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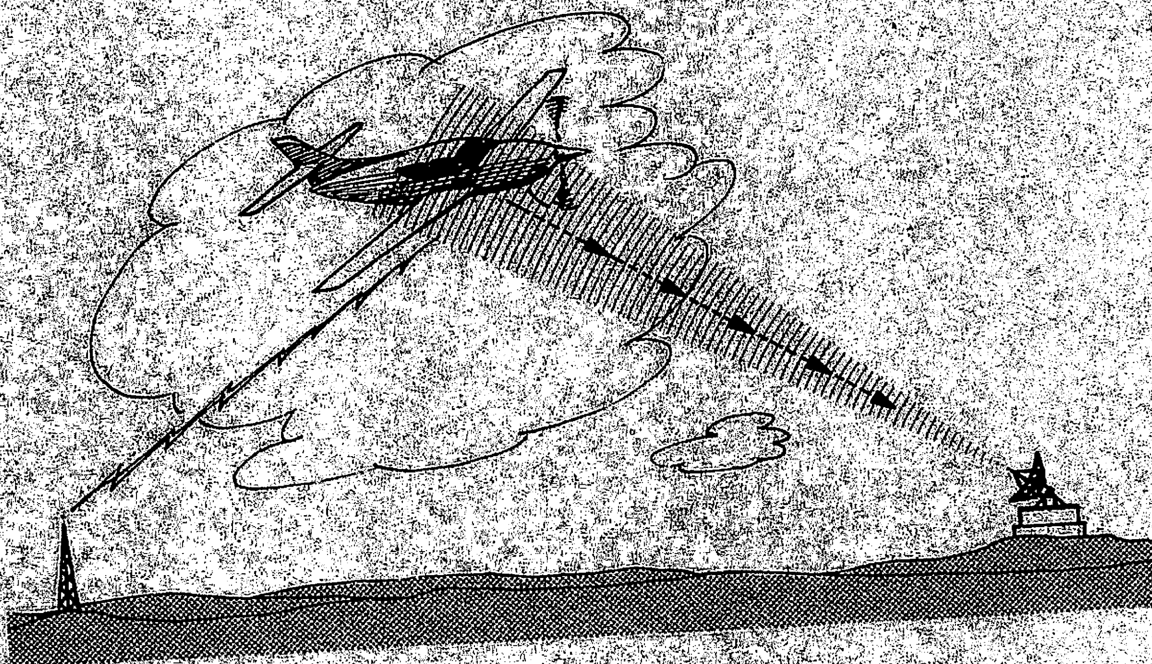
GENERAL AVIATION AVIONICS STATISTICS: 1974



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16. Abstract The primary objectives of this study were to (1) provide a framework for viewing the general aviation (GA) aircraft fleet, which would relate airborne avionics equipment to the capability for an aircraft to perform in the National Airspace System, and (2) within this framework, to portray the types of aircraft common to the GA fleet in terms of descriptive information on the aircraft.

To provide the framework, capability groups of avionics equipment were designed and translated into aircraft capability to perform certain functions in the airspace system. Two types of groups evolved: hierarchical groups consist of avionics equipment meeting FAA requirements for flying in different airspace segments, in different conditions and for landing at different classes of airports; non-hierarchical groups consist of avionics equipment which give an aircraft additional capability, but which are not required equipment according to FAA regulations.

Once the framework was developed, the GA fleet, as represented by the 1974 Aircraft Statistical Master File, was distributed among the capability groups, and its characteristics were studied. In addition, individual capability groups were analyzed to discover subgroups of aircraft with homogeneous characteristics. This report presents the methodologies used in the analyses, statistical tables and other results.

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PREFACE

The avionics data study described in this report was performed under Project Plan Agreements FA-643 and FA-743 sponsored by the Federal Aviation Administration, Office of Management Systems, Information and Statistics Division. It was undertaken as part of a program to assure the quality and usefulness of general aviation data. The study was based on information collected and processed by FAA through its Aeronautical Center in Oklahoma City, Oklahoma.

Several representatives of the Federal Aviation Administration contributed significantly to the study: Nick Soldo and Carolyn Edwards, AMS-230, guided the project as sponsors; Stephen W. Hopkins, AMS-230, produced data tapes for the analysis; George W. MacArthur, AFS-804, answered numerous questions on avionics functions and regulations. All computer programming, data base manipulation and report generation were the responsibility of Ellen Laviana, of Kentron Hawaii, Ltd.

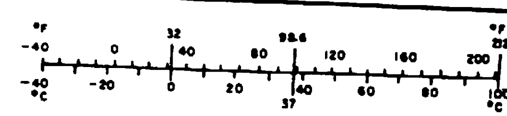
METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
in	inches	2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
		AREA		
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
		MASS (weight)		
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
		VOLUME		
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
		TEMPERATURE (exact)		
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
		AREA		
cm^2	square centimeters	0.16	square inches	in^2
m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
ha	hectares (10,000 m^2)	2.5	acres	
		MASS (weight)		
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
		VOLUME		
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m^3	cubic meters	35	cubic feet	ft^3
m^3	cubic meters	1.3	cubic yards	yd^3
		TEMPERATURE (exact)		
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



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1. INTRODUCTION

1.1 DEFINITION OF GENERAL AVIATION (GA)

The term general aviation (GA) refers to that portion of civil aviation which includes all facets of aviation except air carriers holding a certificate of public convenience and necessity from the Civil Aeronautics Board, and large aircraft commercial operators. GA encompasses such varied services as air taxi, air cargo, industry, agriculture, business, personal, instructional, research, patrol and sport flying. GA aircraft range from four engine turbojets to simple gliders and balloons.

1.2 BACKGROUND

GA aircraft owners compose almost 97 percent of the United States civil air fleet[1] and account for approximately 76 percent of total operations at FAA towered airports.[2] Despite this dominance of the civil air fleet by GA aircraft, the characteristics and capabilities of the GA fleet are subjects which have not been extensively explored in FAA literature.

The FAA's major source of information on the GA fleet is the Aircraft Registration Eligibility, Identification, and Activity Report, AC Form 8050-73, the current version of which is found in Appendix A. Since 1970, FAA has used Part 1 of the form to register annually all U.S. civil aircraft. Part 2 is for GA aircraft only and contains questions on several aircraft characteristics, including avionics equipment, usage, base airport loca-

[1] Census of U.S. Civil Aircraft Calendar Year 1975, U.S. Dept. of Transportation, Federal Aviation Administration, (Washington DC, 1976), p. 4.

[2] FAA Air Traffic Activity Calendar Year 1975, U.S. Dept. of Transportation, Federal Aviation Administration, (Washington DC, 1976) p. 16.

tion, and hours flown.* Reports currently generated from these forms do not provide sufficient information for FAA to assess the GA fleet in terms of machine sophistication, the ability of aircraft to function in the National Airspace System (NAS), and the typical aircraft comprising the fleet.

1.3 PURPOSE OF PROJECT

Accordingly, the purpose of this project is:

a. To enhance the information obtained from AC Form 8050-73 by providing a framework for viewing the GA fleet which would relate airborne avionics equipment to the capability for an aircraft to perform in the NAS.

b. Within this framework, to portray the types of aircraft common to the GA fleet in terms of descriptive information contained in AC Form 8050-73.

This effort will enable the FAA first, to gain insight into the nature of the GA fleet, and second, to measure the impact on the GA fleet of anticipated regulatory changes.

1.4 SOURCE OF DATA

AC Form 8050-73 has been sent out by the FAA in January of every year since 1970 requesting information on the previous year's activities of the aircraft. Part 1 is mandatory for all aircraft, but Part 2 is voluntarily filled out by GA aircraft owners. In the past three years, the response rate for Part 2 has averaged around 73 percent. When the forms are returned to the FAA, they are used, in conjuction with the Aircraft Registration File located at the Aeronautical Center in Oklahoma City, to create the Aircraft Statistical Master (ASM) File on computer tape. Appendix B shows the

*In 1978, the form will be discontinued. Part 1 will be replaced by a triennial aircraft registration and Part 2 will be replaced by an annual GA sample survey.

record layout for the ASM file. The work in this project was based on the 1974 GA fleet as represented by the 1974 ASM File, the most current version available at the project's commencement.

2. DEVELOPMENT AND METHODOLOGY

2.1 FLEET SIZE AND COVERAGE OF THIS REPORT

The 1974 GA aircraft fleet, as represented by the 1974 ASM file, contained 185,350 registered aircraft. Although the response rate to Part 2 of the registration form was only 72.8 percent or 134,935 aircraft, avionics information for previous years was found in the records of 34,095 additional aircraft, so that altogether avionics information was available for 169,030 of the 185,350 GA aircraft.

The tables appearing in this report are all based on the 169,030 GA aircraft for which avionics information was available. Some FAA publications, such as the Census of U.S. Civil Aircraft Calendar Year 1974, are based on the entire fleet size of 185,350. Any disagreements in figures between this report and the Census are due to the elimination from this report of the 16,320 aircraft for which no avionics information was available. Other FAA publications, such as General Aviation: Aircraft, Owner and Utilization Characteristics, are based on those fractions of the GA fleet selected to participate in sample surveys. Results of reports such as these are estimates rather than true population values, introducing another cause for discrepancies in figures between this report and reports based on samples: sampling error. In general, however, results of this report agree with General Aviation results when compared with General Aviation interval estimates.

2.2 PROFILE OF GA FLEET AVIONICS

Table A summarizes the basic avionics data provided by the 1974 ASM file for the analysis of the 1974 GA fleet. It shows the number of aircraft containing each piece of avionics equipment appearing on AC Form 8050-73. Table A has only limited usefulness because it does not enable one to ascertain the number of aircraft containing important groups of equipment, but deals solely with individual pieces of equipment. For example, one cannot determine the number of aircraft containing all three components of an ILS system, localizer, glide slope, and marker beacon receivers. The capability groups discussed below are designed to make the analysis of groups of avionics possible.

2.3 AVIONICS CAPABILITY GROUPS

2.3.1 Purpose of Groups

Avionics capability groups (CG's) are the means through which significant groups of avionics equipment are associated with aircraft capability to perform in the NAS. The word "capability" takes on a number of meanings in conjunction with the NAS. It can refer to where in the airspace an aircraft can fly, at what airports it can land, under what flying conditions it can fly, or to what extent it can participate in the air route, landing, and communications systems. Avionics equipment is installed in an aircraft because of the capabilities gained from it; consequently, one should be able to identify an aircraft's general potential capabilities from knowledge of its avionics equipment configuration. Often several pieces of equipment are required to obtain a certain capability in the NAS; it thus becomes necessary to study groups of avionics, rather than individual pieces. The CG definitions are designed to provide the link between groups of avionics equipment and capabilities. In addition, the CG's provide a framework within which other aspects of the GA fleet can be examined.

TABLE A. BASIC AVIONICS DATA FOR 1974 GA FLEET

<u>VHF Communications Equipment</u>

VHF Receiver Capability	
Tuner	70177
180 channels or less	53835
181 channels or more	85367
VHF Transmitter Capability	
20 channels or less	15398
21 thru 180 channels	47407
181 channels or more	80131
ILS Reception Capability	
Localizer	86529
Glide Slope	46029
Marker Beacon	71092
Transponder Equipment	
64 code	4792
4096 code	66497
Altitude reporting	15633
Navigation Equipment	
VOR Receiver	
One	58470
More than one	77829
Distance Measuring Equipment (DME)	32345
Automatic Direction Finder (ADF)	73121
Weather Radar	7666
Approved Area Navigation Equipment (RNAV) Advisory Circular 90-45	10894

2.3.2 Assumptions

Several assumptions must be made in order to simplify the process of designing the groups and to minimize the number of groups needed. First, it is assumed that an aircraft's avionics equipment defines its capability to perform in the NAS. In actuality, an aircraft's engine size and power, pilot's certification, lack of cabin pressurization, or lack of other types of required equipment may prevent the aircraft from performing at its highest capability level according to its avionics configuration. Second, the capability groups are based on regulations and equipment requirements for the majority of general aviation aircraft. There may be exceptions to the avionics needed for certain capabilities depending on the use of the aircraft, the model of the aircraft, and the pilot's skill at maximizing the capabilities that his avionics equipment gives him. Third, it is assumed that area navigation (RNAV) equipment[3] on GA aircraft is comprised of VOR/DME-based course line computers rather than inertial or Doppler systems, since as of January 1, 1975, fewer than 0.5 percent of GA aircraft contained the self-contained type of RNAV equipment[4]. Thus, RNAV equipment is considered to comply with FAA requirements for both VOR equipment and distance measuring equipment (DME).

