSANDS
3.0
2.5
2.0
1.5
1.0
0.5
0.0
RAW DATA
ADJ. DATA
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
1985 CALENDAR MONTHS

FIGURE 10

TOWERED AIRPORT OPERATIONS COMPARISON

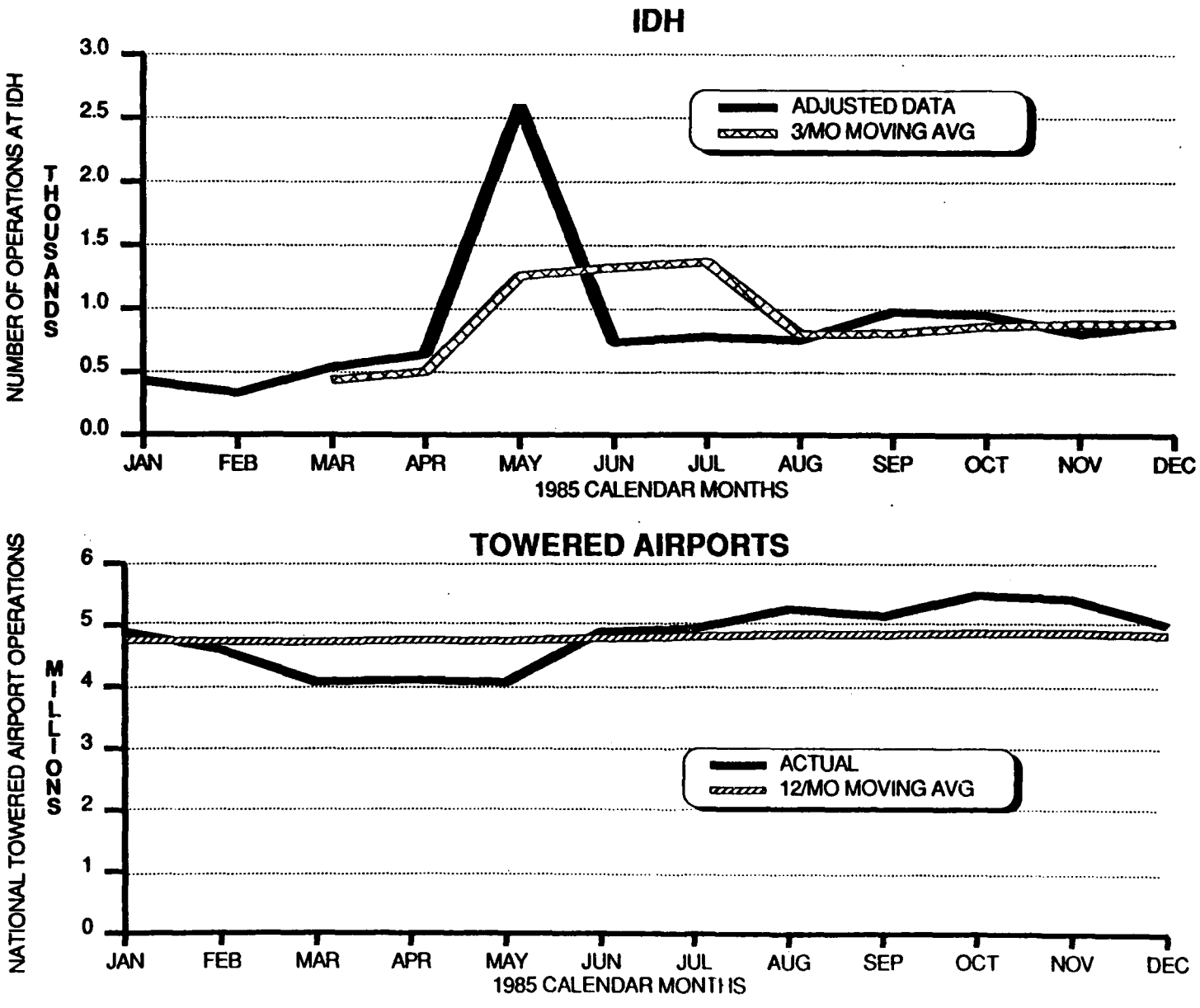


FIGURE 11

the two lines in each graph showing the number of operations per month at both types of facilities displays a significant amount of month-to-month variation. However, the heliport shows significantly greater monthly variation, especially considering the large increase of operations in May due to the Indianapolis 500 race and related activities.

The larger range of variation at IDH can be explained in two ways. First, the national statistics of towered airport data comes from a much larger geographic sampling area. A local event, such as the Indianapolis 500, affecting one airport during one month does not affect the national data that much. Other months will have local events at other airports that will even out the national monthly operations count. Second, the towered airport data deals with a much greater number, 4.8 million monthly operations versus 866 operations at the IDH. Any local variations at the airports would not be significant to the total sample.

Therefore, the 2,600 operations in May at the heliport, primarily attributable to the Indianapolis 500 race, have a much larger impact on the monthly variations at the heliport than local events have on the towered airport data. Furthermore, there is little monthly variation expected in a population as large as the national towered airports that contains many scheduled operations every month at many large airports operating near capacity.

There is, however, a trend in the heliport moving average. There are fewer operations in the first quarter than there are in the third and fourth quarters. This effect is independent of the large increase in the second quarter caused by the Indianapolis 500 race. The increase in the number of operations per month in the last two quarters can more likely be attributed to the fact that the heliport had just opened in the first quarter of 1985 and business had not yet been established. It is likely that operations were still increasing during this time as helicopter operators became familiar with the new heliport. In addition, the cold weather during the first quarter might have had slightly negative effect in the number of operations on those months.

3.2.4 Total Daily Operation Variation

Daily variations were analyzed for each day of the week, by hour of the day, and by day versus night operations. The results were developed from the entire database with no corrections.

3.2.4.1 Day of the Week

The number of operations per day varies by day of the week. Figure 12 shows the average number of operations per month by day of the week. Table 4 shows the average number of operations and the percentage of operations by day of the week. The average number of operations per day is lower on the weekends than on week days.

The lowest daily average number of operations is 20.95, which occurs on Sunday. The average number of operations more than doubles during the work week. The average increases to 44.15 on Monday, and to over 53

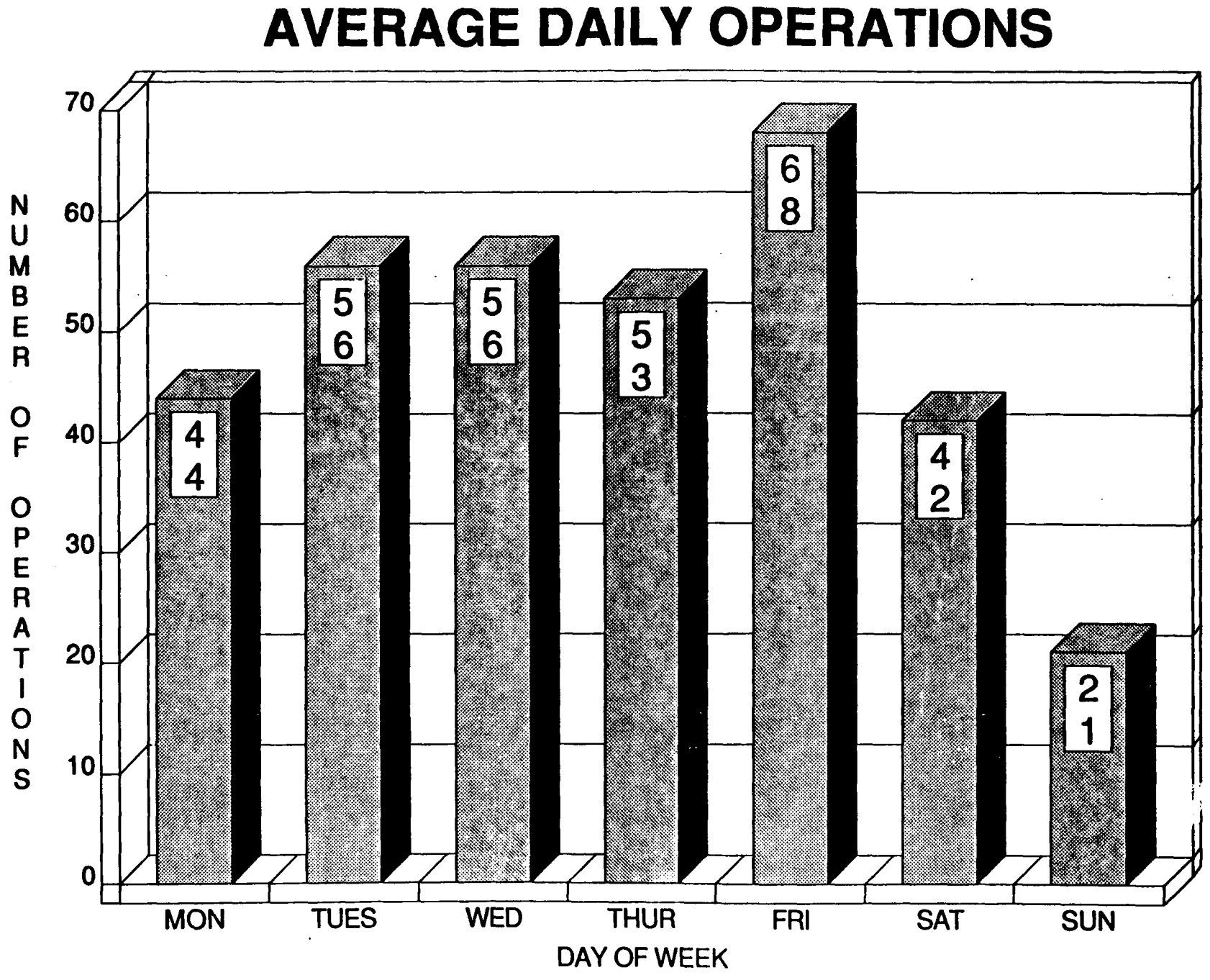

AVERAGE DAILY OPERATIONS
NUMBER OF OPERATIONS
70
60
50
40
30
20
10
0
44
56
56
53
68
42
21
MON
TUES
WED
THUR
FRI
SAT
SUN
DAY OF WEEK

FIGURE 12

TABLE 4
DAILY OPERATIONAL VARIATION

Day of Week	Average	Percent of Total
Monday	44.15	12.98
Tuesday	55.78	16.40
Wednesday	55.93	16.45
Thursday	53.27	15.67
Friday	68.35	20.10
Saturday	41.60	12.23
Sunday	20.95	6.16

Tuesday through Thursday. The average peaks on Friday at 68.35 operations. This peak is most likely due to the approach of the weekend. On Saturday, the average falls to 41.6.

The percentages of operations which take place on each day mirror these average numbers, as would be expected, and are shown graphically in figure 13. It can be seen that the percent of operations increases during the work week.

The affect of business travel on the number of daily operations at the heliport is examined by sorting the database by mission type. Figure 14 shows the results of this sort. The same variation found in the daily data are found when sorted by mission type. For the business dependent operators, Part 135, private, and government operators, the activity increased on weekdays and decreased on the weekends.

In addition, the activity of private operators does not decrease as much as the activity of Part 135 operators on Sundays. EMS operations stay relatively steady, and no significant trends could be determined for training or military operators.

3.2.4.2 Time of Day

Operations varied significantly by the time of day, especially during weekdays. Figure 15 shows two different curves, one for weekdays, and the other for weekends. Each shows the cumulative total of all operations at the heliport for the last 5. The weekend data were separated out to enhance any effect the work week has on operations at IDH. There are two peaks in weekday operations, one in the morning at 8 a.m. with 838 operations, and the other in the afternoon at 3 p.m. with 763 operations. There are also noticeable increases in activity at 6 a.m. and 5 p.m., times consistent with business travel.

Weekends were found to be fairly constant in the number of operations between the hours of 10 a.m. to 5 p.m. The busiest times were between 5 p.m. and 11 p.m. The peak number of operations on weekends were 174 total operations at 7 p.m. hours. This is attributable to the "dinner rides" offered to the public by the FBO (section 4.3.3). The least busy weekend hours were in the late night and early morning with approximately 15 operations per hour from 11 p.m. to 9 a.m.

PERCENT AVERAGE DAILY OPERATIONS

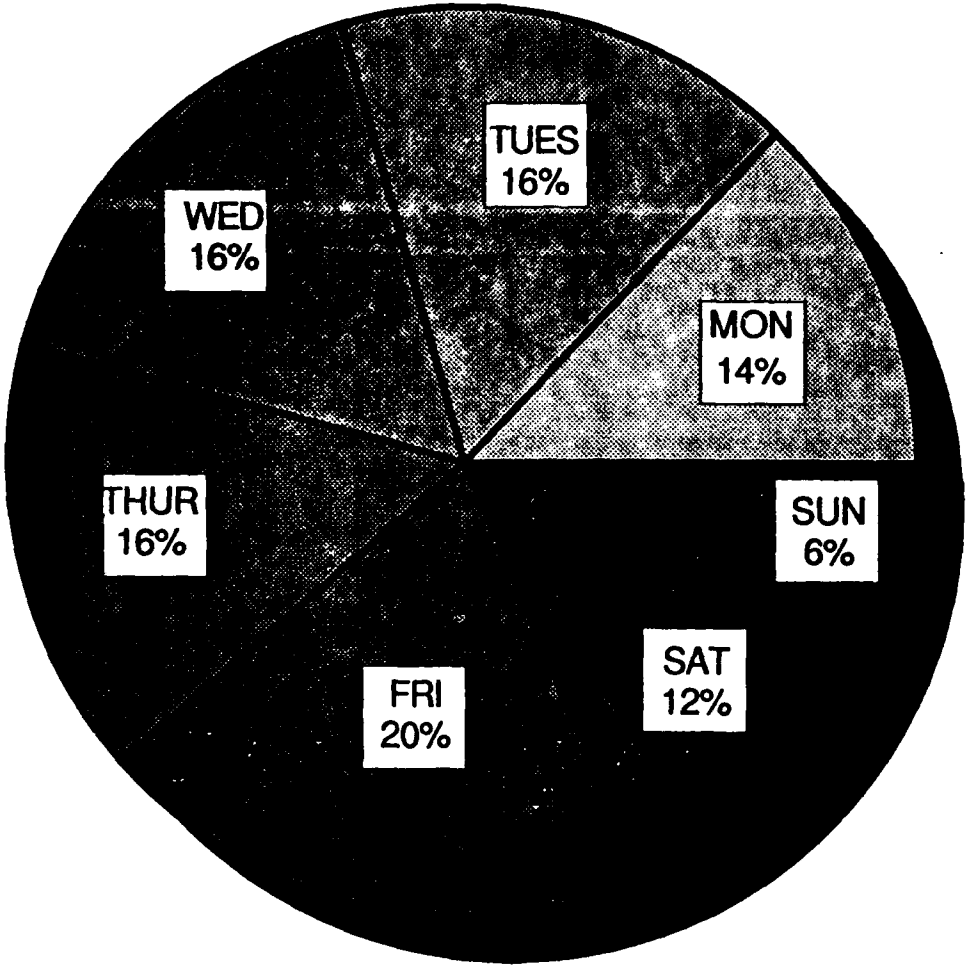


FIGURE 13

MISSION TYPES BY DAY OF WEEK
TOTAL OPERATIONS

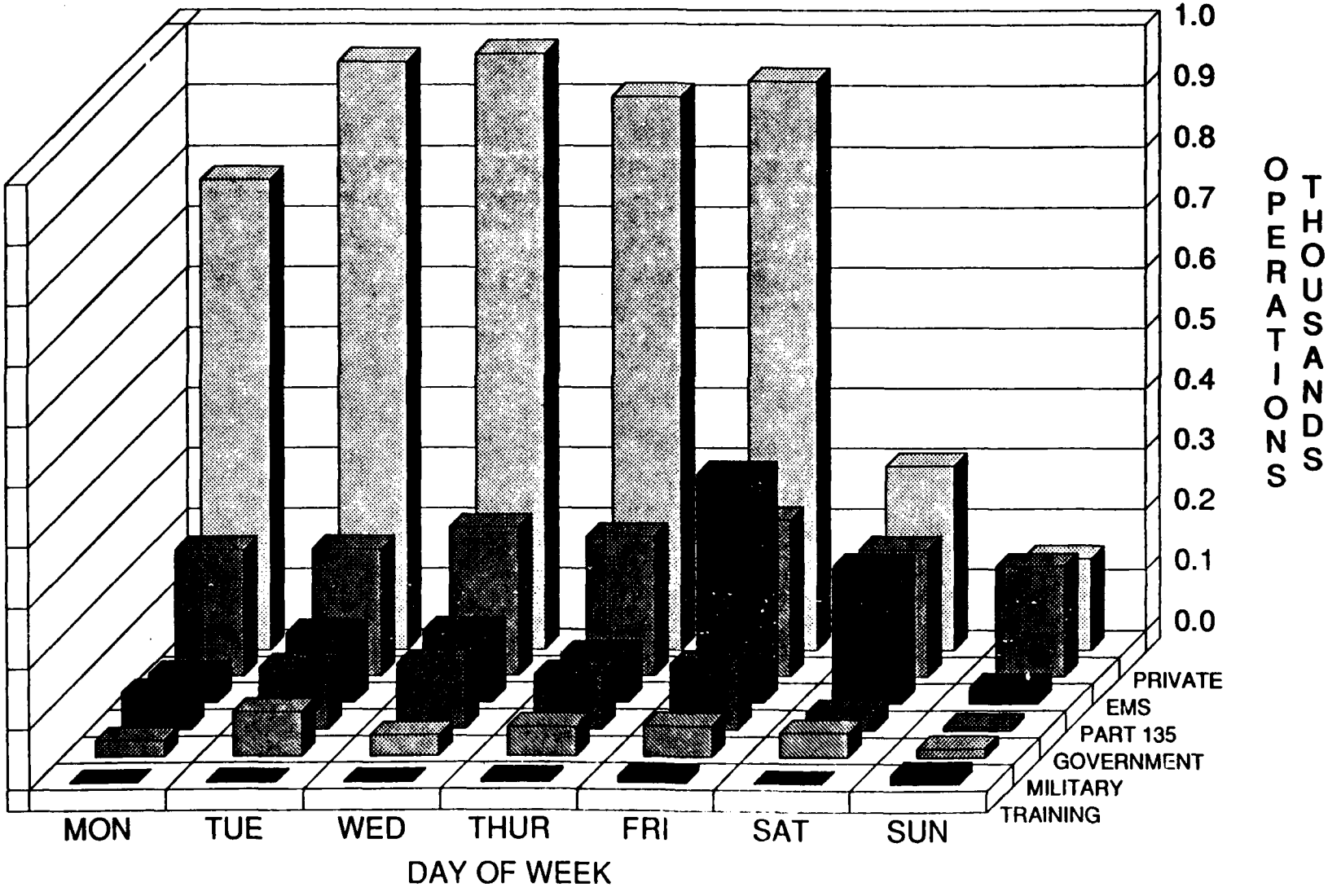


FIGURE 14

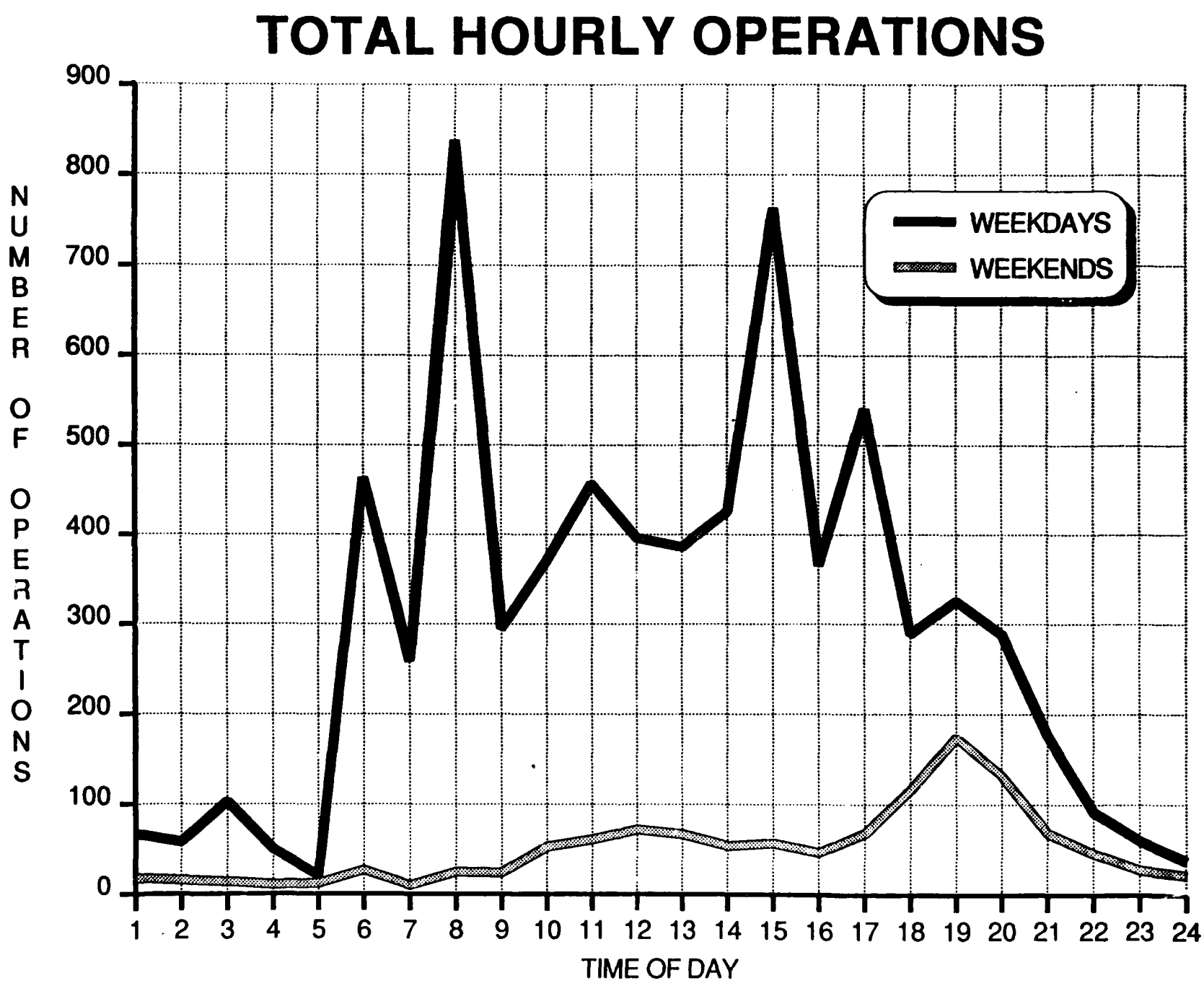

TOTAL HOURLY OPERATIONS
NUMBER OF OPERATIONS
900
800
700
600
500
400
300
200
100
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
TIME OF DAY
WEEKDAYS
WEEKENDS

FIGURE 15

3.2.4.3 Day Operations

The data were sorted by three month quarters and by time of day to determine the effect of daylight hours on the IDH's activity. The percentage of operations conducted in daylight and in darkness were determined. The results both by quarter and by year are presented in table 5. No significant trends could be determined.