2.3.3 Methodology

At the onset of the project, it became apparent that two classifications of avionics equipment existed. The first type consisted of avionics equipment meeting FAA requirements for use of the various aspects of the NAS. The second type was avionics equipment which

[3] See the Glossary for definitions of area navigation equipment and other technical terms.

[4] Avionics Installation Navigation and Communication Report, FAA/AEM.

gave an aircraft additional capability, but which was not required equipment according to FAA regulations. These two types of equipment necessitated the formation of two types of CG's.

To form the first type of CG, three sets of avionics requirements were obtained, one for flight in different segments of the airspace, another for flight in different flying conditions, and the third for landing at different airports. The three sets of requirements were combined into one set of avionics requirements dealing with the above three aspects of the NAS simultaneously. These combined requirements formed the basis for the first type of capability group. They were augmented by miscellaneous requirements for helicopters, air taxis, and gliders.

The formation of the second type of CG was a simpler task. It involved grouping component pieces of avionics equipment which together would form a complete avionics system for enabling an aircraft to make full use of a landing, communications or navigation system in tne NAS. However, except for the instrument landing system (ILS), it was found that an aircraft can gain full use of a system in the NAS by installing only one piece of airborne avionics equipment. Consequently, the second type of CG consists mainly of "groups" containing one piece of equipment each.

2.3.4 Definition of Capability Groups

Definitions of the two types of CG's mentioned above, known as hierarchical and non-hierarchical CG's respectively, are given below in terms of the avionics equipment found in AC Form 8050-73. A glossary at the end of the report explains the numerous terms relating to avionics equipment and the NAS found in the definitions below. Appendix C shows the various segments of the airspace and the regulations pertaining to the airspace, airports, and flying conditions.

a. Hierarchical CG's

The FAA has established airborne avionics equipment requirements for aircraft use of the various segments of the NAS. In this regulatory sense, an aircraft's avionics equipment determines its capabilities to perform in areas of the NAS. FAA regulations deal with three basic capabilities: (1) to fly in different segments of the airspace, (2) to fly in visual flight rules (VFR) and instrument flight rules (IFR) flying conditions, (3) to land at different classifications of airports. In the formation of CG's of avionics equipment which relate to these three capabilities, the groups take on a hierarchical nature, that is, there is an order to the groups. In general, the avionics equipment and the associated capabilities for one capability group are a subset of the avionics equipment and the associated capabilities for the next higher group.

These groups have the additional properties that they are mutually exclusive and exhaustive. When assigning individual aircraft to CG's, mutual exclusiveness means that an aircraft can be assigned to one and only one group. Exhaustiveness means that every aircraft will fall into a group.

Table B describes the hierarchical CG's in terms of avionics equipment and capabilities. The capabilities described represent the highest level at which an aircraft has avionics potential to participate in the NAS. Generally, an aircraft can also participate at all lower levels. Each group of equipment below is described in terms of (1) airspace capability, (2) flying condition capability, (3) airport capability. Exceptions to airport and airspace capabilities are noted for helicopter and glider operations, respectively.

Figure A is a schematic diagram of the hierarchical capability groups, which summarizes the relationship of three types of aircraft capabilities to their required avionics equipment, namely flying conditions, airspace, and airport capabilities. To determine the capabilities associated with a particular avionics box, one must position the box relative to the lines of the capability of interest. The capabilities increase from top to bottom. Generally, they are maximums, i.e., if an aircraft has reached a certain level with regard to one type of capability, it can also perform at lower levels with regard to the type of capability.

TABLE B. CONTINUED

AVIONICS	CAPABILITIES
	(3) Non-TCA controlled airways Group III TCA's Helicopters with 4096 code transponders...Group II TCA's All helicopters...Group I and II TCA's below 1000 feet AGL
Group 4 Two-way communications 4096 code transponder VOR or RNAV	(1) Up to and including 12,500 feel MSL Gliders...Up to and including 18,000 feet MSL VOR airways below 12,500 feet MSL RNAV...Low altitude RNAV airways below 12,500 feet MSL (2) IFR flight (3) Non-TCA controlled airports Group II TCA's Helicopters...Group I TCA's below 1000 feet AGL
Group 5 4096 code transponder Altitude encoding equipment	(1) Non-positive controlled airspace (2) VFR flight, day and night (3) Uncontrolled airports Group III TCA's
Group 6 Two-way communications 4096 code transponder Altitude encoding equipment	(1) Non-positive controlled airspace (2) VFR flight, day and night (3) Non-TCA controlled airports Group III TCA's Helicopters...Group I TCA's
Group 7 Two-way communications 4096 code transponder Altitude encoding equipment VOR	(1) Non-positive controlled airspace VOR airways (2) IFR flight

TABLE B. HIERARCHICAL CAPABILITY GROUPS

AVIONICS	CAPABILITIES
Group 1 No regulatory avionics	(1) Up to and including 12,500 feet mean sea level (MSL) Gliders...Up to and including 18,000 feet MSL ADF...Colored airways below 12,500 feet MSL VOR or RNAV...VOR airways below 12,500 feet MSL RNAV...Low altitude RNAV airways below 12,500 feet MSL (2) VFR flight, day and night (3) Uncontrolled airports
Group 2 Two-way communications	(1) Up to and including 12,500 feet MSL Gliders...Up to and including 18,000 feet MSL (2) VFR flight, day and night (3) Non-TCA controlled airports Group III TCA's Helicopters with 4096 code transponders...Group II TCA's All helicopters...Group I and II TCA's below 1000 feet above ground level (AGL)
Group 3 Two-way communications VOR or Automatic Direction Finder (ADF) or RNAV	(1) Up to and including 12,500 feet MSL Gliders...Up to and including 18,000 feet MSL ADF...Colored airways below 12,500 feet MSL VOR or RNAV...VOR airways below 12,500 feet MSL RNAV...Low altitude RNAV airways below 12,500 feet MSL (2) IFR flight

TABLE B. CONTINUED

AVIONICS	CAPABILITIES
	(3) Group I TCA's
Group 8 Two-way communications 4096 code transponder Altitude encoding equipment VOR/DME } or RNAV	(1) Positive controlled airspace Jet routes RNAV...RNAV routes
	(2) IFR flight
	(3) Group I TCA's

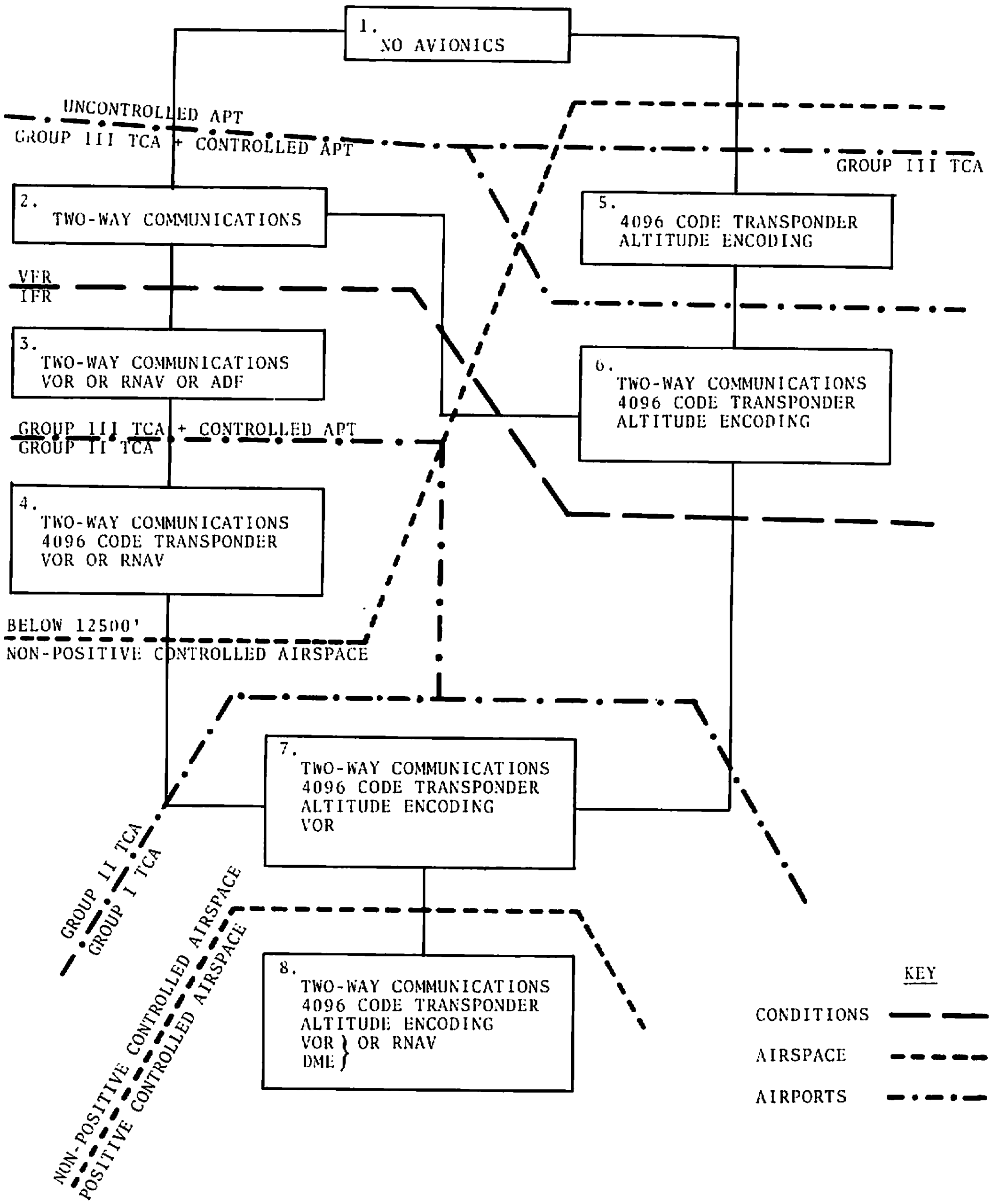

FIGURE A. HIERARCHICAL CAPABILITY GROUPS

b. Non-Hierarchial CG's

Many kinds of avionics equipment exist which give an aircraft additional capabilities to the three types discussed in the previous section. Whereas the latter capabilities are derived from regulatory considerations, those to be discussed in this section are based on engineering and safety considerations. The avionics CG's of this section have none of the properties of the previous groups. That is, they are not hierarchical in nature, nor are they mutually exclusive and exhaustive. The CG's are described below in Table C in terms of the avionics equipment and associated capabilities.

2.4 DESCRIPTION OF AIRCRAFT CHARACTERISTICS

Nine aircraft characteristics were available on the 1974 ASM Files for analysis in the framework of the newly developed CG's. They are listed below with appropriate comment.

a. Primary use of aircraft during 1974.

b. Base airport region: See Appendix D for an FAA regional map.

c. Hours flown during 1974: This variable was discretized into 50-hour intervals for easier reporting.

d. Age of aircraft in 1974: This variable was discretized into 5-year intervals for easier reporting.

e. Computed aircraft type: The thirteen computed aircraft types combine the four aircraft characteristics of engine type, number of engines, aircraft type (simple), and number of seats into meaningful combinations for the GA fleet. See Appendix E for type definitions.

f. Aircraft type (simple).

g. Engine type.

h. Number of engines.

i. Number of seats.

TABLE C. NON-HIERARCHICAL CAPABILITY GROUPS

AVIONICS	CAPABILITIES
Group 1	
Localizer	Partial use of ILS at airports.
Group 2	
Localizer	Partial use of ILS at airports.
Marker Beacon	
Group 3	
Localizer	Full use of ILS at airports.
Marker Beacon	
Glide Slope	
Group 4	
RNAV	Area navigation capability.
Group 5	
Weather Radar	Detection of storms in aircraft's route.

2.5 CAPABILITY GROUPS ANALYSIS

The identification of subgroups of aircraft with homogeneous characteristics within each CG required the use of contingency table and sampling techniques. The methodology used in the identification process is described in Appendix F.

3. RESULTS

DISCUSSION OF RESULTS

Based on the 169,030 aircraft for which avionics data were available, the following results were obtained:

Table 1: Hierarchical versus Non-Hierarchical Capability Groups

This table shows the distribution of GA aircraft into hierarchical and non-hierarchical CG's, beginning with the least sophisticated groups in the upper left-hand corner of the table. Excluding the non-hierarchical CG category, a general diagonal trend can be seen from upper left to lower right corners in the distribution of aircraft. This means that as aircraft increase their capabilities in the hierarchical CG's, they also tend to increase their non-hierarchical equipment capabilities. For example, aircraft with no regulatory avionics (hierarchical CG 1) would not generally possess complex weather radar or area navigation equipment. On the other hand, aircraft in hierarchical CG 8 would not likely be without sophisticated weather, landing and navigation equipment.

Some additional observations on the distribution of GA aircraft are below:

a. Almost 93 percent of GA aircraft cannot fly in positive controlled airspace (above 18,000 MSL).

b. Hierarchical CG's 5 and 6 together contain only 0.13 percent of the GA fleet. Examination of the avionics equipment associated with these groups reveals that both include transponder equipment, but neither include navigation equipment. One includes two-way communications. This suggests a reason for the small number of aircraft in these groups and the comparatively large number in the remaining groups to be that the common path of acquisition of avionics proceeds from communications to transponder to navagation equipment.

c. Only 0.49 percent of the GA fleet falls into non-hierarchical CG 2, Localizer and Glide Slope. This would suggest that the normal pattern in acquiring ILS equipment is begin with a localizer, then add marker beacon equipment, and finally add a glide slope receiver.

d. 79,276 or 47 percent of the GA fleet possess none of the avionics appearing in the non-hierarchical CG's. Of these aircraft, 73,160 fall into heirarchical CG's 1, 2, and 3, and comprise 72 percent of these 3 hierarchical CG's.

Tables 2 through 10: Characteristics of Hierarchical Capability Groups

These tables show the distributions of the nine available aircraft characteristics across the eight hierarchical CG's. Several generalizations about hierarchical CG's and the nature of the GA fleet were revealed in these tables and are listed below.

a. As hierarchical CG's increase in order of sophistication, the predominant uses also grow in sophistication from personal, to personal and business to executive, business and personal.

b. There are some differences among the distributions of hierarchical CG's across base airport region, primarily due to CG's 5 and 6 which are notably smaller than the other CG's. Other variations are evident from the table.

c. Those aircraft containing more avionics equipment and capabilities are flown more hours than those aircraft with smaller investments in avionics equipment.

d. New aircraft (0-10 years) comprise a substantially larger percentage of the higher order CG's than the lower order groups. Old aircraft (over 25 years) comprise a substantially larger proportion of lower order groups than higher order groups.

e. The computed type of aircraft becomes more sophisticated as one moves from low order to high order CG's. Not only does this apply for computed aircraft type, but also for the four characteristics individually which are combined to form the computed aircraft type (simple aircraft type, engine type, number of engines, number of seats).

Tables 11 through 19: Characteristics of Non-Hierarchical Capability Groups

These tables show the distributions of the nine available aircraft characteristics across ten non-hierarchical CG combinations. Generalizations on the nature of non-hierarchical CG's and of the GA fleet as a whole were obtained from these tables and are listed below.

a. As non-hierarchical groups increase in sophistication, the predominant uses change from personal and business, to personal, business and executive, to business and executive.

b. Aircraft falling into the non-grouped category are older than those aircraft falling into the other non-hierarchical CG's. Within the latter groups, there is a gradual decrease in aircraft age moving from less to more sophisticated groups.

c. The distribution of the non-hierarchical CG's over the base airport regions are more uniform than the distributions for the other eight characteristics. Yet, differences are apparent. The greatest departures from the average occur in CG's 6, 8, and 9. These three CG's all contain weather radar as one of their avionics requirements; in fact, groups 8 and 9 are subsets of group 6. It would seem therefore, that the weather radar is the determinant of the distribution. The weather radar is found in unusually high concentrations in the southern, southwestern, and eastern regions, while it is more scarce than normal in the Rocky Mountain and western regions. Weather patterns of these regions provide the probable explanation for this phenomenon. Storms in Eastern United States cover wide areas with clouds, making the location of the storms' electrical centers difficult. In the West, the storms are more concentrated, and easier to track visually. Thus weather radars are more prevalent in the East.

d. Those aircraft containing more avionics equipment and capabilities are flown more hours than those aircraft with small investments in avionics equipment.

e. The computed aircraft type becomes more sophisticated as one moves from lower order to higher order CG's. Not only does this apply for computed aircraft type, but also for the four characteristics individually which are combined to form the computed aircraft type (simple aircraft type, engine type, number of engines, and number of seats).

Tables 20 and 21, Figures 1 through 15: Subgroups of Hierarchical & Non-Hierarchical Capability Groups

These figures and tables show the results of the search for subgroups of aircraft with homogeneous characteristics within each CG. A general discussion of the results follows.

The nature of the aircraft within individual capability groups was more diverse than expected. Only 50 percent on the average of the GA aircraft within any one CG could be classified into subgroups, even when on exception of the number of descriptive factors reduced to two or when the minimum subgroup size was dropped to as low as 3 percent. Approximately six subgroups of aircraft with two to four homogeneous characteristics were identified for each CG. Aircraft which did not fall into large subgroups were grouped into an "other" category.

Nonetheless, the study of the joint characteristics of the GA fleet revealed information about the nature of the CG's which was in agreement with the information revealed by the study of individual characteristics in Tables 2 through 19. A summary of the analyses is shown in Tables 20 and 21. It can be seen that the lower order hierarchical and non-hierarchical CG's contained subgroups of simple aircraft such as older fixed-wing single engine piston aricraft with 1-3 seats which were not flown and older personal use aircraft flown less than 100 hours. As the CG's became more sophisticated, so did the types and uses of aircraft. Simultaneously, the amount of flying time increased, and age decreased. Examination of the highest order CG's revealed subgroups of complex aircraft such as new turboprop aircraft and new two engine aircraft used for executive purposes flown more than 400 hours during the year. In Tables 20 and 21, the capability groups and the subgroups are arranged in order of sophistication beginning in the upper left hand corner of the report. The diagonal trends reveal the strong positive relationship between avionics sophistication and characteristics sophistication. More detailed results of the individual CG analyses are shown in Figures 1 through 15.

TABLE 1

The key following the table shows the interpretation of the symbols and numbers heading the rows and columns of the table. The comments below will facilitate the interpretation of the table:

a. Aircraft assigned to hierarchical CG 1 (No regulatory avionics) contain either no avionics equipment whatsoever or a combination of equipment which does not match or exceed the specified requirements for any other CG.

b. Hierarchical CG 2, (Two-way communications), indicates an aircraft has some combination of VHF receiver and transmitter capabilities, and not necessarily a two-way radio unit.

c. Since non-hierarchical groups are not all mutually exclusive (that is, they overlap), the columns do not add to the counts at the bottom of the table. The first four groups, L through LMG, are mutually exclusive, and the last three groups, IR, IW and All, are mutually exclusive. However, there is some overlap between the first six groups and the last three groups, and between the first four and the next two groups.

d. Non-grouped aircraft, NG, are those aircraft possessing none of the avionics covered by the other nine non-hierarchical CG's.

TABLE 1. HIERARCHICAL VS. NON-HIERARCHICAL GENERAL AVIATION CAPABILITY GROUPS

HCG / NON-H.	1	2	3	4	5	6	7	8	ALL
L	192	127	13390	4816	1	2	188	34	18750
L S	11	4	399	370	0	0	21	19	824
L M	100	44	7331	13836	9	1	790	499	22610
LMO	232	45	4461	26186	64	15	1609	11733	44345
RNAV	301	0	3766	3433	32	0	0	3362	10894
WSAD	21	2	364	2045	18	2	30	5184	7666
I,R	15	0	349	1828	8	0	0	1365	3565
I,W	11	0	242	1663	6	2	26	3396	5346
ALL	1	0	57	345	11	0	0	1771	2185
N S	25813	6703	40639	5577	72	38	370	59	79276
CNT	26632	6930	68685	51150	157	56	2978	12442	169030

NON-CLASSIFIABLE AIRCRAFT NUMBER 16320

TABLE 1. CONTINUED

KEY

Hierarchical Capability Groups

1. No regulatory avionics
2. Two-way communications
3. Two-way communications
   VOR or ADF or RNAV
4. Two-way communications
   4096 code transponder
   VOR or RNAV
5. 4096 code transponder
   Altitude encoding equipment
6. Two-way communications
   4096 code transponder
   Altitude encoding equipment
7. Two-way communications
   4096 code transponder
   Altitude encoding equipment
   VOR
8. Two-way communications
   4096 code transponder
   Altitude encoding equipment
   VOR } or RNAV
   DME }

Non-hierarchical Capability Groups

L: Localizer

M: Marker beacon

G: Glide slope

R, RNAV: Area navigation system

W, WRAD: Weather radar

I, LMG: Complete ILS system

ALL : I, R and W

NG: Non-grouped aircraft

TABLES 2 THROUGH 19

These reports show three numbers in each cell. The first is the number of aircraft falling into the particular capability group-category combination represented by the cell. The second number is the percent of the row or category that the number of aircraft represents. The third number is the percent of the colunm or capability group that the number of aircraft represents.

The key appearing at the bottom of each table gives the avionics associated with the CG's. Hierarchical group reports are additive across the columns as these groups are mutually exclusive. The numbers in the right-hand columns of the non-hierarchical group reports are the marginal distributions of the GA fleet across the categories, but are not row totals since non-hierarchical CG's are not mutually exclusive.

TABLE 2. PRIMARY USE

		1	2	3	4	5	6	7	8	SUM
EXECUTIVE		54	77	395	1765	15	2	95	3833	6236
	ROW %	0,87	1.23	6,33	28,30	0,24	0.03	1,52	61.47	
	COLUMN %	0,20	1,11	0.58	3,45	9,55	3.57	3,19	30.81	3.69
BUSINESS		799	323	7029	12300	30	10	787	3561	24839
	ROW %	3.22	1.30	28,30	49,52	0,12	0.04	3.17	14.34	
	COLUMN %	3.00	4.66	10.23	24.05	19.11	17,86	26.43	28.62	14.70
PERSONAL		7514	2189	27490	16944	29	5	976	1519	56666
	ROW %	13.26	3.86	48.51	29.90	0.05	0.01	1,72	2.68	
	COLUMN %	28.21	31,59	40,02	33,13	18,47	8.93	32,77	12,21	33,52
AERIAL APPLICATION		2654	371	370	164	4	0	7	26	3596
	ROW %	73,80	10.32	10.29	4.56	0.11	0.0	0.19	0.72	
	COLUMN %	9.97	5.35	0.54	0.32	2,55	0.0	0,24	0.21	2,13
INSTRUCTION		426	231	5260	2774	1	3	124	134	8953
	ROW %	4.76	2.58	58.75	30.98	0.01	0.03	1.39	1.50	
	COLUMN %	1.60	3.33	7.66	5.42	0.64	5.36	4.16	1.08	5.30
AIR TAXI		51	249	907	1972	9	4	187	1068	4447
	ROW %	1.15	5.60	20.40	44.34	0.20	0.09	4.21	24.02	
	COLUMN %	0.19	3.59	1.32	3.86	5.73	7.14	6.28	8.58	2.63

TABLE 2. CONTINUED

GROUP		1	2	3	4	5	6	7	8	
INDUSTRIAL/SPECIAL		101	359	641	531	1	4	56	100	1793
	ROW %	5.65	20.02	35.75	29.62	0.06	0.22	3.12	5.58	
	COLUMN %	0.38	5.18	0.93	1.04	0.64	7.14	1.88	0.80	1.06
AIRCRAFT RENTAL BUS.		236	120	2078	2515	3	1	161	195	5309
	ROW %	4.45	2.26	39.14	47.37	0.06	0.02	3.03	3.67	
	COLUMN %	0.89	1.73	3.03	4.92	1.91	1.79	5.41	1.57	3.14
OTHER		473	288	866	621	0	7	47	229	2531
	ROW %	18.69	11.38	34.22	24.54	0.0	0.28	1.86	9.05	
	COLUMN %	1.78	4.16	1.26	1.21	0.0	12.50	1.58	1.84	1.50
IMPUTED/NOT REPORTED		14324	2723	23649	11564	65	20	538	1777	54560
	ROW %	26.21	4.98	43.27	21.16	0.12	0.04	0.98	3.25	
	COLUMN %	53.78	39.29	34.43	22.61	41.40	35.71	18.07	14.28	32.34
TOTALS		26632	6930	68685	51150	157	56	2978	12442	169030
	ROW %	15.76	4.10	40.63	30.26	0.09	0.03	1.76	7.36	