TABLE 5
PERCENTAGE OF DAYLIGHT OPERATIONS

Quarterly		Annually	
Timeframe	Percentage	Timeframe	Percentage
First Quarter	88	1985	71
Second Quarter	86	1986	83
Third Quarter	65	1987	96
Fourth Quarter	55	1988	56
		1989	67

3.2.5 Operations by Aircraft Categories

All helicopters were divided into three categories for the purposes of this analysis: piston (P), single-engine turbine (ST), and twin-engine turbine (TT). The results of the analysis on the entire database show that 67 percent of all operations are flown by single-engine turbines. The next largest percentage of operations are flown by twin-engine turbines at 27 percent. The lowest percentage of operations are flown with piston helicopters at 6 percent. These percentages are illustrated graphically in figure 16.

Figure 17 shows the percentage of operations flown by all three engine types for each year. The general trends evident from 1985 through 1989 are that the percentage of operations performed by twin turbines has increased from 26 percent to 29 percent, the percentage of single turbines is staying relatively steady at 68 percent, and the percentage of piston helicopters has decreased from 6 percent to 1 percent.

3.2.6 Operations by Departure Point

To determine the geographic distribution of the operations at the heliport, the record of each arrival was sorted by its departure point; then the distance from the heliport to each departure point was determined. Table 6 gives the number and percentage of operations from each departure point. Figure 18 depicts the percentages and the numbers of operations by departure points categorized by distance.

There were 91 departure points reported in the data for IDH. Eleven of these were within 25 miles of the IDH and accounted for 94.3 percent of all operations. Local operations at the IDH accounted for 62.6 percent, and departures from Indianapolis International Airport, Methodist Hospital Heliport in Indianapolis, and Brookside Airpark accounted for 10.5, 9.9, and 9.4 percent, respectively.

TOTAL OPERATIONS BY ENGINE TYPE

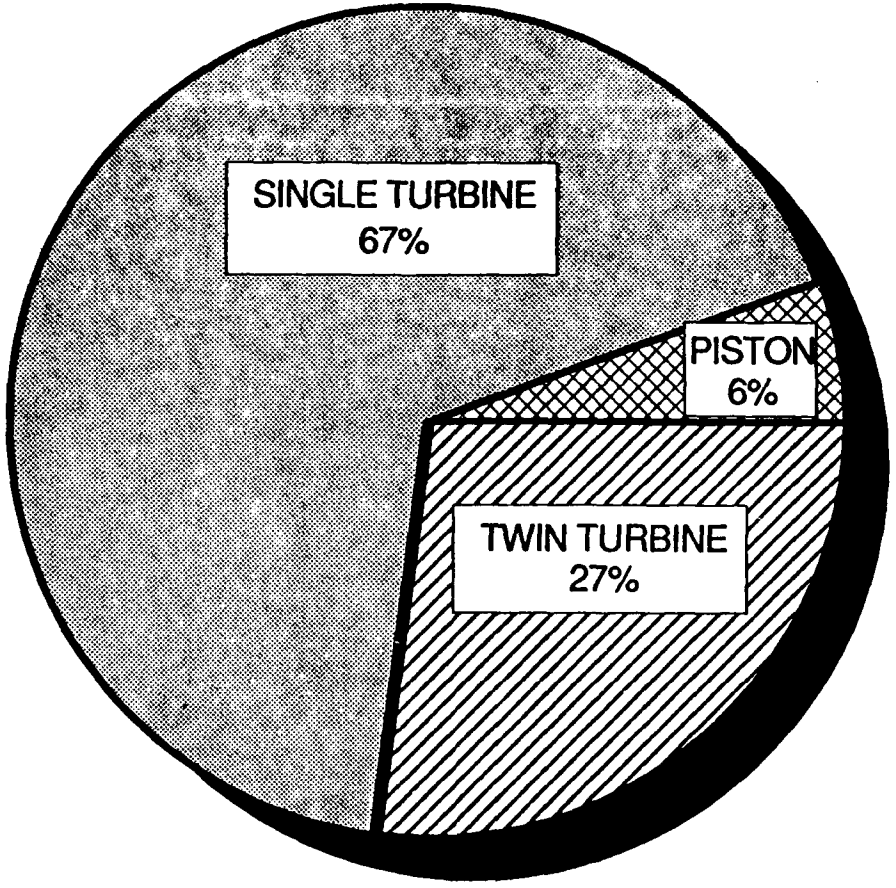
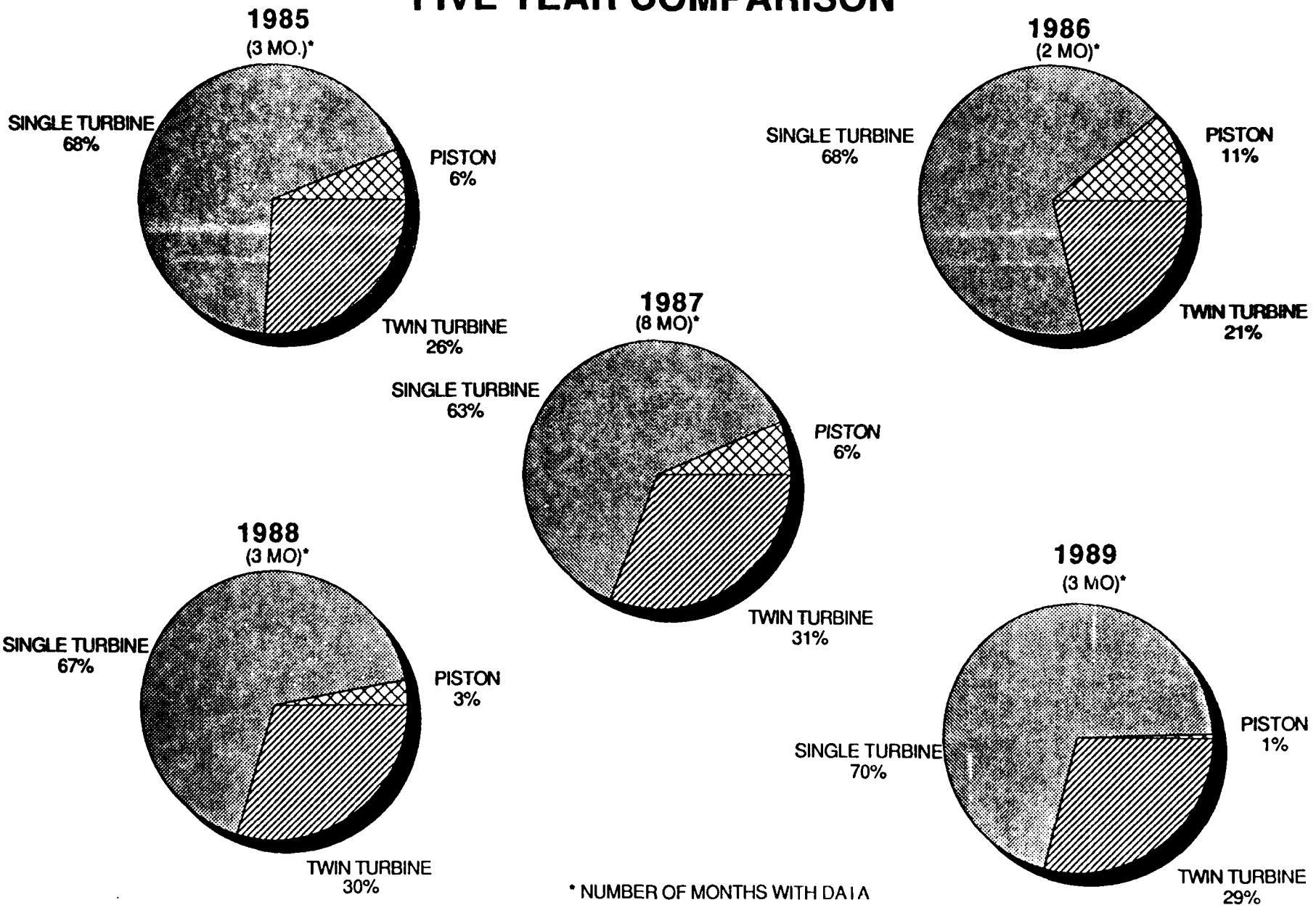


FIGURE 16

OPERATIONS BY ENGINE TYPE

FIVE YEAR COMPARISON



* NUMBER OF MONTHS WITH DATA

FIGURE 17

TABLE 6

TOTAL OPERATIONS BY DEPARTURE POINT

DEPARTURE POINT	DIST*	# OPER	PERCENT
INDIANAPOLIS HELIPORT	1	4945	62.63%
INDIANAPOLIS INTL AIRPORT	1	828	10.49%
METHODIST HOSP-IND	1	789	9.99%
BROOKSIDE, IN	1	742	9.40%
EAGLE CREEK, IN	1	87	1.10%
UNKNOWN	5	58	.73%
LOUISVILLE, KY	2	52	.66%
EVANSVILLE, IN	3	50	.63%
ALLISON ENGINE CORP.	1	30	.38%
SHELBYVILLE, IN	2	30	.38%
CHICAGO, IL	3	28	.35%
FT. KNOX, KY	2	17	.22%
OHIO	2	15	.19%
OHIO STATE UNIV.	2	12	.15%
ROTORWHIRL-IND	2	12	.15%
INDIANA STATE POLICE	2	12	.15%
BELLAIRE, OH	3	11	.14%
COLUMBUS, OH	3	10	.13%
PITTSBURGH, PA	4	9	.11%
LAFAYETTE, IN	2	8	.10%
ST. VINCENTS HOSP - IND	1	8	.10%
METRO AIRPORT	1	7	.09%
BLOOMINGTON, IN	2	6	.08%
FT. BEN. HARRISON, IN	2	6	.08%
TOLEDO, OH	2	6	.08%
PLAINSFIELD, IN	2	5	.06%
ST. LOUIS, MO	4	5	.06%
DETROIT, MI	3	4	.05%
FRANKFORT, IN	2	4	.05%
RENSSELAER, IN	2	4	.05%
KNOW TV STATION	1	4	.05%
KENTUCKY	2	4	.05%
MICHIGAN	3	4	.05%
MUNCIE, IL	3	4	.05%
GLENVIEW, IL	3	4	.05%
VA HOSPITAL	2	4	.05%
DAYTON, OH	2	3	.04%
GM PLANT, IN	2	3	.04%
KOKOMO, IN	2	3	.04%
SOUTH PORT, IN	2	3	.04%
PERU, IN	2	3	.04%
CINCINNATI, OH	2	2	.03%
GARY, IN	2	2	.03%
HOUSTON, TX	4	2	.03%
IDAHO	4	2	.03%
WOLCOTT, IN	2	2	.03%
MT. ONF	2	2	.03%
PETERSUBRG, IN	2	2	.03%
SOUTH BEND, IN	2	2	.03%
TEXAS	4	2	.03%
COLUMBUS, IN	2	1	.01%
BELLEVILLE,IL	3	1	.01%
CALIFORNIA	4	1	.01%
CRAWFORDVILLE, IN	2	1	.01%
INDIANAPOLIS CITY POLICE	1	1	.01%
CLEVELAND, OH	3	1	.01%
COLUMBUS, GA	4	1	.01%
COLUMBUS, IN	2	1	.01%
DALLAS, TX	4	1	.01%
DANVILLE, IN	2	1	.01%
FT. CAMPBELL, KY	3	1	.01%
FT. RUCKER, AL	4	1	.01%
GLENCOE, IL	2	1	.01%
HAMMOND, IN	2	1	.01%
INDIANA UNIV.	1	1	.01%
HARTFORD CITY, IN	2	1	.01%
IOWA	2	1	.01%
JEFFERSONVILLE, IN	2	1	.01%
MIDWAY ARPT- CHICAGO	3	1	.01%
MINNESOTA	4	1	.01%
MT. COMFORT ARPT., IN	2	1	.01%
MT. VERNON , OH	2	1	.01%
NEW JERSEY	4	1	.01%
NOBLES, OH	2	1	.01%
NTS CORP - LOUISVILLE, KY	2	1	.01%
NASHVILLE, TN	4	1	.01%
NEW YORK	4	1	.01%
OKLAHOMA	4	1	.01%
PENNSYLVANIA	4	1	.01%
PARIS, IL	2	1	.01%
RICHMOND, IN	2	1	.01%
ROACHDALE, IN	2	1	.01%
RUSHVILLE, IN	2	1	.01%
BLOOMFIELD, IN	2	1	.01%
SPRINGFIELD, IL	2	1	.01%
TENNESSEE	4	1	.01%
TERRE HAUTE, IN	2	1	.01%
ATHENS, OH	2	1	.01%
WOMEN'S HOSPITAL	2	1	.01%
WEST VIRGINIA	4	1	.01%
WASH. SQ. SHOPPING CTR	2	1	.01%
WISCONSIN	4	1	.01%

* LEGEND:

1 = < 25 MILES
2 = 25 - 150 MILES
3 = 151 - 300 MILES
4 = > 300 MILES
5 = NOT LISTED

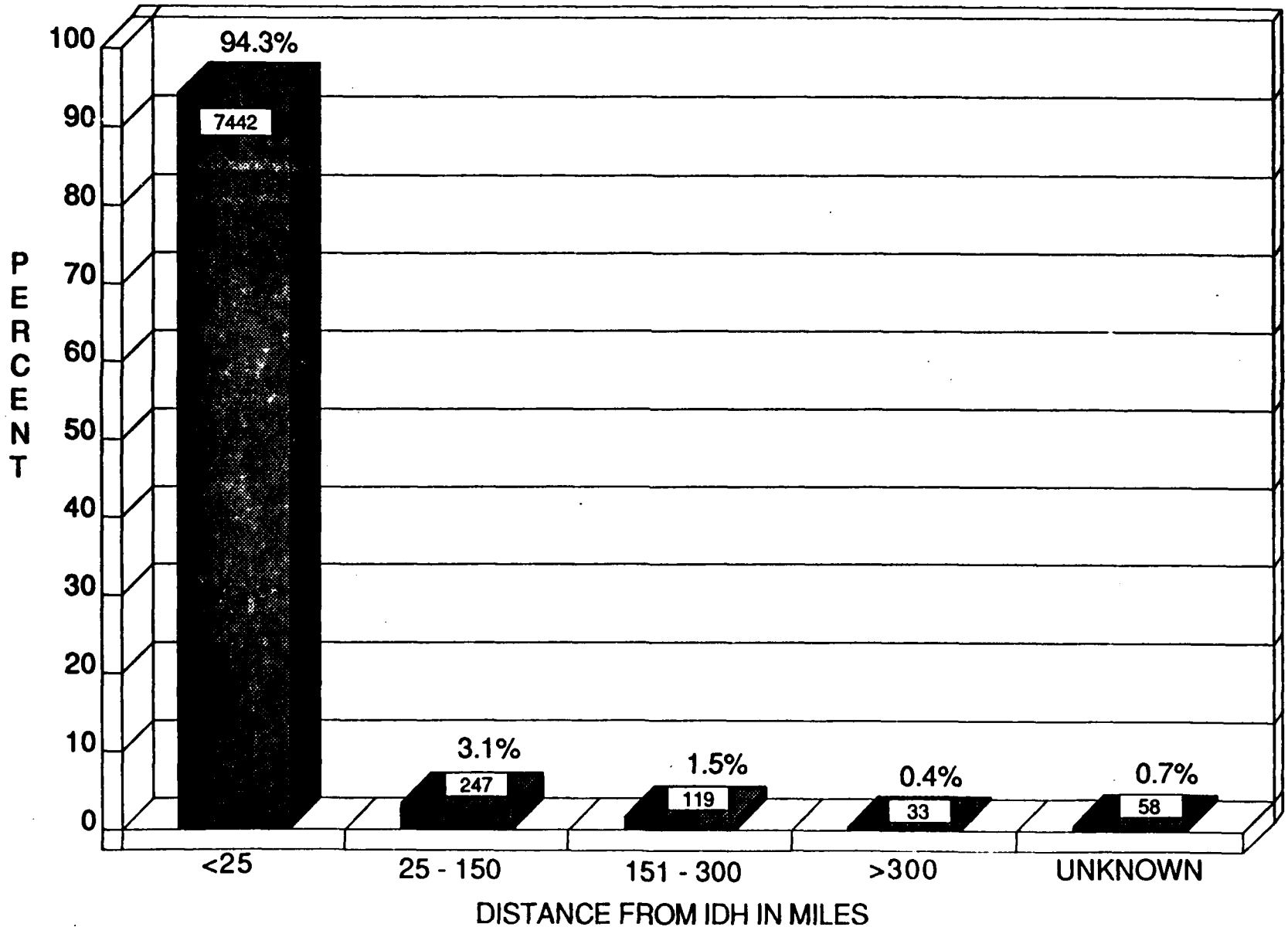

PERCENT OF OPERATIONS BY DISTANCE FROM DEPARTURE POINT
PERCENT
100
90
80
70
60
50
40
30
20
10
0
94.3%
7442
3.1%
247
1.5%
119
0.4%
33
0.7%
58
<25
25 - 150
151 - 300
>300
UNKNOWN
DISTANCE FROM IDH IN MILES

FIGURE 18

Fifty departure points located between 25 and 150 miles from the heliport accounted for 3.1 percent of all operations. Twelve departure points, located between 150 and 300 miles from the heliport, accounted for 1.5 percent of all operations. Another 18 departure points, located more than 300 miles from the heliport, accounted for 0.4 percent of all operations. An additional 0.7 percent of the operations did not list a departure point. It is clear that the overwhelming majority of operations arriving at the IDH originated within 25 miles of the heliport.