KEY

GROUP

1. No regulatory avionics
2. Two-way communications
3. Two-way communications
   VOR or ADF or RNAV
4. Two-way communications
   4096 code transponder
   VOR or RNAV

GROUP

5. 4096 code transponder
   Altitude encoding equipment
6. Two-way communications
   4096 code transponder
   Altitude encoding equipment
7. Two-way communications
   4096 code transponder
   Altitude encoding equipment
   VOR

GROUP

8. Two-way communications
   4096 code transponder
   Altitude encoding equipment
   VOR } or RNAV
   DME }

TABLE 3. BASE AIRPORT REGION

		1	2	3	4	5	6	7	8	SUM
NEW ENGLAND		1047	246	2463	1796	3	2	183	468	6208
	ROW %	16.87	3.96	39.67	28.93	0.05	0.03	2.95	7.54	
	COLUMN %	3.93	3.55	3.59	3.51	1.91	3.57	6.15	3.76	3.67
EASTERN		3195	673	7889	7396	21	7	555	2087	21823
	ROW %	14.64	3.08	36.15	33.89	0.10	0.03	2.54	9.56	
	COLUMN %	12.00	9.71	11.49	14.46	13.38	12.50	18.64	16.77	12.91
SOUTHERN		3502	849	9319	8224	34	3	411	2281	24623
	ROW %	14.22	3.45	37.85	33.40	0.14	0.01	1.67	9.26	
	COLUMN %	13.15	12.25	13.57	16.08	21.66	5.36	13.80	18.33	14.57
GREAT LAKES		5278	1003	13613	9732	22	7	464	2484	32603
	ROW %	16.19	3.08	41.75	29.85	0.07	0.02	1.42	7.62	
	COLUMN %	19.82	14.47	19.82	19.03	14.01	12.50	15.58	19.96	19.29
CENTRAL		2218	275	5044	3361	19	5	191	806	11919
	ROW %	18.61	2.31	42.32	28.20	0.16	0.04	1.60	6.76	
	COLUMN %	8.33	3.97	7.34	6.57	12.10	8.93	6.41	6.48	7.05
ROCKY MOUNTAINS		1537	387	3937	2319	11	1	97	396	8685
	ROW %	17.70	4.46	45.33	26.70	0.13	0.01	1.12	4.56	
	COLUMN %	5.77	5.58	5.73	4.53	7.01	1.79	3.26	3.18	5.14

TABLE 3. CONTINUED

GROUP		1	2	3	4	5	6	7	8	
NORTHWESTERN		1667	590	4356	2509	3	5	127	406	9685
	ROW %	17.42	6.09	45.00	25.91	0.03	0.05	1.31	4.19	
	COLUMN %	6.33	8.51	6.34	4.91	1.91	8.93	4.26	3.26	5.73
WESTERN		3456	1494	10777	8706	11	13	560	1481	26498
	ROW %	13.04	5.64	40.67	32.86	0.04	0.05	2.11	5.59	
	COLUMN %	12.98	21.56	15.69	17.02	7.01	23.21	18.80	11.90	15.68
SOUTHWESTERN		4121	863	8366	6682	27	9	362	1965	22395
	ROW %	18.40	3.85	37.36	29.84	0.12	0.04	1.62	8.77	
	COLUMN %	15.47	12.45	12.18	13.06	17.20	16.07	12.16	15.79	13.25
PACIFIC		29	38	212	89	0	1	4	6	379
	ROW %	7.65	10.03	55.94	23.48	0.0	0.26	1.06	1.58	
	COLUMN %	0.11	0.55	0.31	0.17	0.0	1.79	0.13	0.05	0.22
ALASKAN		546	508	2569	273	6	3	21	39	3965
	ROW %	13.77	12.81	64.79	6.89	0.15	0.08	0.53	0.98	
	COLUMN %	2.05	7.33	3.74	0.53	3.82	5.36	0.71	0.31	2.35
FOREIGN		16	4	138	63	0	0	3	23	247
	ROW %	6.48	1.62	55.87	25.51	0.0	0.0	1.21	9.31	
	COLUMN %	0.06	0.06	0.20	0.12	0.0	0.0	0.10	0.18	0.15
TOTALS		26632	6930	68685	51150	157	56	2978	12442	169030
	ROW %	15.76	4.10	40.63	30.26	0.09	0.03	1.76	7.36	

KEY

GROUP
1. No regulatory avionics
2. Two-way communications
3. Two-way communications
   VOR or ADF or RNAV

GROUP
4. Two-way communications
   4096 code transponder
   VOR or RNAV
5. 4096 code transponder
   Altitude encoding equipment
6. Two-way communications
   4096 code transponder
   Altitude encoding equipment

GROUP
7. Two-way communications
   4096 code transponder
   Altitude encoding equipment
   VOR
8. Two-way communications
   4096 code transponder
   Altitude encoding equipment
   VOR/DME } or RNAV

TABLE 4. HOURS FLOWN

		1	2	3	4	5	6	7	8	SUM
1 - 49		5465	1360	12021	3637	17	11	209	463	23183
	ROW %	23.57	5.87	51.85	15.69	0.07	0.05	0.90	2.00	
	COLUMN %	20.52	19.62	17.50	7.11	10.83	19.64	7.02	3.72	13.72
50 - 99		2590	924	12078	7444	16	3	420	867	24342
	ROW %	10.64	3.80	49.62	30.58	0.07	0.01	1.73	3.56	
	COLUMN %	9.73	13.33	17.58	14.55	10.19	5.36	14.10	6.97	14.40
100 - 149		1177	502	6959	7896	9	1	469	1306	18319
	ROW %	6.43	2.74	37.99	43.10	0.05	0.01	2.56	7.13	
	COLUMN %	4.42	7.24	10.13	15.44	5.73	1.79	15.75	10.50	10.84
150 - 199		587	226	3166	4985	6	1	308	1162	10441
	ROW %	5.62	2.16	30.32	47.74	0.06	0.01	2.95	11.13	
	COLUMN %	2.20	3.26	4.61	9.75	3.82	1.79	10.34	9.34	6.18
200 - 249		542	197	2357	4096	5	2	289	1259	8747
	ROW %	6.20	2.25	26.95	46.83	0.06	0.02	3.30	14.39	
	COLUMN %	2.04	2.84	3.43	8.01	3.18	3.57	9.70	10.12	5.17
250 - 299		363	118	1242	2343	7	3	142	871	5089
	ROW %	7.13	2.32	24.41	46.04	0.14	0.06	2.79	17.12	
	COLUMN %	1.36	1.70	1.81	4.58	4.46	5.36	4.77	7.00	3.01

TABLE 4. CONTINUED

GROUP		1	2	3	4	5	6	7	8	
300 - 349		395	157	1267	2173	6	1	153	928	5080
	ROW %	7.78	3.09	24.94	42.78	0.12	0.02	3.01	18.27	
	COLUMN %	1.48	2.27	1.84	4.25	3.82	1.79	5.14	7.46	3.01
350 - 399		197	91	755	1275	5	2	72	650	3047
	ROW %	6.47	2.99	24.78	41.84	0.16	0.07	2.36	21.33	
	COLUMN %	0.74	1.31	1.10	2.49	3.18	3.57	2.42	5.22	1.80
400 - 449		249	97	821	1222	3	1	72	675	3140
	ROW %	7.93	3.09	26.15	38.92	0.10	0.03	2.29	21.50	
	COLUMN %	0.93	1.40	1.20	2.39	1.91	1.79	2.42	5.43	1.86
450 - UP		743	535	4370	4515	18	11	306	2484	12982
	ROW %	5.72	4.12	33.66	34.78	0.14	0.08	2.36	19.13	
	COLUMN %	2.79	7.72	6.36	8.83	11.46	19.64	10.28	19.96	7.68
NOT FLOWN		8400	995	4225	584	7	6	46	118	14381
	ROW %	58.41	6.92	29.38	4.06	0.05	0.04	0.32	0.82	
	COLUMN %	31.54	14.36	6.15	1.14	4.46	10.71	1.54	0.95	8.51
IMPUTED HOURS		5924	1728	19424	10980	58	14	492	1659	40279
	ROW %	14.71	4.29	48.22	27.26	0.14	0.03	1.22	4.12	
	COLUMN %	22.24	24.94	28.28	21.47	36.94	25.00	16.52	13.33	23.83
TOTALS		26632	6930	68685	51150	157	56	2978	12442	169030
	ROW %	15.76	4.10	40.63	30.26	0.09	0.03	1.76	7.36	

KEY

GROUP
1. No regulatory avionics
2. Two-way communications
3. Two-way communications VOR or ADF or RNAV

GROUP
4. Two-way communications 4096 code transponder VOR or RNAV
5. 4096 code transponder Altitude encoding equipment

GROUP
6. Two-way communications 4096 code transponder Altitude encoding equipment
7. Two-way communications 4096 code transponder Altitude encoding equipment VOR

GROUP
8. Two-way communications 4096 code transponder Altitude encoding equipment VOR/DME or RNAV

TABLE 5. AGE OF AIRCRAFT

		1	2	3	4	5	6	7	8	SUM
0 - 4 YEARS		3144	1297	8120	11549	44	27	613	3449	28243
	ROW %	11.13	4.59	28.75	40.89	0.16	0.10	2.17	12.21	
	COLUMN %	11.81	18.72	11.82	22.58	28.03	48.21	20.58	27.72	16.71
5 - 10 YEARS		2723	1317	18792	17887	31	9	1055	4877	46691
	ROW %	5.83	2.82	40.25	38.31	0.07	0.02	2.26	10.45	
	COLUMN %	10.22	19.00	27.36	34.97	19.75	16.07	35.43	39.20	27.62
11 - 15 YEARS		1679	732	10792	9660	8	2	525	1671	25069
	ROW %	6.70	2.92	43.05	38.53	0.03	0.01	2.09	6.67	
	COLUMN %	6.30	10.56	15.71	18.89	5.10	3.57	17.63	13.43	14.83
16 - 20 YEARS		1180	558	10782	5873	11	5	386	692	19487
	ROW %	6.06	2.86	55.33	30.14	0.06	0.03	1.98	3.55	
	COLUMN %	4.43	8.05	15.70	11.48	7.01	8.93	12.96	5.56	11.53
21 - 25 YEARS		865	357	5219	1828	7	4	141	173	8594
	ROW %	10.07	4.15	60.73	21.27	0.08	0.05	1.64	2.01	
	COLUMN %	3.25	5.15	7.60	3.57	4.46	7.14	4.73	1.39	5.08
26 - 30 YEARS		8909	1525	11248	1391	31	6	88	131	23329
	ROW %	38.19	6.54	48.21	5.96	0.13	0.03	0.38	0.56	
	COLUMN %	33.45	22.01	16.38	2.72	19.75	10.71	2.96	1.05	13.80

TABLE 5. CONTINUED

GROUP		1	2	3	4	5	6	7	8	
31 - 35 YEARS		3935	432	1005	354	4	0	18	136	5884
	ROW %	66.88	7.34	17.08	6.02	0.07	0.0	0.31	2.31	
	COLUMN %	14.78	6.23	1.46	0.69	2.55	0.0	0.60	1.09	3.48
OVER 35 YEARS		1340	134	248	63	1	0	3	12	1801
	ROW %	74.40	7.44	13.77	3.50	0.06	0.0	0.17	0.67	
	COLUMN %	5.03	1.93	0.36	0.12	0.64	0.0	0.10	0.10	1.07
NOT REPORTED		2857	578	2479	2545	20	3	149	1301	9932
	ROW %	28.77	5.82	24.96	25.62	0.20	0.03	1.50	13.10	
	COLUMN %	10.73	8.34	3.61	4.98	12.74	5.36	5.00	10.46	5.88
TOTALS		26632	6930	68685	51150	157	56	2978	12442	169030
	ROW %	15.76	4.10	40.63	30.26	0.09	0.03	1.76	7.36	

KEY

GROUP
1. No regulatory avionics
2. Two-way communications
3. Two-way communications
   VOR or ADF or RNAV

GROUP
4. Two-way communications
   4096 code transponder
   VOR or RNAV
5. 4096 code transponder
   Altitude encoding equipment
6. Two-way communications
   4096 code transponder
   Altitude encoding equipment

GROUP
7. Two-way communications
   4096 code transponder
   Altitude encoding equipment
   VOR
8. Two-way communications
   4096 code transponder
   Altitude encoding equipment
   VOR } or RNAV
   DME }

TABLE 6. COMPUTED AIRCRAFT TYPE

		1	2	3	4	5	6	7	8	SUM
TYPE 1		21144	3259	30170	4068	49	11	221	83	59005
	ROW %	35.83	5.52	51.13	6.89	0.08	0.02	0.37	0.14	
	COLUMN %	79.39	47.03	43.93	7.95	31.21	19.64	7.42	0.67	34.91
TYPE 2		2198	900	35270	35857	51	13	2267	3192	79748
	ROW %	2.76	1.13	44.23	44.96	0.06	0.02	2.84	4.00	
	COLUMN %	8.25	12.99	51.35	70.10	32.48	23.21	76.12	25.66	47.18
TYPE 3		197	53	1388	7726	26	5	308	4236	13939
	ROW %	1.41	0.38	9.96	55.43	0.19	0.04	2.21	30.39	
	COLUMN %	0.74	0.76	2.02	15.10	16.56	8.93	10.34	34.05	8.25
TYPE 4		198	35	807	2463	7	2	102	1965	5579
	ROW %	3.55	0.63	14.46	44.15	0.13	0.04	1.83	35.22	
	COLUMN %	0.74	0.51	1.17	4.82	4.46	3.57	3.43	15.79	3.30
TYPE 5		22	4	103	95	0	1	7	48	280
	ROW %	7.86	1.43	36.79	33.93	0.0	0.36	2.50	17.14	
	COLUMN %	0.08	0.06	0.15	0.19	0.0	1.79	0.24	0.39	0.17
TYPE 6		18	0	12	244	3	1	1	1104	1383
	ROW %	1.30	0.0	0.87	17.64	0.22	0.07	0.07	79.83	
	COLUMN %	0.07	0.0	0.02	0.48	1.91	1.79	0.03	8.87	0.82

TABLE 6. CONTINUED

GROUP		1	2	3	4	5	6	7	8	
TYPE 7		5	0	25	128	2	0	14	355	529
	ROW %	0.95	0.0	4.73	24.20	0.38	0.0	2.65	67.11	
	COLUMN %	0.02	0.0	0.04	0.25	1.27	0.0	0.47	2.85	0.31
TYPE 8		59	12	31	76	0	0	3	38	219
	ROW %	26.94	5.48	14.16	34.70	0.0	0.0	1.37	17.35	
	COLUMN %	0.22	0.17	0.05	0.15	0.0	0.0	0.10	0.31	0.13
TYPE 9		4	3	4	68	4	1	0	1232	1316
	ROW %	0.30	0.23	0.30	5.17	0.30	0.08	0.0	93.62	
	COLUMN %	0.02	0.04	0.01	0.13	2.55	1.79	0.0	9.90	0.78
TYPE 10		1	0	3	6	0	0	0	151	161
	ROW %	0.62	0.0	1.86	3.73	0.0	0.0	0.0	93.79	
	COLUMN %	0.00	0.0	0.00	0.01	0.0	0.0	0.0	1.21	0.10
TYPE 11		1325	1354	330	47	8	11	10	6	3091
	ROW %	42.87	43.80	10.68	1.52	0.26	0.36	0.32	0.19	
	COLUMN %	4.98	19.54	0.48	0.09	5.10	19.64	0.34	0.05	1.83
TYPE 12		41	224	506	365	1	4	42	31	1214
	ROW %	3.38	18.45	41.68	30.07	0.08	0.33	3.46	2.55	
	COLUMN %	0.15	3.23	0.74	0.71	0.64	7.14	1.41	0.25	0.72
TYPE 13		1420	1086	36	7	6	7	3	1	2566
	ROW %	55.34	42.32	1.40	0.27	0.23	0.27	0.12	0.04	
	COLUMN %	5.33	15.67	0.05	0.01	3.82	12.50	0.10	0.01	1.52
TOTALS		26632	6930	68885	51150	157	56	2976	12442	169030
	ROW %	15.76	4.10	40.63	30.26	0.09	0.03	1.76	7.36	

KEY

GROUP
1. No regulatory avionics
2. Two-way communications
3. Two-way communications
   VOR or ADF or RNAV

GROUP
4. Two-way communications
   4096 code transponder
   VOR or RNAV
5. 4096 code transponder
   Altitude encoding equipment
6. Two-way communications
   4096 code transponder
   Altitude encoding equipment

GROUP
7. Two-way communications
   4096 code transponder
   Altitude encoding equipment
8. Two-way communications
   4096 code transponder
   Altitude encoding equipment
   VOR } or RNAV
   DME }

TABLE 7. AIRCRAFT TYPE

		1	2	3	4	5	6	7	8	SUM
GLIDER		1121	1036	33	4	1	0	0	0	2195
	ROW %	51.07	47.20	1.50	0.18	0.05	0.0	0.0	0.0	
	COLUMN %	4.21	14.95	0.05	0.01	0.64	0.0	0.0	0.0	1.30
BALLOON		298	50	3	2	5	7	0	1	366
	ROW %	81.42	13.66	0.82	0.55	1.37	1.91	0.0	0.27	
	COLUMN %	1.12	0.72	0.00	0.00	3.18	12.50	0.0	0.01	0.22
BLIMP/DIRIGIBLE		1	0	0	1	0	0	3	0	5
	ROW %	20.00	0.0	0.0	20.00	0.0	0.0	60.00	0.0	
	COLUMN %	0.00	0.0	0.0	0.00	0.0	0.0	0.10	0.0	0.00
FIXED WING SINGLE		23400	4171	65463	39974	100	24	2490	3285	138907
	ROW %	16.85	3.00	47.13	28.78	0.07	0.02	1.79	2.36	
	COLUMN %	87.86	60.19	95.31	78.15	63.69	42.86	83.61	26.40	82.18
FIXED WING MULTIPLE		446	95	2350	10757	42	10	433	9119	23252
	ROW %	1.92	0.41	10.11	46.26	0.18	0.04	1.86	39.22	
	COLUMN %	1.67	1.37	3.42	21.03	26.75	17.86	14.54	73.29	13.76
ROTORCRAFT		1366	1579	836	412	9	15	52	37	4305
	ROW %	31.73	36.66	19.42	9.57	0.21	0.35	1.21	0.86	
	COLUMN %	5.13	22.77	1.22	0.81	5.73	26.79	1.75	0.30	2.55

TABLE 7. CONTINUED

GROUP	1	2	3	4	5	6	7	8	
NOT REPORTED	0	0	0	0	0	0	0	0	0
ROW %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
COLUMN %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTALS	26632	6930	68685	51150	157	56	2978	12442	169030
ROW %	15.76	4.10	40.63	30.26	0.09	0.03	1.76	7.36	

KEY

GROUP

1. No regulatory avionics

2. Two-way communications

3. Two-way communications
   VOR or ADF or RNAV

GROUP

4. Two-way communications
   4096 code transponder
   VOR or RNAV

5. 4096 code transponder
   Altitude encoding equipment

6. Two-way communications
   4096 code transponder
   Altitude encoding equipment

GROUP

7. Two-way communications
   4096 code transponder
   Altitude encoding equipment
   VOR

8. Two-way communications
   4096 code transponder
   Altitude encoding equipment
   VOR } or RNAV
   DME }

TABLE 8. ENGINE TYPE

		1	2	3	4	5	6	7	8	SUM
RECIPROCATING		25103	5622	68072	50258	141	43	2918	9530	161687
	ROW %	15.53	3.48	42.10	31.08	0.09	0.03	1.80	5.89	
	COLUMN %	94.20	81.13	99.11	98.26	89.81	76.79	97.99	76.60	95.66
TURBOPROP		26	4	60	424	5	1	16	1495	2029
	ROW %	1.28	0.20	2.96	20.90	0.25	0.05	0.79	73.58	
	COLUMN %	0.10	0.06	0.09	0.83	3.18	1.79	0.54	12.00	1.20
TURBOSHAFT		38	224	502	365	1	4	42	31	1207
	ROW %	3.15	18.56	41.59	30.24	0.08	0.33	3.48	2.57	
	COLUMN %	0.14	3.23	0.73	0.71	0.64	7.14	1.41	0.25	0.71
TURBOJET		61	11	19	98	4	1	2	1387	1583
	ROW %	3.85	0.69	1.20	6.19	0.25	0.06	0.13	87.62	
	COLUMN %	0.23	0.16	0.03	0.19	2.55	1.79	0.07	11.15	0.94
TURBINE AIR GEN.		0	0	0	0	0	0	0	0	0
	ROW %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	COLUMN %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RAMJET		2	0	0	0	0	0	0	0	2
	ROW %	100.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	COLUMN %	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00

TABLE 8. CONTINUED

GROUP		1	2	3	4	5	6	7	8	
NO ENGINE		1399	1069	32	5	6	7	0	1	2519
	ROW %	55.54	42.44	1.27	0.20	0.24	0.28	0.0	0.04	
	COLUMN %	5.25	15.43	0.05	0.01	3.82	12.50	0.0	0.01	1.49
NOT REPORTED		3	0	0	0	0	0	0	0	3
	ROW %	100.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	COLUMN %	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
TOTALS		26632	6930	68685	51150	157	56	2978	12442	169030
	ROW %	15.76	4.10	40.63	30.26	0.09	0.03	1.76	7.36	

KEY

GROUP

1. No regulatory avionics
2. Two-way communications
3. Two-way communications
   VOR or ADF or RNAV

GROUP

4. Two-way communications
   4096 code transponder
   VOR or RNAV
5. 4096 code transponder
   Altitude encoding equipment
6. Two-way communications
   4096 code transponder
   Altitude encoding equipment

GROUP

7. Two-way communications
   4096 code transponder
   Altitude encoding equipment
   VOR
8. Two-way communications
   4096 code transponder
   Altitude encoding equipment
   VOR } or RNAV
   DME }

TABLE 9. NUMBER OF ENGINES

		1	2	3	4	5	6	7	8	SUM
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	37	[illegible]	[illegible]	143175
	[illegible] %	17.31	[illegible]	46.29	28.17	0.08	[illegible]	1.77	2.32	
	[illegible] %	[illegible]	[illegible]	[illegible]	78.92	[illegible]	66.07	85.29	26.66	84.70
[illegible]		428	104	2269	[illegible]	42	11	430	[illegible]	22830
	[illegible] %	1.87	[illegible]	9.94	[illegible]	0.18	[illegible]	1.68	58.97	
	[illegible] %	[illegible]	[illegible]	[illegible]	[illegible]	26.75	[illegible]	14.44	71.51	13.51
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	0	[illegible]	0	9	22
	[illegible] %	[illegible]	9.09	22.73	9.09	0.0	0.0	0.0	40.91	
	[illegible] %	[illegible]	0.03	[illegible]	[illegible]	0.0	0.0	0.0	0.07	0.01
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	0	1	8	218	[illegible]
	[illegible] %	4.13	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.65	[illegible]	
	[illegible] %	[illegible]	0.03	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.75	[illegible]
[illegible]		0	0	0	0	0	0	0	0	0
	[illegible] %	[illegible]	[illegible]	[illegible]	[illegible]	0.0	[illegible]	0.0	[illegible]	
	[illegible] %	[illegible]	0.0	0.0	[illegible]	0.0	[illegible]	0.0	[illegible]	0.0
[illegible]		[illegible]	[illegible]	32	5	6	7	0	1	[illegible]
	[illegible] %	[illegible]	[illegible]	1.27	0.20	[illegible]	0.28	0.0	0.04	
	[illegible] %	[illegible]	[illegible]	0.05	[illegible]	[illegible]	12.50	0.0	0.01	1.49
TOTALS		[illegible]	[illegible]	[illegible]	51150	157	56	2978	12442	169050?
	[illegible] %	15.76	[illegible]	40.63	[illegible]	0.09	0.03	1.76	7.36	

KEY

GROUP

1. No regulatory avionics
2. Two-way communications
3. Two-way communications
VOR or RNAV or ADF

GROUP

4. Two-way communications
4096 code transponder
VOR or RNAV
5. 4096 code transponder
Altitude encoding equipment
6. Two-way communications
4096 code transponder
Altitude encoding equipment