3.2.7 Operations by Next Destination

To determine the geographic distribution of operations at the heliport, departures were sorted by their next destination. The distance to the next destination was also determined. Table 7 gives the number and percentage of takeoffs for each next destination; figure 19 categorizes these by distance.

Of the 102 next destinations, four accounted for over 91 percent of the operations departing the heliport. All four of these next destinations were within 25 miles from the heliport. One of these was the IDH itself (52 percent), two were local airports (26 percent), and one was a local hospital (13 percent).

It should be noted that 52 percent of all departures from the heliport returned to the heliport. This number varies from the 63 percent of all arrivals at IDH that also departed from IDH reported in section 3.2.6. The difference is attributed to the data and cannot be explained. The fact remains that a high percentage of the operations at IDH are round trips.

Forty-seven destinations located between 25 and 150 miles from the heliport accounted for 3.2 percent of all departures. Ten destinations, located between 150 and 300 miles of the heliport accounted for 1.5 percent of all departures. Finally, 33 next destinations located farther than 300 miles from IDH accounted for 1.0 percent of all departures, and 1.2 percent of the destinations could not be deciphered.

3.2.8 IFR Operations as a Function of Various Parameters

Of 8,563 operations only 48 (0.56 percent) were conducted under IFR. Of these, 4 were military, 4 were EMS, 39 were private, and 1 was a Part 135 operation.

The reason that there are so few IFR operations at the heliport can be attributed to the limitation of the VOR/DME approach, which is the only type of IFR approach into the heliport. The minimums for this approach are 1 nm of visibility and a ceiling at least 600 feet (AGL). The procedure of making an ILS approach to Indianapolis International Airport and then proceeding special VFR (SVFR) to the heliport is preferred by the pilots, as confirmed by a telephone survey of operators (discussed in section 4.3.7).

3.2.9 VFR Operations as a Function of Various Parameters

Since there were so few IFR operations, virtually all (99.44 percent)

TABLE 7

TOTAL OPERATIONS BY NEXT DESTINATION

NEXT DESTINATION	DIST*	# OPER	PERCENT
INDIANAPOLIS HELIPORT	1	3679	51.91%
IND. INTL AIRPORT	1	1290	17.26%
METH. HOSPITAL - IND	1	1007	13.46%
BROOKSIDE, IN	1	655	8.76%
EAGLE CREEK, IN	1	106	1.42%
UNKNOWN	5	91	1.22%
EVANSVILLE, IN	3	50	.67%
SHELBYVILLE, IN	2	31	.41%
PETERSBURG,IN	2	22	.29%
CHICAGO, IL	3	20	.27%
OHIO	2	18	.24%
LAFAYETTE, IN	2	15	.20%
ALLISON ENGINE CORP.	1	14	.19%
FARMINGDALE, NY	4	13	.17%
OHIO STATE UNIV	2	13	.17%
KENTUCKY	2	12	.16%
ST. LOUIS, MO	4	11	.15%
LOUISVILLE, KY	2	11	.15%
TV13-INDIANAPOLIS	1	10	.13%
RENSSELAER, IN	2	10	.13%
FT. CAMPBELL, KY	3	10	.13%
SOUTH PORT, IN	2	9	.12%
BLOOMINGTON, IN	2	8	.11%
COLUMBUS, OH	3	8	.11%
WOOLCOTT, IN	2	7	.09%
MICHIGAN	3	7	.09%
MICHIGAN CITY, MI	3	7	.09%
MUNCIE, IN	2	5	.07%
PITTSBURGH,PA	4	5	.07%
SOUTH BEND, IN	2	5	.07%
FT. BEN. HARRISON, IN	2	4	.05%
GARY, IN	2	4	.05%
MOORELAND, IN	2	4	.05%
KOKOMO, IN	2	4	.05%
KNOXVILLE, TN	4	4	.05%
MT. COMFORT AIRPORT	2	4	.05%
INDIANA STATE POLICE	2	4	.05%
GREENWOOD, IN	2	4	.05%
GREENFIELD, IN	2	4	.05%
LEXINGTON, KY	2	3	.04%
MARION, IN	2	3	.04%
MIDWAY AIRPORT-CHICAGO	3	3	.04%
ALBUQUERQUE, NM	4	3	.04%
ST. VINCENTS HOSP-IND	2	3	.04%
TEXAS	4	3	.04%
TOLEDO, OH	2	3	.04%
WEST VIRGINIA	4	3	.04%
DETROIT, MI	3	3	.04%
DAYTON, OH	2	2	.03%
FRANKFORT, IN	2	2	.03%
H&H HELIPORT (PVT)	2	2	.03%
HUNTINGBURG, IN	2	2	.03%
INDIANA UNIV	1	2	.03%
KALAMAZOO, MI	2	2	.03%
WEST CHESTER, PA	4	2	.03%
NEW YORK	4	2	.03%
OKLAHOMA	4	2	.03%
PHILADELPHIA,PA	4	2	.03%
ROTORWHIRL-IND	2	2	.03%
VIRGINIA	4	2	.03%
WASHINGTON, DC	4	2	.03%
FLINT, MI	4	2	.03%
BLUFTON, IW	4	2	.03%
FT. WAYNE, IN	2	2	.03%
GM PLANT, IN	2	2	.03%
CRAWFORDVILLE, IN	2	2	.03%
BEDFORD, IN	2	1	.01%
HAMMOND, IN	2	1	.01%
FT. RUCKER, IN	4	1	.01%
COLUMBUS, GA	4	1	.01%
BELI, AZ	4	1	.01%
CALIFORNIA	4	1	.01%
FT. KNOX, KY	2	1	.01%
COLUMBUS, IN	2	1	.01%
NASHVILLE, TN	4	1	.01%
CINCINNATI, OH	2	1	.01%
FT. WORTH, TX	3	1	.01%
GR. RAPIDS, MI	3	1	.01%
O'HARE AIRPORT - CHICAGO	3	1	.01%
HOUSTON, TX	4	1	.01%
LAFAYETTE, LA	4	1	.01%
MARTIN, IN	2	1	.01%
MISSOURI	4	1	.01%
MINNESOTA	4	1	.01%
MORGANTOWN,NC	4	1	.01%
NEW JERSEY	4	1	.01%
NOBLES, OH	2	1	.01%
NTS CORP. - INDIANAPOLIS	1	1	.01%
NEW ORLEANS,LA	4	1	.01%
PENNSYLVANIA	4	1	.01%
PERU, IN	2	1	.01%
RENO, NV	4	1	.01%
ROACHDALE,IN	2	1	.01%
PHOENIX, AZ	4	1	.01%
TARRE HAUTE,IN	2	1	.01%
IOWA CITY, IW	4	1	.01%
VERMILLION, IN	2	1	.01%
VANDALIA, OH	2	1	.01%
WINAMAC, IN	2	1	.01%
FLORIDA	4	1	.01%

* LEGEND:

1	=	< 25	MILES
2	=	25 - 150	MILES
3	=	151 - 300	MILES
4	=	> 300	MILES
5	=	NOT LISTED	

PERCENT OF OPERATIONS BY DISTANCE TO NEXT DESTINATION

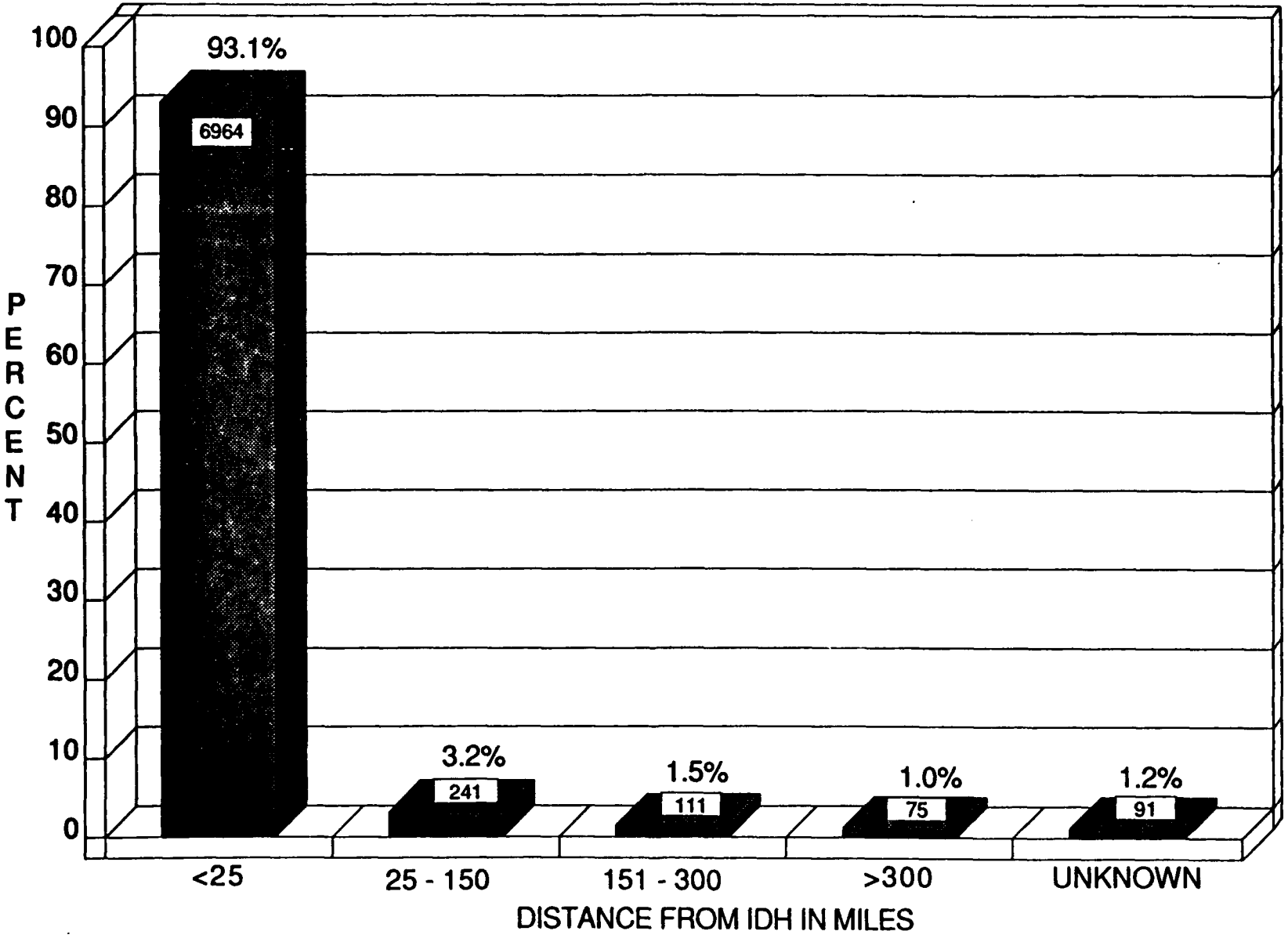


FIGURE 19

operations within any parameter should be considered VFR when calculated from the total database (section 3.2.8).

3.2.10 Aircraft with Various Navigation Capabilities

The available data indicates that during the 5 years of operations recorded at the IDH, 627 different helicopters have used the facility. Figure 20 shows the navigation (NAV) capabilities listed for these helicopters. Four hundred and sixty-one (74 percent) had VOR, 214 (34 percent) had RNAV/LORAN, 97 (15 percent) had ADF, 9 (1 percent) had ILS, and 98 (15 percent) did not list their navigation capabilities. (Percentages add to more than 100 percent due to some aircraft carrying more than one type of avionics.)

3.2.11 Aircraft Requiring Various Types of Services

Of the 8,563 operations recorded by the heliport, 5,599 (65 percent) recorded a need for one or more services. The services provided by the heliport include fuel sales, drop-off and pick-up of passengers, remaining overnight (RON), maintenance, crew meals, aircraft parking, and hangar storage facilities. Another item listed on the data input sheet as a service is the "dinner ride." Although this is a service offered by the heliport, it is a promotional service for the general public, not for the helicopter pilots or operators. However, due to the way in which the data input sheet was organized, it is treated as a service. There was no service listed for 2,964 operations.

The services that the operators use are presented in two ways - first as a function of the total number of operations, and second, as a function of the home base of the helicopters.

As a function of the total number of operations, the number of services required was counted per category of service. For example, if one operation listed the use of three services, such as fuel, passenger drop-off and maintenance, each service was counted under the appropriate category. The service counts were then divided by the total number of operations listing one or more services to determine the percentages.

Figure 21 shows the number of service counts and the percentage of services required for operations for which one or more services were recorded, are as follows: 2,185 requests for fuel (39 percent); passengers dropped-off, 1,678 times (30 percent); passengers picked-up, 1,395 times (25 percent); helicopters remained overnight 150 times (3 percent); maintenance required, 244 times (4 percent); 144 crew meals (3 percent); and 32 requests for hangar storage (less than 1 percent). There were also 450 dinner rides recorded (8 percent). (Percentages add to more than 100 percent due to operations where more than one service was recorded.)

The services required as a function of home base were counted as either the IDH or as "All Other," and are presented in figure 22 by total number and in figure 23 by percentage. For this function service counts and percentages were based on operations reporting both a home base and one or more services required.

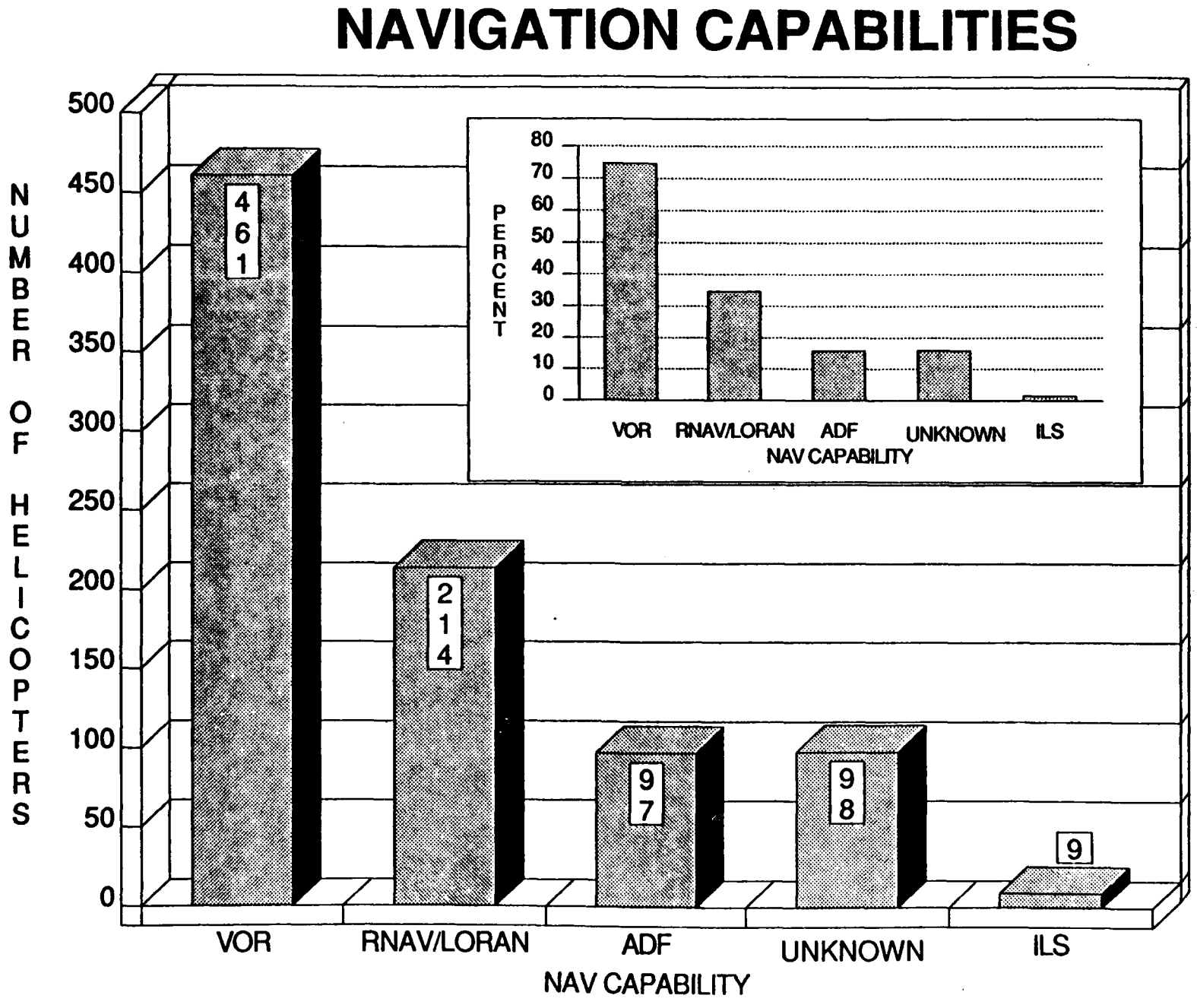
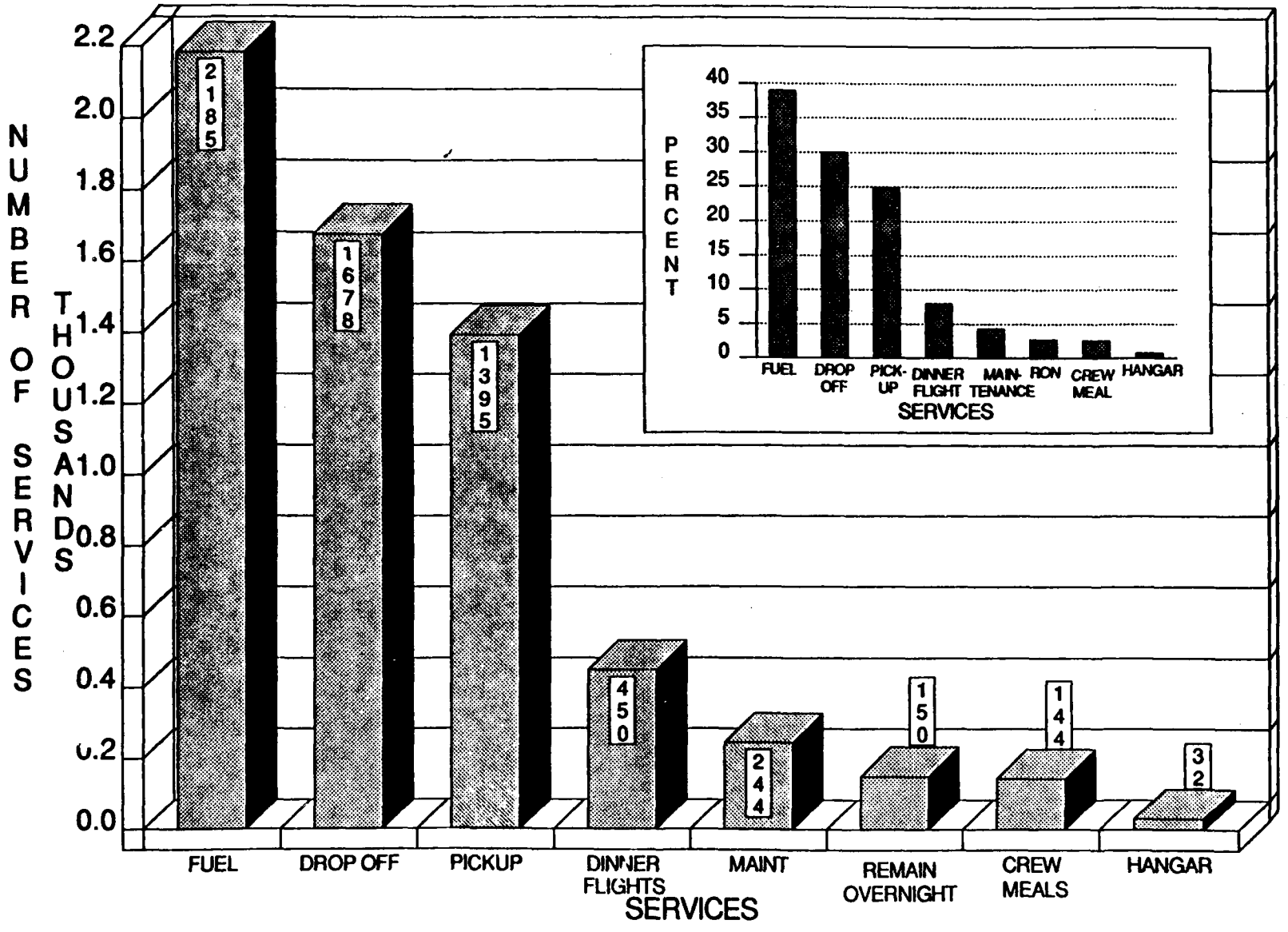

NAVIGATION CAPABILITIES
NUMBER OF HELICOPTERS
500
450
400
350
300
250
200
150
100
50
0
461
214
97
98
9
VOR
RNAV/LORAN
ADF
UNKNOWN
ILS
NAV CAPABILITY
PERCENT
80
70
60
50
40
30
20
10
0
VOR
RNAV/LORAN
ADF
UNKNOWN
ILS
NAV CAPABILITY

FIGURE 20

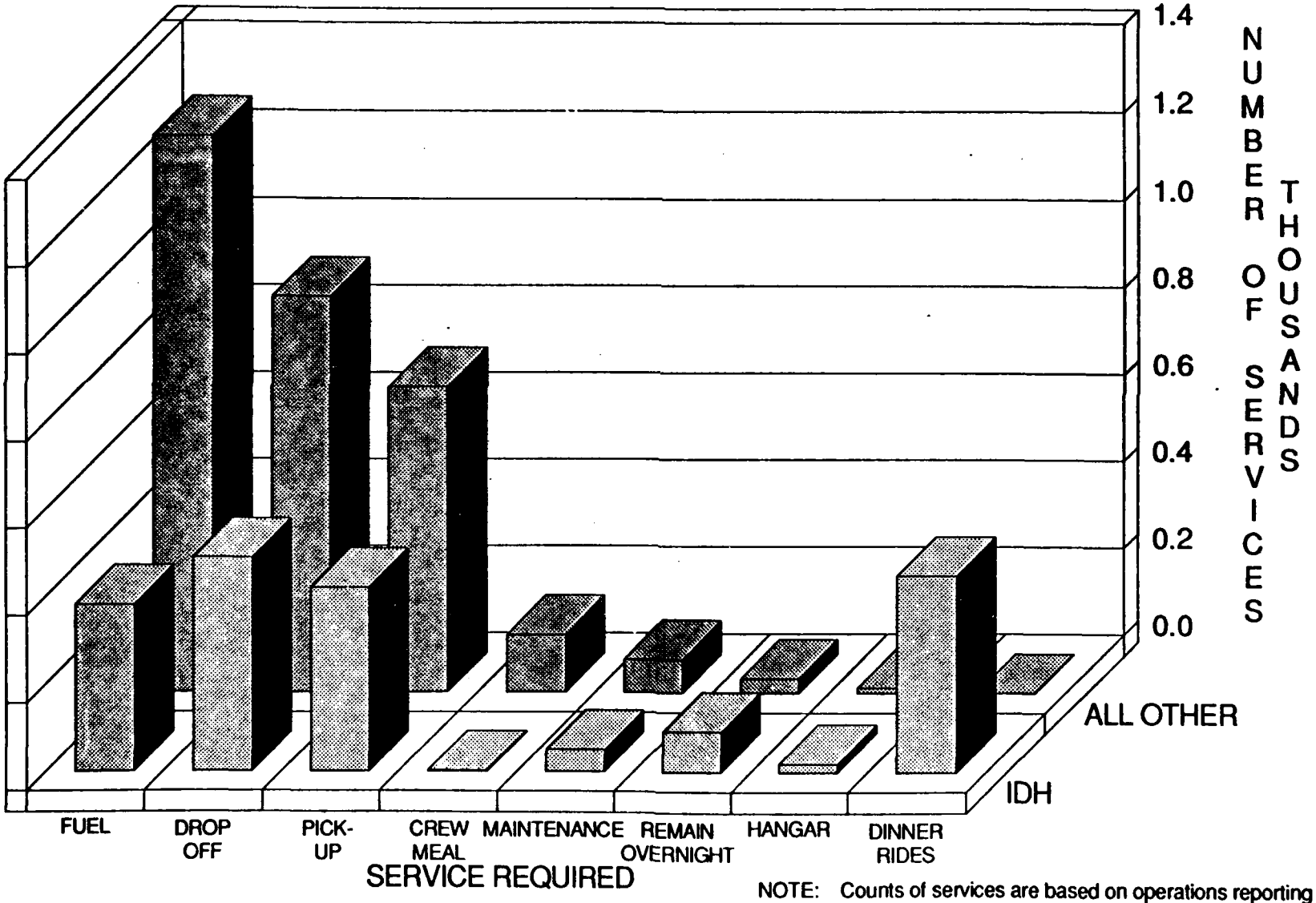
SERVICE REQUIRED



NOTE: Counts of services and percentages are based on operations reporting one or more services required (5,599).

FIGURE 21

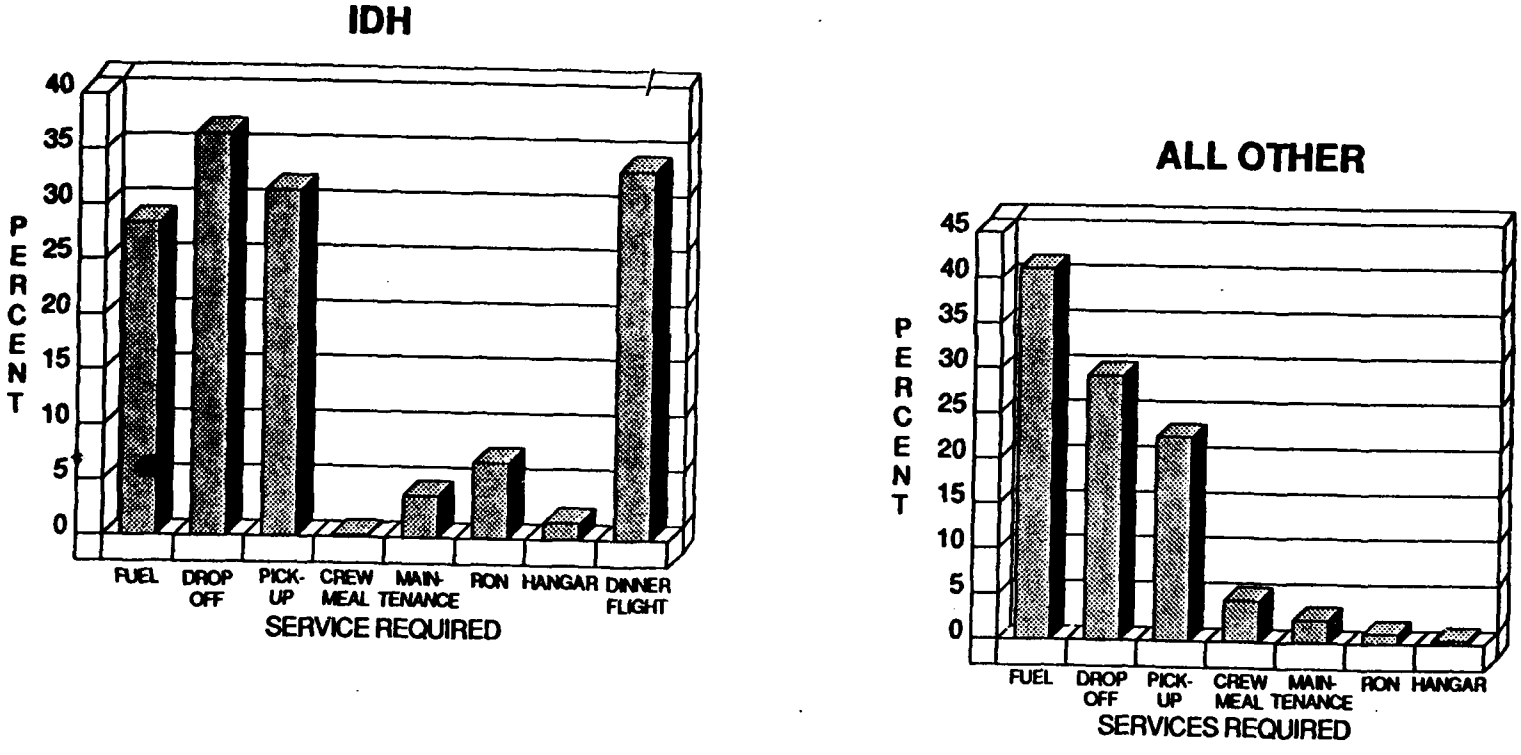
NUMBER OF SERVICES REQUIRED BY HOME BASE



NOTE: Counts of services are based on operations reporting both a home base and one or more services required.

FIGURE 22

PERCENTAGE OF SERVICES REQUIRED BY HOME BASE



RON = REMAIN OVERNIGHT

NOTE: Percentages are based on operations reporting both a home base and one or more services required ("IDH" = 1,341 and "All Other" = 3,105, Total= 4,446).

FIGURE 23

Numbers and percentages for operations by helicopters based at the IDH show 381 (28 percent) required fuel, 490 (37 percent) dropped-off passengers, 421 (31 percent) picked-up passengers, 2 (less than 1 percent) had crew meals, 51 (4 percent) required maintenance, 93 (7 percent) remained overnight, and 20 (2 percent) used hangar storage. All of the dinner flights were provided by aircraft based and operated at the IDH, accounting for 450 operations (34 percent).

For all other helicopters not based at the IDH, 1,276 operations (41 percent) required fuel, 910 (30 percent) dropped-off passengers, 703 (23 percent) picked-up passengers, 132 (4 percent) had crew meals, 77 (3 percent) required maintenance, 34 (1 percent) remained overnight, and 13 (less than 1 percent) used the hangar.

Table 8 provides the counts for each service required by home base for operations where both a home base and one or more services were listed.

3.2.12 Operations by Mission Types

There were six different mission types identified by the IDH data. These are private, Part 135, EMS, military, government, and training. Two categories are misleading and require explanation. The category "private" indicates a helicopter owned and operated for personal use. However, for the most part these helicopters are owned and operated by an individual business, rather than being flown for personal travel. Also, the category "EMS" is mainly a record of refueling operations of an EMS operator based at a nearby hospital. The actual EMS activity, flying patients to the hospital, is conducted from the hospital helipad. However, in the winter some EMS operations are initiated from the heliport when the EMS helicopter is kept in a hangar to keep it warm for a more rapid response time.

The analysis of operations by mission type is conducted in two phases. First, as a function of the total database. Then, as a function of the home base of the helicopter, comparing helicopters with the IDH as home base versus all other home bases. Both the total number of operations, and the percentages of operations, by mission type from the entire database are shown in figure 24. Figure 25 shows the comparison in percentages of operations by mission type as a function of home base. Some discrepancies between the percentages of two phases are apparent.

For example, EMS operations account for 18 percent of the total operations in the database, but account for only 9 percent of the operation of aircraft based at the heliport and 10 percent of operations for helicopters based at other locations. It was expected that the percentages in both phases would be more similar. This anomaly is caused by the difference in sample size of the different phases. The complete database has 8,410 operations that record mission type; however, it contains only 6,701 operations that record both the mission type and the home base.

For the complete database, private operations make up the largest percentage of operations at the heliport with 60 percent of the total, as shown in figure 24. EMS operations make up the second largest percentage with 18 percent of the total. Part 135 (commercial) operations account for 12 percent of the total, government operations 6 percent, military

TABLE 8

TOTAL HOME BASE OPERATIONS FOR SERVICES REQUIRED

LOCATION	RON	FUEL	MAINT	DROP OFF	PICK UP	CREW MEALS	HANGAR	DINNER RIDES
IND HELIPORT	93	361	51	490	421	2	20	450
METH. HOSPITAL	26	757	19	23	12	1	9	0
IND INTL AIRPORT	2	234	17	273	311	30	1	0
BROOKSIDE, IN	0	8	1	514	318	65	0	0
EAGLE CREEK, IN	1	40	3	40	2*	18	1	0
EVANSVILLE, IN	1	37	0	14	14	0	0	0
KENTUCKY	0	18	8	0	0	1	0	0
OHIO	0	28	2	3	1	4	0	0
SHELBYVILLE, IN	0	19	0	2	5	7	0	0
CHICAGO, IL	0	16	1	2	1	1	0	0
TEXAS	0	8	6	4	0	1	0	0
FT. KNOX, KY	0	15	0	0	0	0	0	0
MIDWAY, CHICAGO	1	13	1	0	0	0	0	0
ST. VIN. HOSP-IND	0	3	9	1	0	0	0	0
COLUMBUS, OH	0	10	0	0	0	0	0	0
OHIO STATE UNIV	0	8	0	0	0	3	0	0
BLOOMINGTON, IN	0	2	0	5	2	0	0	0
GARY, IN	0	3	0	4	1	0	0	0
DETROIT, MI	1	7	0	1	0	0	0	0
LOUISVILLE, KY	0	5	0	1	1	0	0	0
MICHIGAN	1	4	0	0	0	0	2	0
OREGON	0	2	2	1	1	0	0	0
ALLISON ENG. CORP	0	2	0	3	1	0	0	0
PETERSBURG, IN	0	5	0	0	0	0	0	0
SOUTH BEND, IN	0	1	0	2	2	0	0	0
W. CHESTER, PA	1	1	0	2	0	0	0	0
ROTORWHEEL - IND	0	2	0	0	2	0	0	0
BEECHCRAFT - IND, IN	0	2	0	3	0	0	0	0
DAYTON, OH	0	1	1	1	0	0	0	0
MOORELAND, IN	0	0	0	2	1	0	0	0
TOLEDO, OH	0	0	3	0	0	0	0	0
CLEVELAND, OH	0	2	0	0	0	0	0	0
IND RACEWAY HELI	0	1	0	0	1	0	0	0
CINCINNATI, OH	0	1	1	0	0	0	0	0
MT. VERNON, IL	0	2	0	2	0	0	0	0
PARIS, IL	0	1	0	1	0	0	0	0
PHOENIX, AZ	0	0	0	0	2	0	0	0
BELLEVILLE, IL	0	1	0	0	0	0	0	0
CHATTANOOGA, TN	0	1	0	0	0	0	0	0
COLUMBUS, GA	0	1	0	0	0	0	0	0
DALLAS, TX	0	0	0	1	0	0	0	0
FT. BEN HARR.,IN	0	1	0	0	0	0	0	0
FT. CAMPBELL, KY	0	1	0	0	0	0	0	0
FT. WAYNE, IN	0	0	0	1	0	0	0	0
GLENCOE, IL	0	1	0	0	0	0	0	0
HAMMOND, IN	0	1	0	0	0	0	0	0
LANESVILLE, IN	0	0	1	0	0	1	0	0
RENSSELLAER, IN	0	0	0	0	1	0	0	0
KOKOMO, IN	0	0	1	0	0	0	0	0
MARTINSVILLE, VA	0	1	0	0	0	0	0	0
MUNCIE, IN	0	1	0	0	0	0	0	0
OKLAHOMA	0	0	0	1	0	0	0	0
PITTSBURGH, PA	0	1	0	0	0	0	0	0
PORTLAND, IN	0	1	0	0	0	0	0	0
PHILIPSBURG, PA	0	1	0	0	0	0	0	0
ST. LOUIS, MO	0	2	0	1	0	0	0	0
TENNESSEE	0	1	0	0	1	0	0	0
WEST VIRGINIA	0	0	1	0	0	0	0	0
WISCONSIN	0	2	0	0	0	0	0	0
OHIO NTL GUARD	0	3	0	1	0	0	0	0
ROACHDALE, IN	0	0	0	1	0	0	0	0
	127	1657	128	1400	1124	134	33	450

NOTE: Service counts are based on operations reporting both a home base and one or more service required.