GROUP

7. Two-way communications
4096 code transponder
Altitude encoding equipment
VOR
8. Two-way communications
4096 code transponder
Altitude encoding equipment
VOR } or RNAV
DME }

TABLE 10. NUMBER OF SEATS

		1	2	3	4	5	6	7	8	SUM
1 SEAT		6150	1589	817	105	16	6	7	10	8700
	ROW %	70,69	18,26	9,39	1,21	0,18	0,07	0,08	0,11	
	COLUMN %	23,09	22,93	1,19	0,21	10,19	10,71	0,24	0,08	5,15
2 SEATS		13774	2414	26433	3874	38	8	201	98	46840
	ROW %	29,41	5,15	56,43	8,27	0,08	0,02	0,43	0,21	
	COLUMN %	51,72	34,83	38,48	7,57	24,20	14,29	6,75	0,79	27,71
3 SEATS		3687	1455	3244	185	7	14	21	8	8621
	ROW %	42,77	16,88	37,63	2,15	0,08	0,16	0,24	0,09	
	COLUMN %	13,84	21,00	4,72	0,36	4,46	25,00	0,71	0,06	5,10
4 SEATS		2065	1088	32342	30616	48	13	1941	2330	70443
	ROW %	2,93	1,54	45,91	43,46	0,07	0,02	2,76	3,31	
	COLUMN %	7,75	15,70	47,09	59,86	30,57	23,21	65,18	18,73	41,67
5 SEATS		320	146	2462	3824	5	0	265	654	7676
	ROW %	4,17	1,90	32,07	49,82	0,07	0,0	3,45	8,52	
	COLUMN %	1,20	2,11	3,58	7,48	3,18	0,0	8,90	5,26	4,54
6 SEATS		246	82	2223	9471	29	9	411	4726	17197
	ROW %	1,43	0,48	12,93	55,07	0,17	0,05	2,39	27,48	
	COLUMN %	0,92	1,18	3,24	18,52	18,47	16,07	13,80	37,98	10,17

TABLE 10. CONTINUED

GROUP		1	2	3	4	5	6	7	8	
7 - 11 SEATS		224	74	649	2395	12	3	99	3491	6947
	ROW %	3.22	1.07	9.34	34.48	0.17	0.04	1.43	50.25	
	COLUMN %	0.84	1.07	0.94	4.68	7.64	5.36	3.32	28.06	4.11
12 - 19 SEATS		97	62	166	223	1	1	12	415	977
	ROW %	9.93	6.35	16.99	22.82	0.10	0.10	1.23	42.48	
	COLUMN %	0.36	0.89	0.24	0.44	0.64	1.79	0.40	3.34	0.58
20 - 49 SEATS		41	16	228	314	1	1	15	483	1099
	ROW %	3.73	1.46	20.75	28.57	0.09	0.09	1.36	43.95	
	COLUMN %	0.15	0.23	0.33	0.61	0.64	1.79	0.50	3.68	0.65
50 - UP SEATS		19	4	121	143	0	1	6	227	521
	ROW %	3.65	0.77	23.22	27.45	0.0	0.19	1.15	43.57	
	COLUMN %	0.07	0.06	0.18	0.28	0.0	1.79	0.20	1.82	0.31
NOT REPORTED		9	0	0	0	0	0	0	0	9
	ROW %	100.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	COLUMN %	0.03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.01
TOTALS		26632	6930	68685	51150	157	56	2978	12442	169030
	ROW %	15.76	4.10	40.63	30.26	0.09	0.03	1.76	7.36	

KEY

GROUP
1. No regulatory avionics
2. Two-way communications
3. Two-way communications
   VOR or ADF or RNAV

GROUP
4. Two-way communications
   4096 code transponder
   VOR or RNAV
5. 4096 code transponder
   Altitude encoding equipment
6. Two-way communications
   4096 code transponder
   Altitude encoding equipment

GROUP
7. Two-way communications
   4096 code transponder
   Altitude encoding equipment
   VOR
8. Two-way communications
   4096 code transponder
   Altitude encoding equipment
   VOR } or RNAV
   DME }

TABLE 11. PRIMARY USE

		L	L G	L M	LMG	RNAV	WRAD	T,P	I,W	ALL	N G	CNT
EXECUTIVE		207	21	184	5432	1471	3629	284	2463	1153	374	6235
	ROW %	3.32	0.34	2.95	87.11	23.59	58.19	4.55	39.50	18.49	6.00	
	COLUMN %	1.10	2.55	0.81	12.25	13.50	47.34	7.97	46.07	52.77	0.47	3.69
BUSINESS		1796	160	4407	11752	2571	1030	1339	674	336	6249	24839
	ROW %	7.23	0.64	17.74	47.31	10.35	4.15	5.39	2.71	1.35	25.16	
	COLUMN %	9.58	19.42	19.49	26.50	23.60	13.44	37.56	12.61	15.38	7.38	14.70
PERSONAL		6916	280	10023	9128	5186	218	764	118	59	28864	55566
	ROW %	12.20	0.49	17.69	16.11	5.62	0.38	1.35	0.21	0.10	50.94	
	COLUMN %	36.89	33.98	44.33	20.58	29.25	2.84	21.43	2.21	2.70	36.41	33.52
AERIAL APPLICATION		119	5	47	121	45	21	8	19	2	3273	3596
	ROW %	3.31	0.14	1.31	3.36	1.25	0.58	0.22	0.53	0.06	91.02	
	COLUMN %	0.63	0.61	0.21	0.27	0.41	0.27	0.22	0.36	0.09	4.13	2.13
INSTRUCTION		2441	32	888	1839	257	32	66	22	9	3654	8953
	ROW %	27.26	0.36	9.92	20.54	2.87	0.36	0.74	0.25	0.10	40.81	
	COLUMN %	13.02	3.88	3.93	4.15	2.36	0.42	1.85	0.41	0.41	4.61	5.30
AIR TAXI		286	24	343	2906	365	702	200	565	135	871	4447
	ROW %	6.43	0.54	7.71	65.35	8.21	15.79	4.50	12.71	3.04	19.59	
	COLUMN %	1.53	2.91	1.52	6.55	3.35	9.16	5.61	10.57	6.18	1.10	2.63

TABLE 11. CONTINUED

GROUP		L	LG	LM	LMG	RNAV	WRAD	I,R	I,W	ALL	NG	
INDUSTRIAL/SPECIAL		327	18	145	379	52	35	17	25	6	909	1793
	ROW %	18.24	1.00	8.09	21.14	2.90	1.95	0.95	1.39	0.33	50.70	
	COLUMN %	1.74	2.18	0.64	0.85	0.48	0.46	0.48	0.47	0.27	1.15	1.06
AIRCRAFT RENTAL BUS.		1016	35	790	1729	177	63	77	37	26	1696	5309
	ROW %	19.14	0.66	14.88	32.57	3.33	1.19	1.45	0.70	0.49	31.95	
	COLUMN %	5.42	4.25	3.49	3.90	1.62	0.82	2.16	0.69	1.19	2.14	3.14
OTHER		300	14	173	660	132	220	41	153	65	1346	2531
	ROW %	11.85	0.55	6.84	26.07	5.22	8.69	1.62	6.05	2.57	53.18	
	COLUMN %	1.60	1.70	0.77	1.53	1.21	2.87	1.15	2.86	2.97	1.70	1.50
IMPUTED/NOT REPORTED		5342	235	5610	10379	2638	1716	769	1270	394	32040	54660
	ROW %	9.77	0.43	10.26	18.99	4.83	3.14	1.41	2.32	0.72	58.62	
	COLUMN %	28.49	28.52	24.81	23.41	24.22	22.38	21.57	23.76	18.03	40.42	32.34
TOTALS		18750	824	22610	44345	10894	7666	3565	5346	2185	79276	169030
	ROW %	11.09	0.49	13.38	26.23	6.45	4.54	2.11	3.16	1.29	46.90	

KEY

GROUP
L: Localizer

M: Marker beacon

G: Glide slope

R, RNAV: Area navigation system

GROUP
W, WRAD: Weather radar

I, LMG: Complete ILS system

ALL: I, R, and W

NG: Non-grouped aircraft

TABLE 12. BASE AIRPORT REGION

	L	L G	L M	LMG	RNAV	WRAD	I,R	I,W	ALL	N G	CNT
NEW ENGLAND	726	26	874	1585	311	181	102	124	52	2905	6208
ROW %	11.69	0.42	14.08	25.53	5.01	2.92	1.64	2.00	0.84	46.79	
COLUMN %	3.87	3.16	3.87	3.57	2.85	2.36	2.86	2.32	2.38	3.66	3.67
EASTERN	2505	97	3762	6175	1444	1214	456	856	338	6945	21823
ROW %	11.48	0.44	17.24	28.30	6.62	5.56	2.09	3.92	1.55	40.99	
COLUMN %	13.36	11.77	16.64	13.92	13.26	15.84	12.79	16.01	15.47	11.28	12.91
SOUTHERN	2877	142	3059	7471	1902	1690	655	1143	531	10607	24623
ROW %	11.68	0.58	12.42	30.34	7.72	6.86	2.66	4.64	2.16	43.08	
COLUMN %	15.34	17.23	13.53	16.85	17.46	22.05	18.37	21.38	24.30	13.39	14.57
GREAT LAKES	3730	133	4943	8083	2177	1637	651	1165	446	15061	32603
ROW %	11.44	0.41	15.16	24.79	6.68	5.02	2.00	3.57	1.37	46.20	
COLUMN %	19.89	16.14	21.86	18.23	19.98	21.35	18.26	21.79	20.41	19.00	19.29
CENTRAL	1310	61	1423	2881	790	497	262	324	160	5998	11919
ROW %	10.99	0.51	11.94	24.17	6.63	4.17	2.20	2.72	1.34	50.32	
COLUMN %	6.99	7.40	6.29	6.50	7.25	6.48	7.35	6.06	7.32	7.57	7.05
ROCKY MOUNTAINS	950	42	882	1806	535	223	151	150	66	4780	8685
ROW %	10.94	0.48	10.16	20.79	6.16	2.57	1.74	1.73	0.76	55.04	
COLUMN %	5.07	5.10	3.90	4.07	4.91	2.91	4.24	2.81	3.02	6.03	5.14

TABLE 12. CONTINUED

		L	LG	LM	LMG	RNAV	WRAD	I,R	I,W	ALL	NG	
NORTHWESTERN		1033	40	1249	2068	470	156	149	117	27	5099	9685
	ROW %	10.67	0.41	12.90	21.35	4.85	1.61	1.54	1.21	0.28	52.65	
	COLUMN %	5.51	4.85	5.52	4.66	4.31	2.03	4.18	2.19	1.24	6.43	5.73
WESTERN		2711	107	3851	7217	1396	554	546	396	147	12179	26498
	ROW %	10.23	0.40	14.53	27.24	5.27	2.09	2.06	1.49	0.55	45.96	
	COLUMN %	14.46	12.99	17.03	16.27	12.81	7.23	15.32	7.41	6.73	15.36	15.68
SOUTHWESTERN		2351	144	2308	6485	1645	1426	553	1006	400	10674	22395
	ROW %	10.50	0.64	10.31	28.96	7.35	6.37	2.47	4.49	1.79	47.66	
	COLUMN %	12.54	17.48	10.21	14.62	15.10	18.60	15.51	18.82	18.31	13.46	13.25
PACIFIC		50	5	19	83	16	10	4	6	4	217	379
	ROW %	13.19	1.32	5.01	21.90	4.22	2.64	1.06	1.58	1.06	57.26	
	COLUMN %	0.27	0.61	0.08	0.19	0.15	0.13	0.11	0.11	0.18	0.27	0.22
ALASKAN		452	23	223	375	197	41	33	29	8	2758	3965
	ROW %	11.40	0.58	5.62	9.46	4.97	1.03	0.83	0.73	0.20	69.56	
	COLUMN %	2.41	2.79	0.99	0.85	1.81	0.53	0.93	0.54	0.37	3.48	2.35
FOREIGN		55	4	17	116	11	37	3	30	6	53	247
	ROW %	22.27	1.62	6.88	46.96	4.45	14.98	1.21	12.15	2.43	21.46	
	COLUMN %	0.29	0.49	0.08	0.26	0.10	0.48	0.08	0.56	0.27	0.07	0.15
TOTALS		18750	824	22610	44345	10894	7666	3565	5346	2185	79276	169030
	ROW %	11.09	0.49	13.38	26.23	6.45	4.54	2.11	3.16	1.29	46.90	