MISSION TYPES
TOTAL OPERATIONS

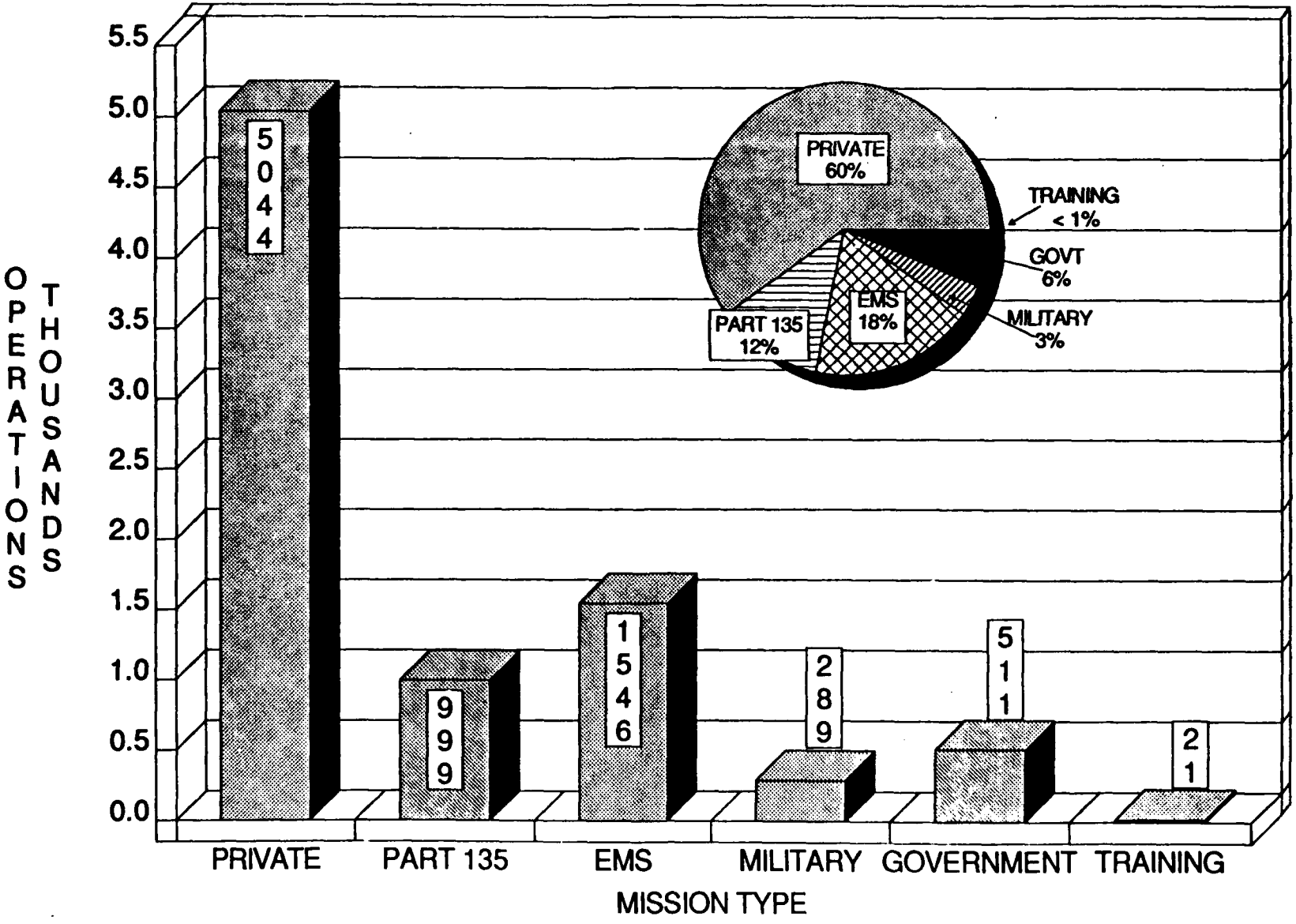


FIGURE 24

NUMBER OF OPERATIONS BY MISSION TYPE AND HOME BASE

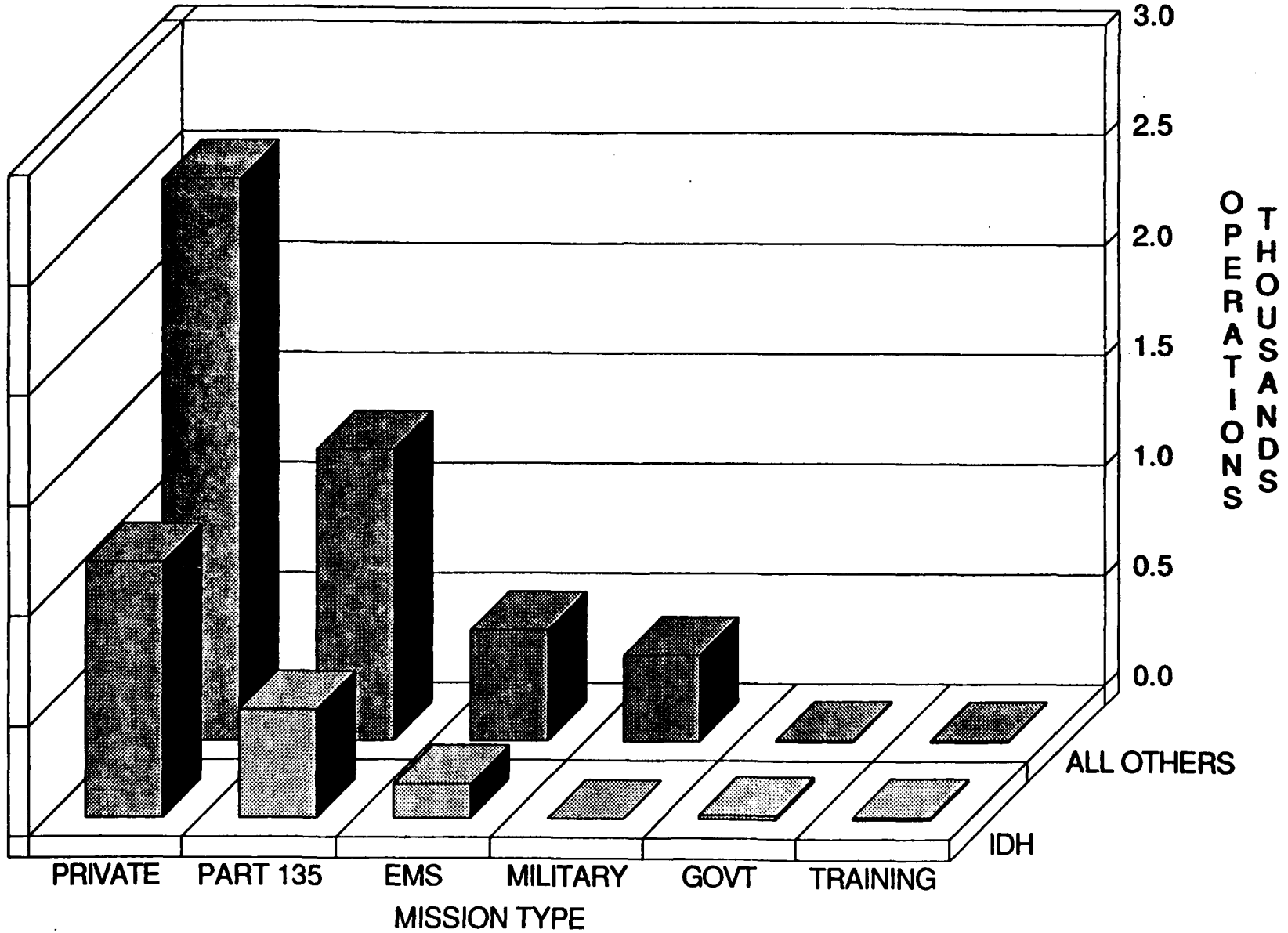


FIGURE 25

operations 3 percent, and training operations account for less than 1 percent of the total number of operations.

Figure 25 presents a comparison of the number of operations by all mission types of helicopters based at the IDH and of helicopter based at all other locations; figure 26 shows the percentages. The number of operations for each individual home base is provided in table 9. The numbers in table 9, minus the number of operations for helicopters based at the IDH, were totaled to create the "All Others" category in figure 25.

For mission types for which a home base was indicated, the percentages for IDH based aircraft and helicopters based at other locations are very similar. A comparison of these two categories reveals that the percentage of operations varies by only 9 percent for private and by only 1 percent for Part 135. For EMS, government, and training operations, the percentages vary by only 2 percent or less. Since there are no military helicopters based at the heliport, there can be no comparison in this mission type. However, the military represents 8 percent of the operations at the heliport.

3.2.13 Number of Crew

The results of the analysis of total operations by number of crew and by mission type are presented in figure 27. Of the operations for which the number of crew was recorded, 7,084 (84 percent) had one crewmember and 1,314 (16 percent) had two crewmembers.

For all mission categories except the military and the government, the trend shows that a greater percentage of operations have only one crewmember. All of the other mission types had one crewmember the majority of the time: private 85 percent; EMS 93 percent; Part 135 97 percent; and training 62 percent.

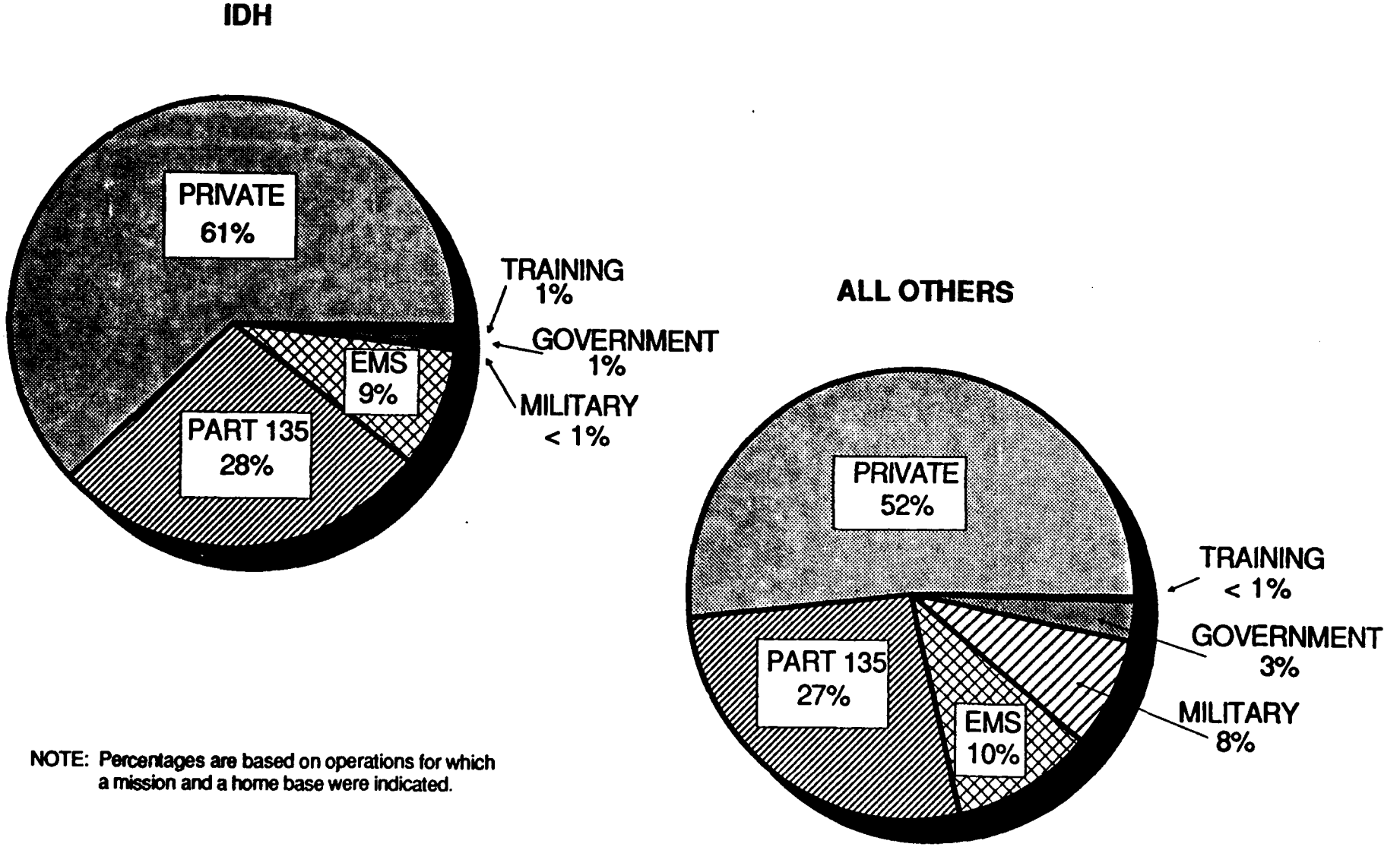
Government operations show an almost 50/50 split between one and two crewmembers, while the majority of military operations recorded two crewmembers (57 percent). Figure 28 shows the number of crew by total operations and aircraft type. Here again, the great majority of operations (85 percent) are conducted with only one pilot.

3.2.14 Number of Passengers

Of the 8,410 operations recorded in the database that have the mission type identified, only 3,919 (47 percent) indicated carrying passengers. The number of operations carrying passengers by mission type is presented in figure 29.

Figure 29 shows that there were 2,478 (63 percent) passenger carrying private operations. The next largest number of passenger carrying operations is flown by Part 135 operators with 546 (14 percent). Together these two categories account for 77 percent of all the passenger carrying operations. This would be expected since these categories provide most of the executive transport operations, not counting the government executive transport operations. The percentage of operations carrying passengers for the total database and by mission type are presented in figure 30.

PERCENTAGE OF OPERATIONS BY MISSION TYPE AND HOME BASE



NOTE: Percentages are based on operations for which a mission and a home base were indicated.

FIGURE 26

TABLE 9

TOTAL HOME BASE OPERATIONS BY MISSION TYPE AND PERCENTAGES

LOCATION	PVT	EMS	P-135	GOVT	MIL	TNG	TOTAL	%
EVANSVILLE, IN	1,581	26	3	9	2	1	1,622	24.01%
IND. HELIPORT	1,192	155	490	19	0	11	1,867	27.64%
METHODIST HOSPITAL	88	1,232	3	0	1	3	1,327	19.64%
IND INTL AIRPORT	322	3	486	340	30	0	1,181	17.48%
EAGLE CREEK, IN	225	0	0	0	0	6	231	3.42%
BROOKSIDE, IN	82	0	0	0	0	0	82	1.21%
OTHER (UNCLEAR NAMES)	49	10	0	4	0	0	63	.93%
SHELBYVILLE, IN	2	1	0	8	40	0	51	.75%
OHIO	9	2	0	0	33	0	44	.65%
MIDWAY AIRPRT, CHICAGO, IL	6	19	2	0	0	0	27	.40%
CHICAGO, IL	16	7	2	0	0	0	25	.37%
TEXAS	20	0	0	0	0	0	20	.30%
FT. KNOX, KY	0	0	0	4	13	0	17	.25%
KENTUCKY	12	2	0	2	0	0	16	.24%
ST. VINCENTS HOSP, IND.,IN	6	10	0	0	0	0	16	.24%
OHIO STATE UNIV.	0	0	0	2	14	0	16	.24%
COLUMBUS, OH	0	0	0	14	0	0	14	.21%
LOUISVILLE, KY	4	2	0	0	4	0	10	.15%
DETROIT, MI	7	0	0	2	0	0	9	.13%
PETERSBURG, IN	7	0	0	0	0	0	7	.10%
MICHIGAN	6	0	0	1	0	0	7	.10%
GARY, IN	3	0	4	0	0	0	7	.10%
OREGON	6	0	0	0	0	0	6	.09%
BLOOMINGTON, IN	5	0	0	0	0	0	5	.07%
WEST CHESTER, PA	5	0	0	0	0	0	5	.07%
ALLISON ENGINE CORP	5	0	0	0	0	0	5	.07%
ROTORWHIRL - IND	5	0	0	0	0	0	5	.07%
SOUTH BEND, IN	2	0	2	0	0	0	4	.06%
BEECHCRAFT	4	0	0	0	0	0	4	.06%
MOORELAND, IN	4	0	0	0	0	0	4	.06%
ST. LOUIS, MO	4	0	0	0	0	0	4	.06%
TOLEDO, OHIO	0	4	0	0	0	0	4	.06%
IND. RACEWAY HELIPORT	3	0	0	0	0	0	3	.04%
PARIS, IL	2	0	0	0	0	0	2	.03%
RENSSELLAER, IN	2	0	0	0	0	0	2	.03%
KOKOMO, IN	0	0	0	2	0	0	2	.03%
IOWA CITY, IN	0	2	0	0	0	0	2	.03%
CLEVELAND, OH	0	2	0	0	0	0	2	.03%
MT. VERNON, IL	2	0	0	0	0	0	2	.03%
MUNCIE, IL	2	0	0	0	0	0	2	.03%
BELLVILLE, IL	0	0	0	0	2	0	2	.03%
CHATTANOOGA, TN	0	0	2	0	0	0	2	.03%
COLUMBUS, GA	0	0	0	2	0	0	2	.03%
DAYTON, OH	1	0	1	0	0	0	2	.03%
FT. BEN. HARRISON, IN	2	0	0	0	0	0	2	.03%
FT. CAMPBELL, KY	0	0	0	0	2	0	2	.03%
LANESVILLE, IN	2	0	0	0	0	0	2	.03%
PHILADELPHIA, PA	2	0	0	0	0	0	2	.03%
ROACHDALE, IN	2	0	0	0	0	0	2	.03%
PHOENIX, AZ	2	0	0	0	0	0	2	.03%
TENNESSEE	2	0	0	0	0	0	2	.03%
OKLAHOMA	1	0	0	0	0	0	1	.01%
HAMMOND, IN	1	0	0	0	0	0	1	.01%
FT. WAYNE, IN	1	0	0	0	0	0	1	.01%
DALLAS, TX	1	0	0	0	0	0	1	.01%
MARTINSVILLE, VA	1	0	0	0	0	0	1	.01%
PITTSBURGH, PA	1	0	0	0	0	0	1	.01%
GLENCOE, IL	0	0	0	0	1	0	1	.01%
CINCINNATI, OH	0	1	0	0	0	0	1	.01%
VIRGINIA	1	0	0	0	0	0	1	.01%
WEST VIRGINIA	0	1	0	0	0	0	1	.01%
WISCONSIN	1	0	0	0	0	0	1	.01%
	3,709	1,479	995	409	142	21	6,755	100.00%

NOTE: Percentages are based on operations for which a mission and a home base were indicated.

TOTAL OPERATIONS BY NUMBER OF CREW AND MISSION TYPE

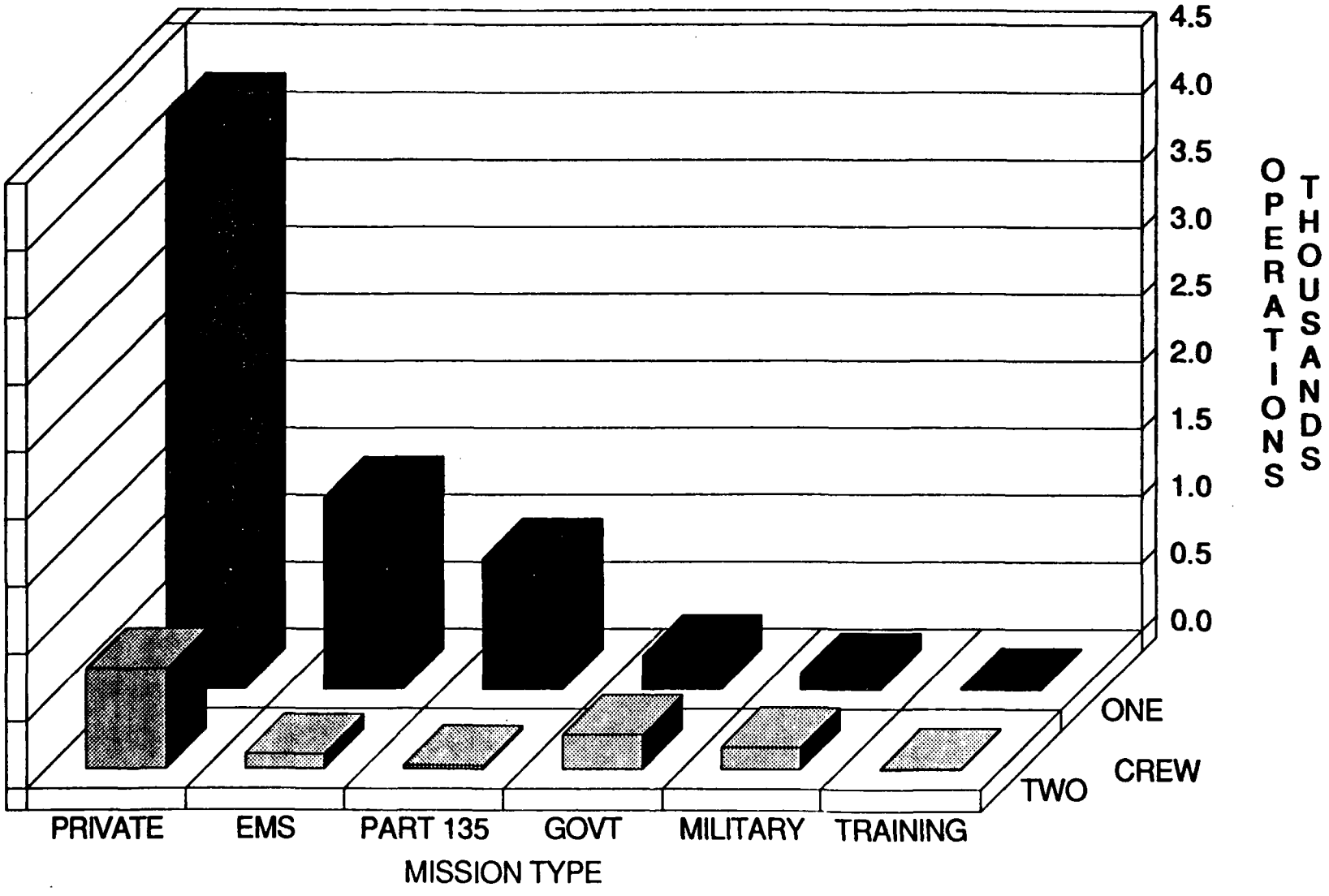


FIGURE 27

TOTAL OPERATIONS BY NUMBER OF CREW AND AIRCRAFT TYPE

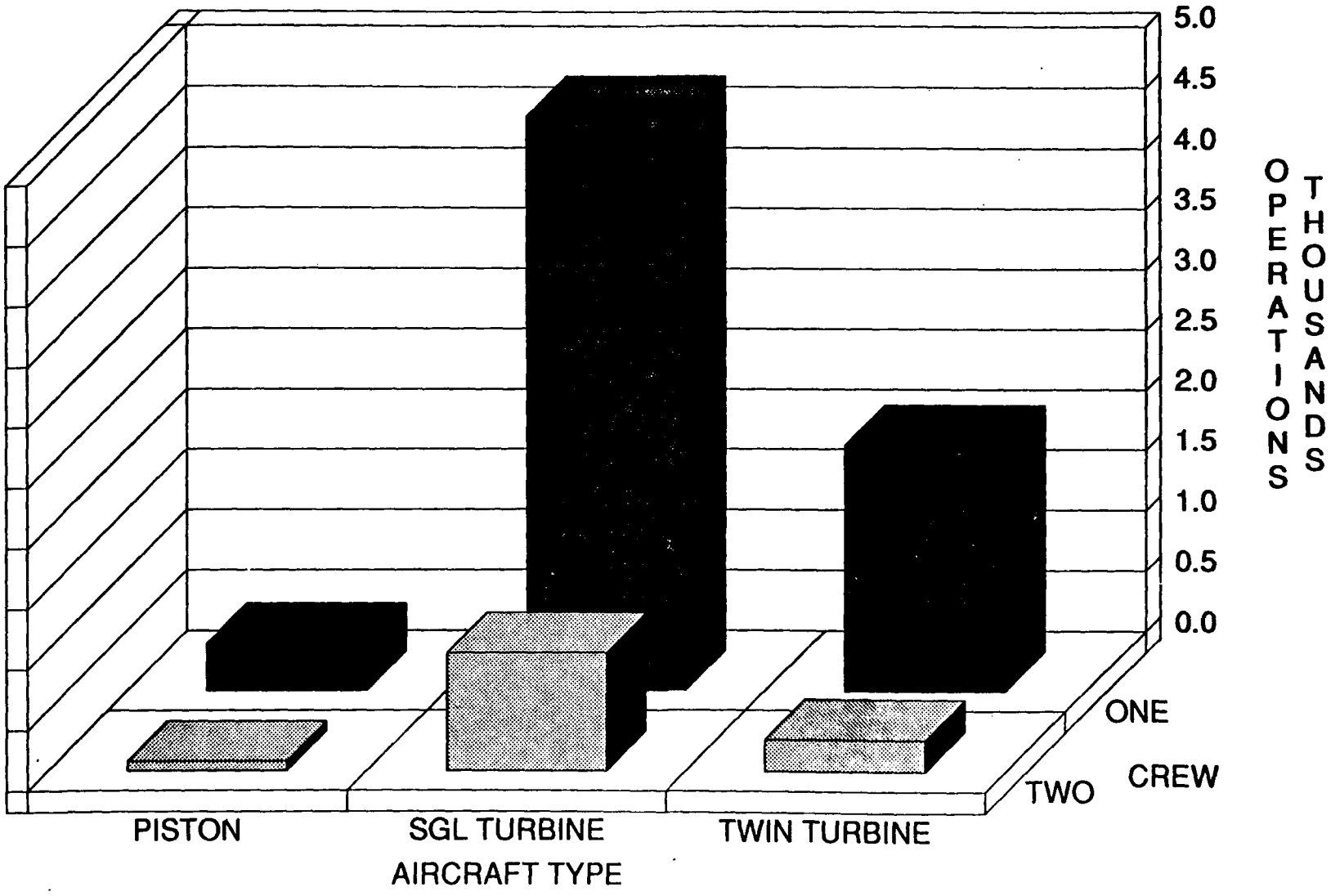


FIGURE 28

OPERATIONS CARRYING PASSENGERS BY MISSION TYPE

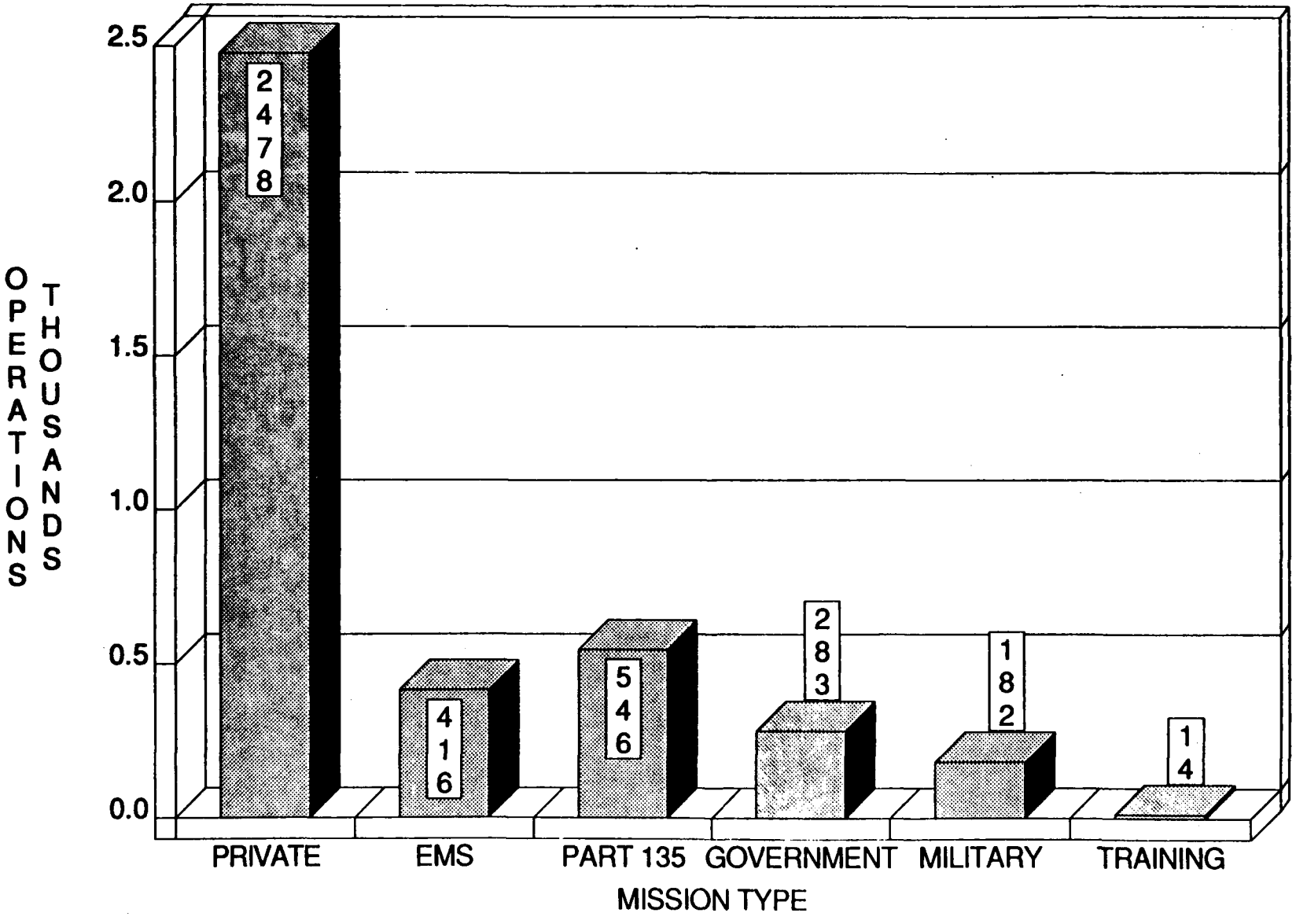


FIGURE 29

PERCENT OF PASSENGER CARRYING OPERATIONS BY TOTAL OPERATIONS AND MISSION TYPE

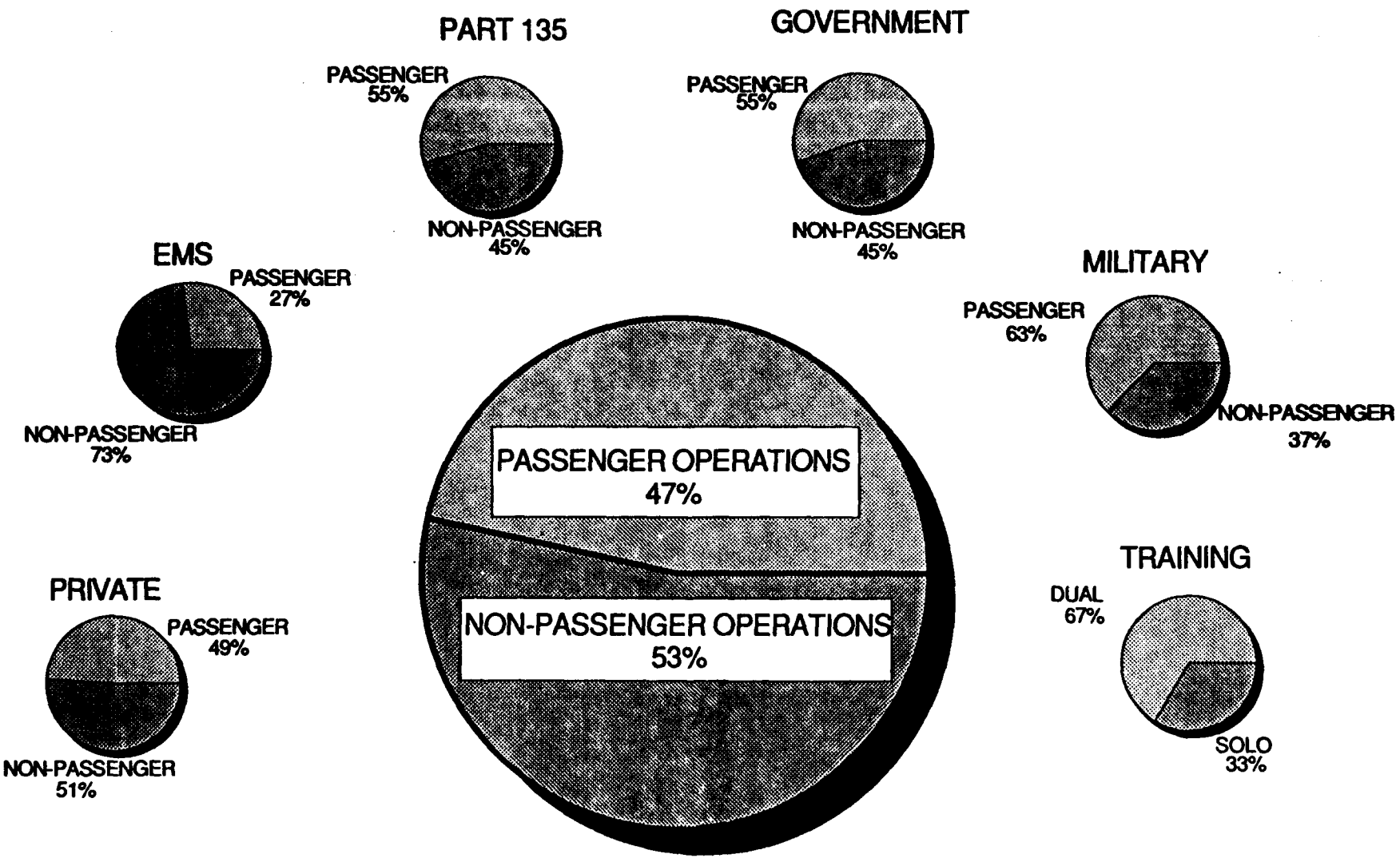


FIGURE 30

In all of the mission categories except EMS, approximately half the operations carry passengers. Of these, 49 percent are private, 55 percent Part 135, 54 percent government, 63 percent military, and 67 percent training.

The EMS category would most likely fall into this trend by having 100 percent of its operations for either the pick-up or the drop-off of a passenger (patient). However, the heliport data does not indicate this, since most of the EMS operations at the heliport are for the purpose of fueling the helicopter and not for medical transport.

3.3 SUMMARY OF DATA ANALYSIS

All of the results presented in this section are based upon data that is known to have significant sampling error, causing a clumped, non-normal distribution. For this reason, it is difficult to compare the numbers for any parameter in this report to operational numbers of other airports or heliports.

The most likely operational scenario indicates that the IDH supports approximately 10,000 operations per year and has been operating at this same level since shortly after it opened in January 1985. These operations are fairly evenly distributed throughout the year, except for the month of May, when there are approximately 3,000 operations due to the Indianapolis 500 race.

Variation was found in the number of daily operations as a function of several parameters. Operations varied by day of the week with each weekday having 15 percent of the total operations and the weekend having approximately 9.5 percent of the total.

The number of operations also changed with the time of day. The peak number of operations followed the normal business day patterns, with traffic being busiest in the mornings and evenings.

The geographic distribution of the helicopters using the heliport was found to be surprisingly small, with over 99 percent of the arrivals coming from departure points less than 25 miles away, and over 91 percent of the departures going to destinations less than 25 miles away.

There is virtually no IFR traffic into the heliport because of the extremely limiting VOR/DME approach. This would probably change if an instrument approach with lower minimums (such as an MLS approach or an improved nonprecision approach) was implemented.

Over 84 percent of all operations at the heliport had a single pilot, and a large percentage of the operations with two pilots were military. Passenger transportation accounted for a large percentage of the total operations.

4.0 MARKETING ANALYSIS

This section investigates the approaches taken by the heliport sponsor, the Indianapolis Airport Authority (IAA) and the Indianapolis Heliport Corporation (IHC) to market the heliport to the community throughout the process of planning, developing, and operating the facility. It then explores the marketing techniques used to sell the heliport to the overall helicopter market.

4.1 HELIPORT HISTORY

Consideration was given to developing a heliport in Indianapolis as early as 1954 when the Indianapolis Planning Commission recommended that a public use heliport be built in the city to provide access to downtown. A heliport was built at the current site of the IDH in 1969, and there has been an operational heliport in this same location ever since that time.

The first heliport was called the Beeline Heliport. The idea for its construction was conceived in November 1968 when six municipal agencies, including the IAA, formed a committee called the Helicopter Operation Committee for the purpose of operating helicopters. The heliport that resulted from the efforts of this committee was located on 2.3 acres that was part of the Beeline Railroad yard, and was therefore named the Beeline Heliport. The land was rented by the IAA from CONRAIL for $1.00 per year.

Between 1969 and 1979, the heliport was a private use facility. In 1974 inquiries were made into the possibility of making the Beeline Heliport a public use facility because the committee had received so many requests for its use. Legal considerations precluded the change at that time. Through actions taken between 1978 and 1979, permission was received from the FAA for the change of status from private use to public use. The IAA bought the heliport in December 1979 and the name was changed to the IDH.

One of the key events leading to future success of the heliport was the implementation of the height limiting zoning ordinance in August 1981. The Department of Metropolitan Development (DMD) amended the existing Airspace District Zoning Ordinance of Marion County, Indiana, to include Heliport Height Zoning. This ordinance restricts the height of construction around the heliport to protect the heliport's approach/departure paths. The ordinance is considered by the IHC as a critical element in the future ability of the heliport to survive, simply because it prohibits any high-rise construction that would interfere with the heliport's operation.

Several grants were received from the Federal Government to improve the heliport. Minimal improvements were made to the heliport after the change to public use status in 1979. In 1981 the IAA received Federal grants for development and airspace utilization. Airport Improvement Program (AIP) grants were approved in December of 1982. In 1983 when the FAA announced the National Prototype Demonstration Heliport Program, the IAA decided to submit an application for the IDH. Out of seven applicants

nationwide, Indianapolis was chosen to be one of the four cities selected for this program.

The heliport remained open during all of the construction except during December 1984 when the new landing pad was built. It was officially dedicated as the first FAA National Prototype Heliport on May 9, 1985.

4.2 DEVELOPMENT MARKETING

Those persons involved with the heliport's development often make the comment that, "all the circumstances were right for its development." These "circumstances" include its location, the existing demand, the political support it received at all levels, the lack of public opposition, and the availability of financial backing. Each of these factors are discussed below.

4.2.1 Heliport Development

The location was well suited for the FAA National Prototype Heliport Demonstration and Development Program. The program wanted to demonstrate the usefulness and viability of full-service downtown heliports. The location of the existing heliport where the prototype was to be built was a few blocks from the center of the downtown on the edge of an industrial area, which therefore provided convenient access to the commercial and business activity of Indianapolis and held great potential for integrating urban transportation modes.

Two additional factors served to reinforce the decision to use the site of the existing heliport. First, the heliport was in an industrial rather than residential area and therefore inherently compatible with heliport development. Second, in 1982, even before the first AIP grants were made to improve the existing heliport, this area of Indianapolis was in need of revitalization. Consequently, improvements to this area of the city were welcome.

At the time of application for AIP improvement grants, the first IDH was already a frequently used public use heliport. Therefore, a clear demand for a heliport in this location had already been established. The demand existed because the location was advantageous for helicopter transportation by allowing convenient access to downtown.

Political support for the heliport had existed at all government levels from the beginning. There was federal support in the form of approximately $2.5 M in grants issued. The state of Indiana supported the heliport throughout its development process primarily, as had the Federal Government, through funding. The state provided $75,000 to the IAA for purchase of the land when the Beeline Heliport changed to a public use facility in 1979. This amount was considered as matching funds for the first two FAA grants. When this same site was chosen for the prototype program, the state furnished 5 percent of the total funding amounting to $141,272. Table 10 contains a complete list of funding. The state has continued to support the heliport by providing site surveys and airspace evaluations.

TABLE 10
FUNDING CONTRIBUTIONS FOR THE IDH SINCE 1979

Date	Federal	State	local (sponsor) IAA	(estimated private*) IHC
1979		$ 75,000 original land acquisition		
7/1983	$ 602,442			
9/1989	399,771			
5/1984	1,073,187	40,300 FAA match		
9/1984	467,496	25,972 FAA match		
			$ 458,728	$ 2.5-3 M
TOTAL	$2,542,896	$ 141,272	$ 458,728	$ 2.5-3 M

GRAND TOTAL $ 6,142,896 (using $3 M as private contribution)

* Size of contribution depends on whether total value of equipment is included.

Of particular importance is the fact that local support had existed since the idea of a city heliport first originated in 1954. It is this level of governmental support that has the most consequence for any heliport. It is critical because local support is based on the community's attitude working through the local government. As has been demonstrated in the history of heliport development in many areas, if the local community does not want a heliport, the heliport, more often than not, does not get built; and if the heliport already exists, without public support it can be closed easily. The IHC has been cognizant of this critical component in the viability of the heliport and fostering local support is a continuous effort on their part. This aspect of marketing is addressed in section 4.3.

When discussing the success of the heliport with those persons who have been involved, whether the topic is the development process or the current operation, it is apparent that the heliport has had broad-based support from many sectors of the community of Indianapolis. This support encompasses both commercial and political interests in the city. This is most effectively illustrated by the fact that the idea of a heliport for the city goes back over 35 years. In essence, the present heliport is a logical extension of the idea that began and was accepted by community leaders as early as 1954.

The general public did not oppose the original private use facility, the Beeline Heliport, and they did not oppose it when it became a public use facility renamed the IDH. There has been no public opposition to the present operation. An important reason for the lack of opposition is the location. The site of the heliport, although adjacent to downtown, is an industrial district away from business and residences. The vast majority of the public, who had no dealings with the heliport, did not know the

heliport was there. Those who did know of its existence had no complaint. The same holds true today. There has been no public opposition to the present heliport, either during the planning for improvements to the previous IDH or to the more elaborate design of the prototype when it was constructed.

In fact, support in the business and political arena for the heliport was sufficient to ensure financial backing for the project from business sectors of the community, in addition to the Federal and state grants.

4.2.2 Public Use Heliport with Private Operator

There are several approaches to running a public use heliport. In areas where there are a large number of helicopters so that the projected number of operations are high enough, the heliport can be sustained with landing fees alone. A heliport can be wholly operated or subsidized by a city or state aviation agency as part of their system. Or the heliport can be managed by a private operator for profit.

From the beginning, the operating plan for the IDH was for the heliport to be run by a private entity. The IHC believes that the advantages of a privately run, public use heliport are that the heliport is run like a business, as a profit making entity, with a business mentality, and as such, there is no tax burden on the public to support it. The advantages of this are further explored in section 4.3. The plan to use a private enterprise to run the facility was considered an attribute by the city as well as by the Indiana Aviation Authority in the planning stages and is considered a significant factor in selling the heliport to the community.

A competition was held to select a private company, or FBO, to run the heliport. Approximately six proposals were submitted to the IAA presenting plans for design and operation of the heliport. Ideas ranged from a "trailer with a phone" concept to a standard "airport FBO type" operation.

The plan submitted by the IHC was selected. They credit their selection to specific components of their proposal. First, they presented a complete business plan, one that stated what they would do for the city. Second, the plan they presented called for a completely low-key operation. This theme was carried out in the overall heliport design, including the architectural design of the terminal building, which was deliberately styled to blend in with the tone of the overall city. The IHC proposal also included a well thought out business plan that offered a scope and range of services specifically suited to both the purpose of that heliport and to the area in which it is located. Specific examples of this are discussed in section 4.3.3.

4.2.3 Development Marketing - Conclusion

Due to the circumstances in which the heliport evolved, there was minimal need for active marketing when promoting the idea of sponsoring an FAA Prototype Heliport for the City of Indianapolis. The idea of a heliport in the city had been accepted by city leaders, and unopposed by the public, for over thirty-five years. Plans had already gone forward to

make improvements to the existing heliport through AIP grants before the FAA/Industry National Prototype Heliport Demonstration and Development Program was announced. It was a logical extension to apply for the prototype grant.

In other words, all the key persons and sectors of the community had already been sold on the idea of improving the existing heliport before the prototype program was implemented. For over 30 years, there had been no opposition from the public to any of the three heliports that had been operated in that location.

4.3 CONTINUOUS MARKETING

The IHC, who runs the IDH, feels that the success of the heliport is based on three factors: political support, public cooperation--meaning lack of public opposition, and the fact the heliport is privately operated.

In considering these factors for success, two concepts emerge with regard to political support and public cooperation. These can be summed up by saying that the heliport is at once both "invisible" and "highly visible." Both these postures pertain to the overall marketing approaches used to promote the use of the current IDH and to retain the political support and public cooperation that are vital to its continued success. The fact that the heliport is run as a private business may allow more leeway in marketing than perhaps a public agency may have. The continuous marketing strategies are discussed below.

4.3.1 The Invisible Heliport

The heliport is "invisible" because many people in the community do not know it is there. This became evident to the managers of the IHC when riding the elevator up to the restaurant in the heliport's terminal building at lunchtime. Other people in the elevator would ask, "what do you do here?" or say, "we didn't even know you were here." This is rightfully recognized as a valuable marketing tool. Although there is no plan to keep the heliport a secret--in fact educating the public about the heliport is a part of the overall marketing strategy--the fact that many people are unaware of the heliport's existence shows that it operates in an unobtrusive manner. Consequently, when people do become aware of the facility, it is hoped that they will also realize that the heliport is an enhancement to the community that does not detract from the quality of life in any way.