KEY

GROUP
- L: Localizer
- M: Marker beacon
- G: Glide slope
- R, RNAV: Area navigation system

GROUP
- W, WRAD: Weather radar
- I, LMG: Complete ILS system
- All: I, R, and W
- NG: Non-grouped aircraft

TABLE 13. HOURS FLOWN

	L	L G	L M	LMG	RNAV	WRAD	I,R	I,W	ALL	N G	CNT
1 - 49	2519	88	2334	2524	1178	264	210	170	78	15072	23183
ROW %	10.87	0.38	10.07	10.89	5.08	1.14	0.91	0.73	0.34	65.01	
COLUMN %	13.43	10.68	10.32	5.69	10.81	3.44	5.89	3.18	3.57	19.01	13.72
50 - 99	3009	123	4170	4475	1534	282	403	170	92	11927	24342
ROW %	12.36	0.51	17.13	18.38	6.30	1.16	1.66	0.70	0.38	49.00	
COLUMN %	16.05	14.93	18.44	10.09	14.08	3.68	11.30	3.18	4.21	15.04	[illegible]
100 - 149	2174	123	3600	5505	1324	404	518	276	113	6534	18319
ROW %	11.87	0.67	19.65	30.05	7.23	2.21	2.83	1.51	0.62	35.69	
COLUMN %	11.59	14.93	15.92	12.41	12.15	5.27	14.53	5.16	5.17	8.25	10.84
150 - 199	1044	62	2114	4036	826	385	379	257	118	3029	10441
ROW %	10.00	0.59	20.25	38.66	7.91	3.69	3.63	2.46	1.13	29.01	
COLUMN %	5.57	7.52	9.35	9.10	7.58	5.02	10.63	4.81	5.40	3.82	6.18
200 - 249	856	53	1537	3884	799	509	383	340	164	2303	8747
ROW %	9.79	0.61	17.57	44.40	9.13	5.82	4.38	3.89	1.87	26.33	
COLUMN %	4.57	6.43	6.80	8.76	7.33	6.64	10.74	6.36	7.51	2.91	5.17
250 - 299	493	24	790	2306	448	451	218	322	127	1350	5089
ROW %	9.69	0.47	15.52	46.92	8.80	8.86	4.28	6.33	2.50	26.53	
COLUMN %	2.63	2.91	3.49	5.39	4.11	5.88	6.12	6.02	5.81	1.70	3.01

TABLE 13. CONTINUED

GROUP		L	LG	LM	LMG	RNAV	WRAD	I,R	I,W	ALL	NG	
300 - 349		423	20	657	2437	489	585	197	396	187	1392	5080
	ROW %	10.36	0.39	12.93	47.97	9.63	11.52	3.88	7.80	3.68	27.40	
	COLUMN %	2.79	2.43	2.91	5.50	4.49	7.63	5.53	7.41	8.56	1.76	3.01
350 - 399		334	24	364	1534	313	486	103	329	156	766	3047
	ROW %	10.96	0.79	11.95	50.34	10.27	15.95	3.38	10.80	5.12	25.14	
	COLUMN %	1.78	2.91	1.61	3.46	2.87	6.34	2.89	6.15	7.14	0.97	1.80
400 - 449		397	14	310	1554	291	501	92	341	158	840	3140
	ROW %	12.64	0.45	9.87	49.49	9.27	15.96	2.93	10.86	5.03	26.75	
	COLUMN %	2.12	1.70	1.37	3.50	2.67	6.54	2.58	6.38	7.23	1.06	1.86
450 - UP		2059	58	1124	5629	1054	2083	293	1475	598	4019	12982
	ROW %	15.86	0.45	8.66	43.36	8.12	16.05	2.26	11.36	4.61	30.96	
	COLUMN %	10.98	7.04	4.97	12.69	9.68	27.17	8.22	27.59	27.37	5.07	7.68
NOT FLOWN		714	42	420	798	341	191	50	135	44	12186	14381
	ROW %	4.96	0.29	2.92	5.55	2.37	1.33	0.35	0.94	0.31	84.75	
	COLUMN %	3.81	5.10	1.86	1.80	3.13	2.49	1.40	2.53	2.01	15.37	8.51
IMPUTED HOURS		4628	193	5190	9561	2297	1525	719	1135	350	19852	40279
	ROW %	11.49	0.48	12.89	23.79	5.70	3.79	1.79	2.82	0.87	49.29	
	COLUMN %	24.68	23.42	22.95	21.01	21.08	19.89	20.17	21.23	16.02	25.04	23.83
TOTALS		18750	824	22610	44349	10894	7666	3565	5346	2185	79276	169030
	ROW %	11.09	0.49	13.38	26.23	6.45	4.54	2.11	3.16	1.29	46.90	

KEY

GROUP
- L: Localizer
- M: Marker beacon
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TABLE 14. AGE OF AIRCRAFT

	L	L G	L M	LMG	RNAV	WRAD	I,R	I,W	ALL	N G	CNT
0 - 4 YEARS	4239	131	2432	10789	2236	2101	927	1137	950	10424	28243
ROW %	15.01	0.46	8.61	38.20	7.92	7.44	3.28	4.03	3.36	36.91	
COLUMN %	22.61	15.90	10.76	24.33	20.53	27.41	26.00	21.27	43.48	13.15	16.71
5 - 10 YEARS	5502	219	8077	15476	3415	2775	1253	2157	581	16512	46691
ROW %	11.78	0.47	17.30	33.15	7.31	5.94	2.68	4.62	1.24	35.36	
COLUMN %	29.34	26.58	35.72	34.90	31.35	36.20	35.15	40.35	26.59	20.83	27.62
11 - 15 YEARS	2586	137	5152	7549	1787	750	598	570	150	9095	25069
ROW %	10.32	0.55	20.55	30.11	7.13	2.99	2.39	2.27	0.60	36.28	
COLUMN %	13.79	16.63	22.79	17.02	16.40	9.78	16.77	10.66	6.86	11.47	14.83
16 - 20 YEARS	2187	124	3663	4425	1383	439	351	330	93	8500	19487
ROW %	11.22	0.64	18.80	22.71	7.10	2.25	1.80	1.69	0.48	43.62	
COLUMN %	11.66	15.05	16.20	9.98	12.70	5.73	9.85	6.17	4.26	10.72	11.53
21 - 25 YEARS	1086	69	1282	1276	453	177	79	137	31	4651	8594
ROW %	12.64	0.80	14.92	14.85	5.27	2.06	0.92	1.59	0.36	54.12	
COLUMN %	5.79	8.37	5.67	2.88	4.16	2.31	2.22	2.56	1.42	5.87	5.08
26 - 30 YEARS	1972	55	1278	887	759	130	61	99	23	18576	23329
ROW %	8.45	0.24	5.48	3.80	3.25	0.56	0.26	0.42	0.10	79.63	
COLUMN %	10.52	6.67	5.65	2.00	6.97	1.70	1.71	1.85	1.05	23.43	13.80

TABLE 14. CONTINUED

GROUP		L	LG	LM	LMG	RNAV	WRAD	I,R	I,W	ALL	NG	
31 - 35 YEARS		215	25	86	580	124	217	22	176	35	4917	5884
	ROW %	3.65	0.42	1.46	9.86	2.11	3.69	0.37	2.99	0.59	83.57	
	COLUMN %	1.15	3.03	0.38	1.31	1.14	2.83	0.62	3.29	1.60	6.20	3.46
OVER 35 YEARS		49	0	19	84	20	18	4	16	2	1635	1801
	ROW %	2.72	0.0	1.05	4.66	1.11	1.00	0.22	0.89	0.11	90.78	
	COLUMN %	0.26	0.0	0.08	0.19	0.18	0.23	0.11	0.30	0.09	2.06	1.07
NOT REPORTED		914	64	621	3279	717	1059	270	724	320	4966	9932
	ROW %	9.20	0.64	6.25	33.01	7.22	10.66	2.72	7.29	3.22	50.00	
	COLUMN %	4.87	7.77	2.75	7.39	6.58	13.81	7.57	13.54	14.65	6.26	5.68
TOTALS		18750	824	22610	44345	10894	7666	3565	5346	2185	79276	169050
	ROW %	11.09	0.49	13.38	26.23	6.45	4.54	2.11	3.16	1.29	46.90	

KEY

GROUP
L: Localizer

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GROUP
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ALL: I, R and W

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TABLE 15. COMPUTED AIRCRAFT TYPE

		L	L G	L M	LMG	RNAV	WRAD	I,R	I,W	ALL	N G	CNT
TYPE 1		8248	131	2767	1295	1670	34	57	7	5	45301	59005
	ROW %	13.98	0.22	4.69	2.19	2.83	0.06	0.10	0.01	0.01	76.77	
	COLUMN %	43.99	15.90	12.24	2.92	15.33	0.44	[illegible]	0.13	0.23	57.14	[illegible]
TYPE 2		9922	586	18919	21881	5206	145	1829	40	32	26603	79748
	ROW %	12.44	0.73	23.72	27.44	6.53	0.18	2.29	0.05	0.04	33.36	
	COLUMN %	52.92	71.12	83.68	49.34	47.79	1.89	51.30	0.75	1.46	35.56	47.18
TYPE 3		148	58	831	12350	1920	1536	1329	1038	491	516	13939
	ROW %	1.06	0.42	5.96	88.60	13.77	11.02	9.53	7.45	3.52	3.70	
	COLUMN %	0.79	7.04	3.68	27.85	17.62	20.04	37.28	19.42	22.47	0.65	8.25
TYPE 4		89	20	45	5085	983	2574	288	1879	685	327	5579
	ROW %	1.60	0.36	0.81	91.15	17.62	46.14	5.16	33.68	12.28	5.86	
	COLUMN %	0.47	2.43	0.20	11.47	9.02	33.58	8.08	35.15	31.35	0.41	3.30
TYPE 5		6	1	1	209	39	159	2	122	36	61	280
	ROW %	2.14	0.36	0.36	74.64	13.93	56.79	0.71	43.57	12.86	21.79	
	COLUMN %	0.03	0.12	0.00	0.47	0.36	2.07	0.06	2.28	1.65	0.08	0.17
TYPE 6		1	1	3	1360	441	1323	8	890	430	18	1383
	ROW %	0.07	0.07	0.22	98.34	31.89	95.66	0.58	64.35	31.09	1.30	
	COLUMN %	0.01	0.12	0.01	3.07	4.05	17.26	0.22	16.65	19.68	0.02	0.82

TABLE 15. CONTINUED

GROUP		L	LG	LM	LMG	RNAV	WRAD	I,R	I,W	ALL	NG	
TYPE 7		0	0	0	525	86	386	25	324	61	3	529
	ROW %	0.0	0.0	0.0	99.24	16.26	72.97	4.73	61.25	11.53	0.57	
	COLUMN %	0.0	0.0	0.0	1.18	0.79	5.04	0.70	6.06	2.79	0.00	0.31
TYPE 8		30	8	4	109	13	60	3	49	10	67	219
	ROW %	13.70	3.65	1.83	49.77	5.94	27.40	1.37	22.37	4.57	30.59	
	COLUMN %	0.16	0.97	0.02	0.25	0.12	0.78	0.08	0.92	0.46	0.08	0.13
TYPE 9		0	2	0	1306	360	1279	0	917	359	7	1316
	ROW %	0.0	0.15	0.0	99.24	27.36	97.19	0.0	69.68	27.28	0.53	
	COLUMN %	0.0	0.24	0.0	2.95	3.30	16.69	0.0	17.15	16.43	0.01	0.78
TYPE 10		0	0	0	157	74	155	0	78	74	1	161
	ROW %	0.0	0.0	0.0	97.52	45.96	96.27	0.0	48.45	45.96	0.62	
	COLUMN %	0.0	0.0	0.0	0.35	0.68	2.02	0.0	1.46	3.39	0.00	0.10
TYPE 11		69	4	5	9	25	4	0	2	1	2982	3091
	ROW %	2.23	0.13	0.16	0.29	0.81	0.13	0.0	0.06	0.03	96.47	
	COLUMN %	0.37	0.49	0.02	0.02	0.23	0.05	0.0	0.04	0.05	3.76	1.83
TYPE 12		229	13	32	57	64	9	24	0	1	850	1214
	ROW %	18.86	1.07	2.64	4.70	5.27	0.74	1.98	0.0	0.08	70.02	
	COLUMN %	1.22	1.58	0.14	0.13	0.59	0.12	0.67	0.0	0.05	1.07	0.72
TYPE 13		8	0	3	2	13	2	0	0	0	2540	2566
	ROW %	0.31	0.0	0.12	0.08	0.51	0.08	0.0	0.0	0.0	98.99	
	COLUMN %	0.04	0.0	0.01	0.00	0.12	0.03	0.0	0.0	0.0	3.20	1.52
TOTALS		18750	824	22610	44345	10894	7666	3565	5346	2185	79276	169030
	ROW %	11.09	0.49	13.38	26.23	6.45	4.54	2.11	3.16	1.29	46.90	