To be invisible the heliport must blend in with all aspects of the community, both visually and operationally. As previously stated, the architecture was specifically designed to be unobtrusive, to coalesce with the buildings around it and with the tone of the city itself. This means the heliport is not set apart from the community nor does it call unnecessary attention to itself. Being invisible also means selecting an appropriate location for the heliport and selecting ingress and egress routes that do not infringe on noise sensitive or intrusion sensitive localities, such as over schools, hospitals, and residential neighborhoods.

Another critical part of being invisible is to monitor the way in which the helicopters using the heliport are operated and to enforce procedures that do not annoy the people of the community.

The IHC managers are conscientious in this effort. They even welcome unsolicited help in this regard provided by a neighboring business. The chief executive officer (CEO) of a supply company to the east of the heliport, which has been there for three generations, called Service Supply, has given his employees a "helicopter incident report form." Any employee of Service Supply who sees an aircraft operated in a manner that appears unsafe can fill out the form and turn it in to the CEO. Then, although the managers of both the supply company and the heliport are friends, the supply company CEO will report the incident, not to the heliport, but to either the IAA or the FAA. The acceptance of such careful scrutiny not only provides a check on the "invisibility" of the operation but also is a superior public relations tool in that they not only welcome such attention and criticism, but openly discuss it.

4.3.2 The Highly Visible Heliport

Marketing for continued public acceptance, or lack of opposition, stems from continuous public education and community involvement. A major part of the marketing strategy employed to promote continued acceptance of the heliport by the community revolves around keeping the heliport "highly visible" to community leaders.

The marketing technique used by the IHC to make the heliport highly visible is to make it a point to be involved in the community. The IHC is active in the Chamber of Commerce and professional organizations. They perform community service work and provide presentations about the heliport to various schools, clubs and organizations, as well as on television and radio talk shows. This allows business and political leaders to know who they are, what they do, and most important, how the heliport benefits the city of Indianapolis. It also allows the heliport to become familiar to the public and to become a part of their city, not to be an intrusion. This way the heliport is not viewed by the public as a problem, but as an asset.

4.3.3 The Heliport as a Business

One key factor considered significant to the potential success of the heliport is that it is run as a private business. It is believed that this approach results in a different attitude toward operating the facility than if it were run strictly as a heliport and that this approach is potentially more successful.

The IHC feels that a successful business is based on diversification, i.e., having businesses at the heliport other than just the heliport. However, the businesses selected are those that also fit the purpose of the heliport and the area in which it is located. Examples of the types of businesses located at the heliport are shown in table 11.

TABLE 11
BUSINESSES RENTING SPACE IN THE INDIANAPOLIS DOWNTOWN HELIPORT

Aviation Related Activities

aircraft sales
Part 135 operator
EMS operator (alternate base)
hangar facilities (helicopter maintenance/parts)
avionics sales
overnight sleeping rooms for pilots and crew

Nonaviation Related Activities

accountant
travel agent
photographer
restaurant
conference room

The IHC also does heliport consulting by advising on the location and construction of personal heliports for those persons in the local area who are planning to buy a helicopter for their own business.

One marketing technique that IHC feels has been one of the most significant methods for educating the public about the heliport and one that allows the public to become familiar with helicopters is the "dinner ride." For $80 two people can have a steak dinner and a 20 minute tour around the city in a helicopter. The IHC estimates that over 10,000 people have taken advantage of these rides, and they feel that these are 10,000 people who will not oppose the heliport. The restaurant is also available for catered parties (no helicopter ride included).

The fact that the heliport is no tax burden to the public is used as an indirect marketing tool. This fact generally counters arguments that tax money is being used for something perceived by some as being frivolous.

4.3.4 Return On Investment (ROI) to the City

Another important method for marketing the heliport is to recognize the ways that the heliport benefits the city, and to stress these benefits in presentations and discussions about the heliport. The IHC estimates that the heliport returns $2-3 million per year to the city, which they feel is a conservative figure.

The heliport returns money to the city in a direct way through the fees it pays to the IAA. These fees include 1 percent of the gross receipts on all maintenance performed, 10 percent of the tenant office rental, and $.05/gallon on fuel delivered to the heliport.

Indirectly, the city also benefits from the heliport through the initial and continuing revitalization of the area in which the heliport is

located. The heliport is cited as a major factor in the decision of the Farm Bureau of Indiana to locate in, and renovate a nearby building. In addition, the heliport has been a catalyst for a high-tech office park that is to be developed by the Mansur Development Corporation on 50 acres adjacent to the heliport. The 50-acre area now includes a junk yard but is otherwise unused.

The heliport has generated ancillary businesses around the facility. These include concerns such as office supplies and restaurants, as well as new outlets for retail businesses at the heliport itself. Although it can be argued that some of these services, such as fuel, aircraft maintenance, and parts, can be obtained at the airport, it is more convenient for those who are using the heliport for other business they may have in the city to use the heliport for these aircraft services. Conversely, those who come in to use the heliport for aircraft services find that they can also use other services in the city. In other words, the heliport is bringing in business that would otherwise not exist to other companies in the city. In addition, other companies in Indianapolis have bought helicopters just because the heliport is there.

Recognition of the direct and indirect benefits the heliport brings to the city is invaluable in marketing its continued existence. It is the one question that communities are asking more frequently when a heliport is proposed in their area. The acknowledged value of this approach as a marketing tool stems from the business attitude used to run the heliport and goes back to the initial concept by which the IHC won the FBO contract - "what we can do for the city."

4.3.5 Specific Marketing Techniques

In addition to the aforementioned marketing strategies, the IHC employs specific techniques to maintain and increase business at the heliport. One such strategy is that no landing fees are charged to aircraft using the facility, although a fee for remaining overnight is charged. Lack of a landing fee encourages pilots to use the heliport, and it is felt that no money is lost in the long run because more revenue is generated from the other services used once the helicopter is there.

The heliport also promotes a "meal for a dollar" program. The pilot has a fuel card that is punched each time fuel is purchased. When the 50 gallon requirement is reached, the card can be turned in to the restaurant for a meal for a dollar; IHC pays the difference up to $5.

The biggest event of the year in Indianapolis is, of course, the Indianapolis 500 automobile race held on Memorial Day weekend in May. This event and those held in conjunction with it, plus the amateur athletic events and beauty contests also scheduled in May, account for a large percentage of the heliport's activities for the entire year. It is estimated that there are between 600 to 750 operations at the heliport during the one-day event (see section 3.1.2.). Although a large number of people would use the heliport for this event in any case, the heliport

promotes its use by offering a "race package." This package has been offered for the last 3 years. The price was originally $165 per person, but in 1989 it was increased to $200. The package includes:

- one night's stay in the Embassy Suites Hotel
- helicopter ride to the Raceway heliport located two blocks from the main entrance
- access to the hospitality tent
- Coleman soft cooler with a heliport sticker
- six pack of the beverage of the client's choice
- baseball cap with a heliport sticker
- pen with the heliport name
- score card for the race
- deck of cards

For other times of the year, an agreement has been established with local hotels to give those persons using the heliport a corporate rate or military rate at the hotels, whichever is appropriate.

The IHC sponsors a champagne party in the heliport's restaurant on New Year's Eve. The restaurant can also be reserved for private parties such as an engagement, wedding, etc., at any time of the year. One couple even rented a helicopter so they could be married during a helicopter ride. All these events receive publicity which is good for the heliport.

4.3.6 Indirect Marketing Techniques by the City

The city of Indianapolis and the IAA perform no direct marketing for the heliport. However, both use the heliport as a technique for promoting the city. For instance, the Chamber of Commerce has been quoted as saying that "(the heliport is) symbolic of a city looking to the future..." The current mayor, William Hudnut, said in 1985, "The heliport will not only benefit by the growth of Indianapolis, but [will], in fact, be a factor in the city's growth." The heliport is used to market the city to white collar corporations to convince them to locate their businesses there.

The IAA uses the heliport in a similar manner. For example, in a recent meeting of attorneys responsible for negotiating leases with the state's airports for international air carriers, the participants were given a tour of the heliport and a helicopter ride around the city.

Officials from the city government and the IAA praise the heliport and give talks about it to the their respective industries.

4.3.7 Telephone Survey Results

Systems Control Technology made a telephone survey to users of the heliport. Those surveyed were selected because they had been identified from the operations database as frequent users of the heliport. The helicopters used by those surveyed cover a range of helicopter types,

including McDonnell Douglas 500D, Bell 206B and 206L, Aerospatiale Twin Star, and the Messerschmitt-Boelkow-Blohm (BO) 105. The survey asked general questions about why these people used the heliport, what their impression was of the heliport, what services they used, and how they would improve it, i.e., what would make them use it more.

The results showed a high opinion of the heliport. The main reason people used it was its location. The next reason was the services it provides. The two most commonly mentioned services were first, maintenance, and then fuel. No one surveyed could give an example of anything they would like to see added.

None of the persons interviewed flew IFR into the heliport. Some of these operators had IFR-equipped aircraft, but still did not fly IFR for reasons pertaining to the individual service they perform.

When asked if they had noticed any marketing efforts other than through the helicopter industry, none had. However, one operator noted that to increase business at the heliport, the effort would have to come from helicopter industry sources, since it is the pilot of the aircraft who makes the decision to use the heliport or to use an alternative site such as an airport.

4.3.8 Continuous Marketing - Conclusion

The number of operations estimated at the first public use heliport in Indianapolis averaged about 5,000 per year. Almost as soon as the new prototype heliport opened, the number of operations increased to approximately 10,000 per year and has stayed at that level during the study period.

The FBO managers feel that within the 200-300 mile service area the number of helicopters has remained static. The IHC stated that while the owners of helicopters within this area change, the number of aircraft does not. This means that the heliport has more or less captured the entire available market. The IHC feels that the only way that operations would be significantly increased is if other major cities within the operating market area, i.e., St. Louis and Chicago, built equivalent public use heliports. This would create the basis for a helicopter transportation network between major cities in the midwest that perhaps would be linked to other regions. It is believed that these additional heliports would stimulate businesses in their areas to buy and use helicopters. If these cities all had heliports, this would create a helicopter transportation network in which the three cities and all the heliports would share their market areas.

The heliport's industrial base, or types of industries that use helicopters,as remained essentially the same since it first opened as a public use heliport in 1979. Consequently, the types of users are the same as when it opened as the prototype, with some minor changes. These changes consist mainly of increased use of the heliport for specific missions.

such as corporate executive and air charter, rather than any new use. The current industrial base includes:

- coal mining
- energy industries
- construction
- agriculture
- electronic news gathering (ENG)
- electronics
- utilities
- EMS
- state and city law enforcement
- military
- corporate
- air charter

The air charter mission consists of an "on-demand" service provided by the IHC, and Helicopter Air Link, a Part 135 operator that uses the Indianapolis Heliport as a base.

4.4 SUMMARY OF MARKETING ANALYSIS

The success of the IDH appears to be a combination of good planning, active and continuous marketing, and to some extent good timing. The planning aspect goes back some 35 years to when the original private heliport was first conceived and developed in a mostly industrial area. The planning has continued through conversion to public use and finally to the successful national prototype heliport that exists today.

In the marketing aspect, the heliport has been able to maintain a balance between being highly visible to the helicopter operators and their supporting clients nearly invisible to opponents of heliports and helicopters. Certainly the location of the heliport in a largely industrial area, while being near the downtown central business district, contributes significantly to the IDH's ability to maintain this bifurcated visibility profile.

Finally, good timing has certainly played a role in the IDH's success. Public funds through Federal, state, and local governments have been available when the IDH needed them, first when the heliport became a public use facility, and second, when the heliport became a part of the FAA's national prototype program. But what was good timing for the IDH can be attributed to good planning on the part of the Federal, state and local agencies in having funds available to develop public heliport facilities.

5.0 CONCLUSION

This report provides an analysis of the operational activity of the IDH since it opened as the first FAA/Industry National Prototype Demonstration Heliport in January 1985. It also analyzes how the proponents of the heliport used marketing techniques from the planning and development stages to present day to promote continued and increased use of the heliport.

5.1 OPERATIONAL ACTIVITY

The data on the IDH's operations were provided by the managers of the IHC, the FBO that runs the heliport. Due to a misunderstanding between the FAA and the FBO, much of the data that had been collected was lost. The data that was available for statistical analysis contained large gaps, often months long, that rendered any detailed statistical analysis unsound. Even the data that were available for this analysis were limited.

5.1.1 Data Collection

The heliport, although open 24 hours a day, 365 days a year, did not have a full staff during the study period. The personnel whose assigned task it was to monitor and record the operations only worked from 8 a.m. to 5 p.m. Data was recorded at other times, specifically nights and weekends, but the recordkeeping was inconsistent and only performed if time and other duties allowed. Consequently, for any 24-hour period the data cannot be considered totally accurate or complete.

The data input sheet on which the operations were recorded, shown in figure 4, was relatively detailed, particularly when compared to data collection efforts of other heliports. However, the range of categories under each data field was somewhat limited. For example, such items as "service required" and "type of operations" (missions) were limited in scope. Each provided a smaller range of choices than would be desired for a complex analysis.

The person recording the data would typically select an appropriate standardized abbreviation under each category. For data entries for which no standardized selections were provided, such as aircraft make/model, departure point, next destination, etc., the abbreviations used were composed by whomever was entering the data. These entries were inconsistent and sometimes unreadable. In addition, not all fields of data for each operation were filled in, which limited the comparability in the analysis.

This system of collection was necessary because the persons filling in the data sheet may not have had an extensive knowledge of helicopters and helicopter operational characteristics. The simplified procedure did allow any employee who was available to record data to do so, thereby providing more data than may otherwise have been collected, but due to these same procedures, some of the data that were recorded could not be used.

Another limiting factor was that during May, there were numerous events associated with the Indianapolis 500 automobile race and also several amateur sporting competitions and beauty contests. This created such an expansion of operations at the heliport that the activity data were purposefully not recorded due to lack of time. It was estimated by the IHC that the IDH did an equivalent of approximately 8 months worth of business in May. Although this was good for the heliport's business, there were no accurate records of these operations. The only source of information were estimates by the FBO managers. Therefore, an accurate appraisal of the effect of May operations or the relationship of the May data to the annual operations, was not possible.

5.1.2 Data Analysis

The consequence of the various data collection problems was that the data available for IDH analysis showed a non-normal distribution. A non-normal distribution can be caused by sampling error or by a population that truly has a non-normal distribution. In the case of the IDH, this type of distribution must be attributed to sampling error from both the unintentional loss of data and from the limitations of the data collection processes. The magnitude of the resultant gaps in the data precluded any attempt to correct the sampling error. This resulted in a generalized rather than a highly detailed analysis of the IDH's operations.

From all indications, the number of total annual operations appears to remain static at around 10,000 to 12,000 per year between January 1985 when the IDH opened and March 1989. Except for May, during the annual Indianapolis 500 automobile race, there is no recurring pattern in monthly operational characteristics. The "best guess" estimate of monthly operations is 700 to 900 per month, except for May. May has approximately 2,800 to 3,000 operations.

Weekdays are the busiest at the heliport, with Fridays showing the highest number of operations and 20 percent of the week's activity. During the week, the heliport is busiest between 6 a.m. and 9 a.m. with a secondary peak between 3 p.m. and 5 p.m. On weekends, the busiest time is between 5 p.m. and 9 p.m. with the highest number of operations at about 7 p.m.

The mission type that most frequently uses the heliport is "private," followed by operations in support of the EMS operator, Part 135, government, military, and training, in that order. The helicopter engine classification that uses the IDH most is the single-engine turbine, followed by twin turbine and piston. The trend during the study period appears to be an increase in twin-engine turbine operations, a level share of single-engine turbine operations, and a decrease in piston-engine operations.

The majority of helicopters are equipped with navigation capabilities, with 45 percent having VOR receivers, 34 percent with RNAV/Loran-C, 9 percent with ADF, and less than 1 percent with ILS. Only 11 percent had none of these navigation capabilities.

The services that the heliport provided were listed on the data collection sheet as fuel, drop off/pick up of passengers, overnight parking, maintenance, restaurant, hangar, and dinner flights. The dinner flights are for the public and would not be a service that would encourage pilots to use the heliport. The most frequently stated service used at the IDH was fuel at 34 percent, followed by drop off passengers at 27 percent, pick up of passengers at 22 percent, RON at 5 percent, maintenance at 4 percent, crew meals at 2 percent, and hangar use less than 1 percent.

The majority of helicopters are flown by a one-person crew. Military and government flights appear to have more than one crewmember, but it was not clear from the data if the additional crew was a requirement of the type of helicopter flown or were considered crew because of the tasks they were to perform.

Out of the total number of operations, the private mission carried the most passengers. When each mission was analyzed individually, the percentages of passenger versus non-passenger operations varied considerably. Overall, 47 percent of all operations carry passengers.

5.2 MARKETING ANALYSIS

The FBO managers believe that this heliport's success is due to three factors: political support, lack of public opposition, and private operation. The IDH benefited from the ability to recognize how well these operating concepts worked for this location early in the heliport's development, and they have continued to build on this approach.

A history of political support from all government levels, no opposition from the public to the previous heliports in the same location, and the developmental approach of emphasizing the heliport's benefit to the city have all helped to bring about a successful beginning. In addition, because the IDH was the first national demonstration prototype heliport to open, they received much national publicity and attention from the helicopter industry. Consequently, all potential users in both the heliport's market area and at the national level were notified of the opening.

The original marketing approach has been sustained through a well thought out plan of public education and low key public relations. Promoting the benefits of the IDH to all sectors of the community is an ongoing and vital effort. Tactics include direct marketing to the public with dinner rides, presentations to schools and clubs, and interviews to the media. This approach also included indirect marketing through the Chamber of Commerce and philanthropic organizations, as well as continued presentations to the national and international helicopter industry.

Another key to the success the IDH has experienced in Indianapolis goes beyond marketing. This was the understanding in the planning stages that the heliport had to be more than just a heliport. In fact the IDH, as merely a takeoff and landing facility, would not generate any income other than for fuel sales since there is no landing fee. Since 5 percent

of the cost for fuel goes to the IAA this would not have left much for the heliport itself.

A major source of revenue comes from the businesses, both aviation related and nonaviation related, that operate out of the heliport. Making the heliport multi-use by providing space for other businesses not only increased the use of the heliport but also created revenue. This approach may be vital to the financial success of any privately run urban public use facilities, particularly if there is a limited market area or a restricted number of helicopters.

The multi-use heliport concept also benefits the heliport by making it part of the community. Aviation related business may bring in revenue but, again, the market is limited. Nonaviation-related businesses located at a heliport allow those persons not associated directly with helicopters to use the heliport and become comfortable with it. Because the business or service is located at the heliport and the public must go to the heliport to use these services, the heliport becomes less of an unknown to be feared and more a part of their everyday lives.

Choosing the types of businesses to locate at the heliport must be done with care. At one time, the IDH terminal building was designed to be five stories high and to include hotel facilities. However, a hotel would have competed with the hotels planned for the city's redevelopment program and may have, therefore, created conflict within neighborhood areas and the business community. This possibility was recognized by the IHC and the hotel plans were dropped. The businesses now operating out of the heliport are those that are compatible with and complementary to neighborhood needs.

The factors contributing to the success of the IDH are a valuable contribution to the success of future heliports. It should be noted, however, that it does not necessarily follow that private managership of a public use heliport is the only way a heliport can be successful. Other successful heliports have alternate methods of backing and management, primarily by a public entity. For example, the Manhattan Downtown Heliport in New York City is run by the Port Authority of New York and New Jersey (PANYNJ) and the new heliport in Portland, Oregon is citizen-sponsored and managed.

In addition, the Federal contribution to the development of heliports should be recognized. So far no large public use heliport has been built without Federal funding. Benefits from Federal grants and technical support are important to any heliport development.

Heliport proponents should study and evaluate the location, the market area, the local economic conditions, and especially the political climate before deciding how a heliport should be funded and how it should be managed.

5.3 RECOMMENDATIONS

Although this study was able to extract some operational characteristics from the data provided by the IHC, a rigorous statistical analysis was impossible due to the limitations of the database. As a consequence

an opportunity to evaluate the IHC's operational trends was inconclusive. Such an evaluation may have provided valuable lessons on the workings of the IHC that could have been significant to other existing urban heliports and to future heliports as an example of well-informed planning.

It must be stressed that comprehensive and accurate data collection is in a heliport's own best interests. Accurate records of the numbers of operations, what types of helicopters use the heliport, the missions types it attracts, where these operations originate and where they go, as well as how much revenue is collected, etc., are a vital record for heliport management and planning purposes. 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.

Accurate records further serve the entire helicopter industry. Lack of accurate data, or unfortunately most often lack of any data, has been a handicap in determining the need for heliports. Lack of heliports is often quoted as a leading cause for constricted growth of the industry.

As a result of this study, 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. Heliports receiving Federal grant money 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 all FAA funded heliports.

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.

4. The FAA should analyze the operational data to determine whether the heliport planning and development grants are achieving public benefits.

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

Accurate documentation of operational statistics is in each heliport's own best interests. These recommendations would not only provide for accurate and adequate collection at individual heliports, but would promote a more equitable statistical evaluation among all FAA funded heliports and would provide documentation of the need for follow-on grants.

APPENDIX A
DATA CORRECTION METHODOLOGY

The correction of the IDH data for numbers of operations, both per year and per month, was a three-step process. The data were first corrected for months in which data were partially recorded, then for months in which data were not recorded. Finally, for night operations (that is, the number of operations which occurred between the hours of 6 p.m. and 6 a.m. every day) that were not recorded. The methodologies for these correction methods will be described in the next three sections, respectively.

A.1 Correction for Months with Partial Data

To correct the data for months in which only partial data on the number of operations per month is available, the entire database was sorted by year, month, and day of the week. Then the number of operations per day, for each day of the week, for each month were counted, i.e., the number of operations taking place on all Tuesdays in each individual month. Next, the number of days that data were recorded for each individual day of the week were counted, i.e., how many Tuesdays were there in a particular month in which data were collected (e.g., in March 1989).

From these two counts, the average number of operations for each day of the week, for each month of available data, was computed. This was done in a spread sheet format on a personal computer. The results are shown in table A-3. Next, a calendar was referenced to find the number of times each day of the week occurred in each month for every year between 1985 and 1989, i.e., how many Tuesdays are there in March 1986. Then the average number of operations for each day of the week were multiplied by the number of times that day of the week actually occurred in each month. This exercise provided an estimate of the total number of operations that took place on each weekday of each month.

By totaling all seven days of the week, an estimate of the number of operations which took place in each month was produced, as shown in table A-3. This technique was used for both the annual and monthly estimation of the number of operations. These estimates have not been corrected for operations that took place after normal IDH business hours.

A.2 Correction for Months with No Data

If there were no data at all for a month in the database, it was necessary to sort the data by year and day of the week, and use the average number of operations per day for each day of the week for the entire year as an estimate for that one month. In other words, the number of operations per day of the week for each year were counted, i.e., the number of operations that took place on all Tuesdays in 1989. Then the number of times that data were recorded for each day of the week was counted, i.e., how many Tuesdays were there on which data were collected in 1986.

From these two counts, the average number of operations for each day of the week, for each year in the database, was computed. Next, the

number of days per year when no data were recorded was counted. In other words, how many of each day of the week are there in the months for which no data were recorded. The average for each day of the week was then multiplied by the number of missing days in order to estimate the number of operations which took place in the missing months. This procedure was performed manually, because each year was different with regard to the amount of data collected and months do not have the same number of days of the week from year to year, i.e., four Mondays in March in one year and five in the next.

Table A-1 provides all computations used to estimate the number of operations in 1986 using this method. The data in the spread sheet provided as table A-3 shows all the raw data used to make all the annual estimates. The month of May is purposely handled separately, as all data for May comes from the FBO estimates discussed in Section 3.1.2 in the text. The estimated numbers of operations in May were 2,600 in 1985, 2,700 in 1986, 2,800 in 1987, 2,900 in 1988, and 3,000 in 1989. May is also left out of the count of how many days are missing in the year.

TABLE A-1
ESTIMATE OF ANNUAL OPERATIONS FOR MONTHS WITH NO DATA

	Months With Data		Months Without Data
1986	JAN, FEB, MAY*		MAR, APR, JUN, JUL, AUG, SEP, OCT, NOV, DEC
	44	Operations/3 Mondays = 14.67 Ops/Mon	
	105	Operations/5 Tuesdays = 21 Ops/Tue	
	101	Operations/5 Wednesdays = 20.2 Ops/Wed	
	85	Operations/5 Thursdays = 17 Ops/Thr	
	148	Operations/4 Fridays = 37 Ops/Fri	
	76	Operations/4 Saturdays = 19 Ops/Sat	
	21	Operations/5 Sundays = 4.2 Ops/Sun	

(40	Missing Mondays/CY	1986) X	14.67 Ops/Mon	=	587	Ops/Mon/CY 1986
(40	" Tuesdays/CY	1986) X	21 Ops/Tue	=	840	Ops/Tue/CY 1986
(40	" Wednesdays/CY	1986) X	20.2 Ops/Wed	=	808	Ops/Wed/CY 1986
(38	" Thursdays/CY	1986) X	17 Ops/Thr	=	1,406	Ops/Thr/CY 1986
(38	" Fridays/CY	1986) X	37 Ops/Fri	=	1,406	Ops/Fri/CY 1986
(39	" Saturdays/CY	1986) X	19 Ops/Sat	=	711	Ops/Sat/CY 1986
(40	" Sundays/CY	1986) X	4.2 Ops/Sun	=	168	Ops/Sun/CY 1986
			Total		5,196	Missing Ops
			Plus Ops From JAN, FEB, AND MAY		3,412	Monthly Ops
			Estimated Annual Operations		8,608	Ops/CY 1986

* Data derived from FBO manager's estimate.

A.3 Correction for Night Operations Not Recorded

Finally, the last factor which must be taken into account is the FBO manager's estimate of the number of operations which occur each night, but which are not recorded on a consistent basis between 6 p.m. and 6 a.m. every day.

Section 3.1.1 of the text explains the number of night operations estimated by the FBO managers. Here, only the total average estimate of 10.05 operations per night, every night is used. Table A-2 presents the number of annual operations that were recorded in the database, the total number of night operations per year, the percentage of operations recorded during the off hours, and the average number of operations recorded per night during the off hours.

For the estimate of annual operations with night estimates, the average number of operations per night is increased to 10.05 operations per night. For example, the estimate for annual operations in 1985 is 8,393 without correction for night operations. This estimate contains an average of 4.6 operations per night using just the raw data. The estimate of night operations for 1985 was 4.6 per night; therefore, this amount was subtracted from 10.05 (10.05 - 4.6 = 5.54). Then the results were multiplied by 365 (365 days per year times 5.45 = 1989), and 1989 operations were added to the estimate of the annual number of operations for 1986, for a total of 10,382.

The same method was used for all years in the database. However, note that 1988 needed no adjustment for night operations as it already had 10.9 operations per night in the unadjusted data. The figures that include the total estimate of night operations were used in the study when an estimate of total operations at the heliport was called for.

TABLE A-2
ESTIMATED NUMBER OF NIGHT OPERATIONS

Year	Night Ops/Total Ops	Percentage of Night Ops	Average Number of Operations
1985	1,538/4,952	32%	4.6 Ops/Night
1986	243/579	42%	4.1 Ops/ "
1987	32/673	5%	0.26 Ops/ "
1988	996/1,798	55%	10.9 Ops/ "
1989	164/377	46%	1.8 Ops/ "

TABLE A-3 COMPUTATION OF ADJUSTED MONTHLY OPERATIONS
FROM RAW IDH DATA

MONTH	DOW	# OF OPS	RAW OPS PER MONTH	# OF DAYS OF DATA	AVG OPS/ DAY	# DAYS IN MONTH	OPS/ DOW	CORRECTED OPS/MONTH
JAN 85	MO	27	195	4	6.75	4	27.00	244.00
	TU	63		4	15.75	5	78.75	
	WE	51		4	12.75	5	63.75	
	TH	34		4	8.50	5	42.50	
	FR	18		3	6.00	4	24.00	
	SA	0		0	0.00	4	0.00	
	SU	2		1	2.00	5	8.00	
FEB 85	MO	6	42	1	6.00	4	24.00	168.00
	TU	10		1	10.00	4	40.00	
	WE	9		1	9.00	4	36.00	
	TH	0		0	0.00	4	0.00	
	FR	16		1	16.00	4	64.00	
	SA	1		1	1.00	4	4.00	
	SU	0		0	0.00	4	0.00	
MAR 85	MO	53	346	4	13.25	4	53.00	353.50
	TU	66		4	16.50	4	66.00	
	WE	70		4	17.50	4	70.00	
	TH	55		4	13.75	4	55.00	
	FR	97		5	19.40	5	97.00	
	SA	5		2	2.50	5	12.50	
	SU	0		0	0.00	5	0.00	
APR 85	MO	97	443	5	19.40	5	97.00	464.00
	TU	87		5	17.40	5	87.00	
	WE	94		4	23.50	4	94.00	
	TH	80		4	20.00	4	80.00	
	FR	68		4	17.00	4	68.00	
	SA	15		2	7.50	4	30.00	
	SU	2		1	2.00	4	8.00	
JUN 85	MO	77	530	4	19.25	4	77.00	560.58
	TU	76		4	19.00	4	76.00	
	WE	86		4	21.50	4	86.00	
	TH	102		4	25.50	4	102.00	
	FR	120		4	30.00	4	120.00	
	SA	37		4	9.25	5	46.25	
	SU	32		3	10.67	5	53.33	
AUG 85	MO	83	572	4	20.75	4	83.00	572.00
	TU	72		4	18.00	4	72.00	
	WE	85		4	21.25	4	85.00	
	TH	136		5	27.20	5	136.00	
	FR	143		5	28.60	5	143.00	
	SA	29		5	5.80	5	29.00	
	SU	24		4	6.00	4	24.00	

TABLE A-3 COMPUTATION OF ADJUSTED MONTHLY OPERATIONS
FROM RAW IDH DATA (Continued)

MONTH	DOW	# OF OPS	RAW OPS PER MONTH	# OF DAYS OF DATA	AVG OPS/ DAY	# DAYS IN MONTH	OPS/ DOW	CORRECTED OPS/MONTH
SEP 85	MO	105	715	5	21.00	5	105.00	715.00
	TU	143		4	35.75	4	143.00	
	WE	113		4	28.25	4	113.00	
	TH	104		4	26.00	4	104.00	
	FR	137		4	34.25	4	137.00	
	SA	58		4	14.50	4	58.00	
	SU	55		5	11.00	5	55.00	
OCT 85	MO	113	775	4	28.25	4	113.00	775.00
	TU	133		5	26.60	5	133.00	
	WE	175		5	35.00	5	175.00	
	TH	144		5	28.80	5	144.00	
	FR	83		4	20.75	4	83.00	
	SA	68		4	17.00	4	68.00	
	SU	59		4	14.75	4	59.00	
NOV 85	MO	45	630	4	11.25	4	45.00	630.00
	TU	77		4	19.25	4	77.00	
	WE	115		4	28.75	4	115.00	
	TH	83		4	20.75	4	83.00	
	FR	175		5	35.00	5	175.00	
	SA	85		5	17.00	5	85.00	
	SU	50		4	12.50	4	50.00	
DEC 85	MO	110	713	5	22.00	5	110.00	713.00
	TU	142		5	28.40	5	142.00	
	WE	66		4	16.50	4	66.00	
	TH	77		4	19.25	4	77.00	
	FR	150		4	37.50	4	150.00	
	SA	89		4	22.25	4	89.00	
	SU	79		5	15.80	5	79.00	
JAN 86	MO	0	30	0	0.00	4	0.00	148.00
	TU	1		1	1.00	4	4.00	
	WE	19		1	19.00	5	95.00	
	TH	9		1	9.00	5	45.00	
	FR	0		0	0.00	5	0.00	
	SA	0		0	0.00	4	0.00	
	SU	1		1	1.00	4	4.00	
FEB 86	MO	44	550	3	14.67	4	58.67	564.67
	TU	104		4	26.00	4	104.00	
	WE	82		4	20.50	4	82.00	
	TH	76		4	19.00	4	76.00	
	FR	148		4	37.00	4	148.00	
	SA	76		4	19.00	4	76.00	
	SU	20		4	5.00	4	20.00	

TABLE A-3 COMPUTATION OF ADJUSTED MONTHLY OPERATIONS
FROM RAW IDH DATA (Continued)

MONTH	DOW	# OF OPS	RAW OPS PER MONTH	# OF DAYS OF DATA	AVG OPS/ DAY	# DAYS IN MONTH	OPS/ DOW	CORRECTED OPS/MONTH
SEP 87	MO	24	185	3	8.00	4	32.00	223.00
	TU	32		5	6.40	5	32.00	
	WE	62		5	12.40	5	62.00	
	TH	31		4	7.75	4	31.00	
	FR	26		4	6.50	4	26.00	
	SA	10		1	10.00	4	40.00	
	SU	0		0	0.00	4	0.00	
OCT 87	MO	34	273	4	8.50	4	34.00	309.00
	TU	56		4	14.00	4	56.00	
	WE	44		4	11.00	4	44.00	
	TH	78		5	15.60	5	78.00	
	FR	52		5	10.40	5	52.00	
	SA	9		1	9.00	5	45.00	
	SU	0		0	0.00	4	0.00	
NOV 87	MO	28	139	5	5.60	5	28.00	162.00
	TU	30		4	7.50	4	30.00	
	WE	23		4	5.75	4	23.00	
	TH	26		3	8.67	4	34.67	
	FR	31		3	10.33	4	41.33	
	SA	0		0	0.00	4	0.00	
	SU	1		1	1.00	5	5.00	
DEC 87	MO	24	136	4	6.00	4	24.00	171.00
	TU	28		4	7.00	5	35.00	
	WE	33		5	6.60	5	33.00	
	TH	33		3	11.00	5	55.00	
	FR	18		3	6.00	4	24.00	
	SA	0		0	0.00	4	0.00	
	SU	0		0	0.00	4	0.00	
JAN 88	MO	18	178	4	4.50	4	18.00	188.50
	TU	31		4	7.75	4	31.00	
	WE	37		4	9.25	4	37.00	
	TH	50		4	12.50	4	50.00	
	FR	42		4	10.50	5	52.50	
	SA	0		0	0.00	5	0.00	
	SU	0		0	0.00	5	0.00	
FEB 88	MO	35	181	5	7.00	5	35.00	197.00
	TU	54		4	13.50	4	54.00	
	WE	44		4	11.00	4	44.00	
	TH	19		3	6.33	4	25.33	
	FR	29		3	9.67	4	38.67	
	SA	0		0	0.00	4	0.00	
	SU	0		0	0.00	4	0.00	

TABLE A-3 COMPUTATION OF ADJUSTED MONTHLY OPERATIONS
FROM RAW IDH DATA (Continued)

MONTH	DOW	# OF OPS	RAW OPS PER MONTH	# OF DAYS OF DATA	AVG OPS/ DAY	# DAYS IN MONTH	OPS/ DOW	CORRECTED OPS/MONTH
MAR 88	MO	17	106	3	5.67	4	22.67	161.58
	TU	29		4	7.25	5	36.25	
	WE	20		3	6.67	5	33.33	
	TH	32		3	10.67	5	53.33	
	FR	8		2	4.00	4	16.00	
	SA	0		0	0.00	4	0.00	
	SU	0		0	0.00	4	0.00	
AUG 88	MO	23	293	3	7.67	5	38.33	433.00
	TU	38		3	12.67	5	63.33	
	WE	31		3	10.33	5	51.67	
	TH	30		2	15.00	4	60.00	
	FR	67		3	22.33	4	89.33	
	SA	79		3	26.33	4	105.33	
	SU	25		4	6.25	4	25.00	
SEP 88	MO	6	203	1	6.00	4	24.00	348.00
	TU	25		2	12.50	4	50.00	
	WE	22		2	11.00	4	44.00	
	TH	30		3	10.00	5	50.00	
	FR	50		3	16.67	5	83.33	
	SA	65		3	21.67	4	86.67	
	SU	5		2	2.50	4	10.00	
OCT 88	MO	43	261	3	14.33	5	71.67	593.17
	TU	25		1	25.00	4	100.00	
	WE	43		2	21.50	4	86.00	
	TH	40		2	20.00	4	80.00	
	FR	39		2	19.50	4	78.00	
	SA	53		2	26.50	5	132.50	
	SU	18		2	9.00	5	45.00	
NOV 88	MO	75	396	4	18.75	4	75.00	412.33
	TU	73		5	14.60	5	73.00	
	WE	71		5	14.20	5	71.00	
	TH	49		4	12.25	4	49.00	
	FR	70		4	17.50	4	70.00	
	SA	49		3	16.33	4	65.33	
	SU	9		4	2.25	4	9.00	
DEC 88	MO	23	287	2	11.50	4	46.00	398.50
	TU	25		4	6.25	4	25.00	
	WE	48		4	12.00	4	48.00	
	TH	22		3	7.33	5	36.67	
	FR	102		4	25.50	5	127.50	
	SA	56		3	18.67	5	93.33	
	SU	11		2	5.50	4	22.00	

TABLE A-3 COMPUTATION OF ADJUSTED MONTHLY OPERATIONS FROM RAW IDH DATA (Continued)

MONTH	DOW	# OF OPS	RAW OPS PER MONTH	# OF DAYS OF DATA	AVG OPS/ DAY	# DAYS IN MONTH	OPS/ DOW	CORRECTED OPS/MONTH
JAN 89	MO	24	150	5	4.80	5	24.00	222.00
	TU	33		5	6.60	5	33.00	
	WE	24		4	6.00	4	24.00	
	TH	21		4	5.25	4	21.00	
	FR	25		4	6.25	4	25.00	
	SA	20		1	20.00	4	80.00	
	SU	3		1	3.00	5	15.00	
FEB 89	MO	4	125	2	2.00	4	8.00	158.00
	TU	36		4	9.00	4	36.00	
	WE	18		4	4.50	4	18.00	
	TH	9		2	4.50	4	18.00	
	FR	40		4	10.00	4	40.00	
	SA	17		2	8.50	4	34.00	
	SU	1		1	1.00	4	4.00	
MAR 89	MO	10	102	2	5.00	4	20.00	197.75
	TU	17		3	5.67	4	22.67	
	WE	25		4	6.25	5	31.25	
	TH	15		2	7.50	5	37.50	
	FR	23		3	7.67	5	38.33	
	SA	11		1	11.00	4	44.00	
	SU	1		1	1.00	4	4.00	

APPENDIX B
DAYLIGHT OPERATIONS

To determine whether or not an operation was conducted in daylight or in darkness, the database was divided into quarters: January - March, April - June, July - September, and October - December. Then the sunrise and sunset times were found for the first and last days of each quarter. Finally, the average times for both sunrise and sunset were found for each quarter by adding the two sunrise times and dividing by 2, and by adding the two sunset times and dividing by 2. Table B-1 provides the data used in the computation of these average sunrises and sunsets for each quarter.

TABLE B-1
SUNRISE AND SUNSET TIMES
(military time)

Quarter	Day	Sunrise	Sunset
First	First	0827	1757
	Last	0655	1930
	Average	0741	1843
Second	First	0653	1931
	Last	0546	2037
	Average	0619	2004
Third	First	0546	2037
	Last	0703	1853
	Average	0624	1945
Fourth	First	0704	1851
	Last	0827	1756
	Average	0745	1824

Once the average sunrise and sunset times were known for each quarter, the database was sorted for all operations which took place between sunrise and sunset. The results of the data sort are provided in table B-2.

TABLE B-2
DAYLIGHT OPERATIONS PER QUARTER

	Daylight Operations/Total Operations per Quarter				
Year	First	Second	Third	Forth	Total
1985	575/583	845/977	946/1289	1129/2118	3495/4952
1986	483/580	---*	---	---	483/579
1987	---	---	168/185	479/548	647/673
1988	465/465	---	159/496	376/944	1000/1798
1989	240/377	---	---	---	240/377
Total	1763/2005	845/977	1273/1970	1984/3610	5865/8361

* --- = No Data

The percentages in section 3.1.4.3 were calculated from the numbers presented in table B-2.