KEY

GROUP
- L: Localizer
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GROUP
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- ALL: I, R and W
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TABLE 16. AIRCRAFT TYPE

		L	L G	L M	LMG	RNAV	WRAD	I,P	I,W	ALL	N G	CNT
GLIDER		8	0	0	1	7	0	0	0	0	2179	2195
	ROW %	0.36	0.0	0.0	0.05	0.32	0.0	0.0	0.0	0.0	99.27	
	COLUMN %	0.04	0.0	0.0	0.00	0.06	0.0	0.0	0.0	0.0	2.75	1.30
BALLOON		0	0	0	0	6	0	0	0	0	360	366
	ROW %	0.0	0.0	0.0	0.0	1.64	0.0	0.0	0.0	0.0	98.36	
	COLUMN %	0.0	0.0	0.0	0.0	0.06	0.0	0.0	0.0	0.0	0.45	0.22
BLIMP/DIRIGIBLE		0	0	3	1	0	2	0	0	0	1	5
	ROW %	0.0	0.0	60.00	20.00	0.0	40.00	0.0	0.0	0.0	20.00	
	COLUMN %	0.0	0.0	0.01	0.00	0.0	0.03	0.0	0.0	0.0	0.00	0.00
FIXED WING SINGLE		18200	725	21690	23220	6879	181	1889	48	37	71971	138907
	ROW %	13.10	0.52	15.61	16.72	4.95	0.13	1.36	0.03	0.03	51.81	
	COLUMN %	97.07	87.99	95.93	52.36	63.14	2.36	52.99	0.90	1.69	90.79	82.18
FIXED WING MULTIPLE		244	82	880	21057	3913	7470	1652	5296	2146	933	23252
	ROW %	1.05	0.35	3.78	90.56	16.83	32.13	7.10	22.78	9.23	4.01	
	COLUMN %	1.30	9.95	3.89	47.48	35.92	97.44	46.34	99.06	98.22	1.18	13.76
ROTORCRAFT		298	17	37	65	89	13	24	2	2	3832	4305
	ROW %	6.92	0.39	0.86	1.53	2.07	0.30	0.56	0.05	0.05	89.01	
	COLUMN %	1.59	2.06	0.16	0.15	0.82	0.17	0.67	0.04	0.09	4.83	2.55

TABLE 16. CONTINUED

GROUP	L	LG	LM	LMG	RNAV	WRAD	I,R	I,W	ALL	NG	
NOT REPORTED	0	0	0	0	0	0	0	0	0	0	0
ROW %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
COLUMN %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTALS	18750	824	22610	44345	10894	7666	3565	5346	2185	79276	169030
ROW %	11.09	0.49	13.38	26.23	6.45	4.54	2.11	3.16	1.29	46.90	

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- L: Localizer
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TABLE 17. ENGINE TYPE

	L	L G	L M	LMG	RNAV	RRAD	I,R	I,K	ALL	N G	CNT
RECIPROCATING	18483	800	22571	40830	9844	4454	3505	3088	1250	75829	161667
ROW %	11.43	0.49	13.96	25.25	6.09	2.75	2.17	1.91	0.77	46.90	
COLUMN %	98.58	97.09	99.83	92.07	90.36	58.10	98.32	57.76	57.21	95.65	95.66
TURBOPROP	26	2	7	1963	538	1767	34	1262	501	30	2029
ROW %	1.28	0.10	0.34	96.75	26.52	87.09	1.68	62.20	24.69	1.48	
COLUMN %	0.14	0.24	0.03	4.43	4.94	23.05	0.95	23.61	22.93	0.04	1.20
TURBOSHAFT	229	13	30	57	64	9	24	0	1	845	1207
ROW %	18.97	1.08	2.49	4.72	5.30	0.75	1.99	0.0	0.08	70.01	
COLUMN %	1.22	1.58	0.13	0.13	0.59	0.12	0.67	0.0	0.05	1.07	0.71
TURBOJET	5	9	2	1494	436	1436	2	996	433	68	1583
ROW %	0.32	0.57	0.13	94.38	27.54	90.71	0.13	62.92	27.35	4.30	
COLUMN %	0.03	1.09	0.01	3.37	4.00	18.73	0.06	18.63	19.82	0.09	0.94
TURBINE AIR GEN.	0	0	0	0	0	0	0	0	0	0	0
ROW %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
COLUMN %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RAMJET	0	0	0	0	0	0	0	0	0	2	2
ROW %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.00	
COLUMN %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00

TABLE 17. CONTINUED

GROUP	L	LG	LM	LMG	RNAV	WRAD	I,R	I,W	ALL	NG	
NO ENGINE	7	0	0	1	12	0	0	0	0	2499	2519
ROW %	0.28	0.0	0.0	0.04	0.48	0.0	0.0	0.0	0.0	99.21	
COLUMN %	0.04	0.0	0.0	0.00	0.11	0.0	0.0	0.0	0.0	3.15	1.49
NOT REPORTED	0	0	0	0	0	0	0	0	0	3	3
ROW %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.00	
COLUMN %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00
TOTALS	16750	824	22610	44345	10894	7666	3565	5346	2185	79276	169030
ROW %	11.09	0.49	13.38	26.23	6.45	4.54	2.11	3.16	1.29	46.90	

KEY

GROUP
- L: Localizer
- M: Marker beacon
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TABLE 19. NUMBER OF SEATS

	L	L G	L M	LMG	RNAV	WRAD	I,R	I,W	ALL	N G	CNT
1 SEAT	222	11	18	71	74	4	4	1	1	8309	8700
ROW %	2.55	0.13	0.21	0.82	0.85	0.05	0.05	0.01	0.01	95.51	
COLUMN %	1.18	1.33	0.08	0.16	0.68	0.05	0.11	0.02	0.05	10.48	5.15
2 SEATS	7452	118	2672	1259	1465	30	53	8	3	34258	46840
ROW %	15.91	0.25	5.70	2.69	3.13	0.06	0.11	0.02	0.01	73.14	
COLUMN %	39.74	14.32	11.82	2.84	13.45	0.39	1.49	0.15	0.14	43.21	27.71
3 SEATS	644	12	94	43	164	11	3	7	2	7688	8021
ROW %	7.47	0.14	1.09	0.50	1.90	0.13	0.03	0.08	0.02	89.18	
COLUMN %	3.43	1.46	0.42	0.10	1.51	0.14	0.08	0.13	0.09	9.70	5.10
4 SEATS	9094	499	16625	17444	4403	132	1368	39	25	25114	70443
ROW %	12.91	0.71	23.60	24.76	6.25	0.19	1.94	0.06	0.04	35.65	
COLUMN %	48.50	60.56	73.53	39.34	40.42	1.72	38.37	0.73	1.14	31.68	41.67
5 SEATS	574	68	1400	3756	551	69	311	44	21	1765	7676
ROW %	7.48	0.89	18.24	48.93	7.18	0.90	4.05	0.57	0.27	22.99	
COLUMN %	3.06	8.25	6.19	8.47	5.06	0.90	8.72	0.82	0.96	2.23	4.54
6 SEATS	606	84	1734	13314	2328	1742	1498	1154	576	1336	17197
ROW %	3.52	0.49	10.08	77.42	13.54	10.13	8.71	6.71	3.35	7.77	
COLUMN %	3.23	10.19	7.67	30.02	21.37	22.72	42.02	21.59	26.36	1.69	10.17

TABLE 19. CONTINUED

GROUP	L	LG	LM	LMG	RNAV	WRAD	I,R	I,W	ALL	NG	
7 - 11 SEATS	115	21	55	6313	1439	4152	261	2974	1164	434	6947
ROW %	1.66	0.30	0.76	90.87	20.71	59.77	3.76	42.81	16.76	6.25	4.11
COLUMN %	0.61	2.55	0.23	14.24	13.21	54.16	7.32	55.63	53.27	0.55	
12 - 19 SEATS	21	3	6	686	145	460	28	349	107	249	977
ROW %	2.15	0.31	0.61	70.21	14.84	47.08	2.87	35.72	10.95	25.49	0.58
COLUMN %	0.11	0.36	0.03	1.55	1.33	6.00	0.79	6.53	4.90	0.31	
20 - 49 SEATS	22	8	4	979	226	650	33	451	193	81	1099
ROW %	2.00	0.73	0.36	89.08	20.56	59.14	3.00	41.04	17.56	7.37	0.65
COLUMN %	0.12	0.97	0.02	2.21	2.07	8.48	0.93	8.44	8.83	0.10	
50 - UP SEATS	0	0	4	480	99	416	6	319	93	33	521
ROW %	0.0	0.0	0.77	92.13	19.00	79.85	1.15	61.23	17.85	6.33	0.31
COLUMN %	0.0	0.0	0.02	1.08	0.91	5.43	0.17	5.97	4.26	0.04	
NOT REPORTED	0	0	0	0	0	0	0	0	0	9	9
ROW %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.00	0.01
COLUMN %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.01	
TOTALS	18750	824	22610	44345	10894	7666	3565	5346	2185	79276	169030
ROW %	11.09	0.49	13.38	26.23	6.45	4.54	2.11	3.16	1.29	46.90	

KEY

GROUP
- L: Localizer
- M: Marker beacon
- G: Glide slope
- R, RNAV: Area navigation system

GROUP
- W, WRAD: Weather radar
- I, LMG: Complete ILS system
- ALL: I, R and W
- NG: Non-grouped aircraft

TABLE 20. SUBGROUPS OF HIERARCHICAL CAPABILITY GROUPS

CHARACTERISTICS				GROUPS					
Primary Use	Hours Flown	Age in Years	Computed Aircraft Type[1]	1	2	3	4	7	8
1.	Not Flown	0-25	1	1278 5.2%	209 3.1%				
2.	Not Flown	26+	1	3982 16.3%	276 4.1%				
3. Personal	1-100		1	5437 22.2%	1010 15.2%	8251 12.2%			
4. Personal	100-400		1		235 3.5%				
5.	100-400	26+	1	1013 4.1%					
6. Personal	100-400						9720 19.3%		1075 8.8%
7. Personal	1-100		2		180 2.7%	10310 15.2%	5328 10.6%		
8. Personal	1-100	0-10	13			345 5.2%			
9. Personal	1-100	0-10		1236 5.1%					
10. Aerial Application		0-10	1	1359 5.6%	134 2.1%				
11. Personal	100-400		2			4498 6.6%			
12.	1-100	11-25	2					198 6.7%	
13. Personal	100-400	0-10	2					307 10.4%	
14. Business		11-25	2			2786 4.1%	3192 6.3%		
15.	100-400	0-10	1			4429 6.5%			
16.	100-400	0-10	13		197 3.0%				
17.	100-400	11-25	2					385 13.1%	
18.	1-100	0-10	2					247 8.4%	
19. Business	100-400	0-10	2				3648 7.2%	285 9.7%	695 5.7%
20. Air Taxi		0-10							751 6.1%
21.		0-10	11		605 9.1%				
22. Business	100-400	0-10	3						889 7.2%
23. Executive	100-400	0-10	14						1115 9.1%
24.	400+	0-10				4262 6.3%	4499 8.9%	263 8.9%	
25. Executive	400+	0-10	14						1301 10.6%
			Counts	26632	6930	68685	51150	2978	12442
			Unuseable	2181	278	950	671	28	164
			% in Subgroups[2]	58.5	48.0	50.9	52.3	42.8	47.5

1. Type
   - 1 Fixed wing single engine piston 1-3 seats
   - 2 Fixed wing single engine piston 4+ seats
   - 3 Fixed wing 2 engine piston 1-6 seats
   - 11 Piston Rotorcraft
   - 13 Other
   - 15 Fixed wing 2 engine
2. % is based on the capability group count minus the number of unuseable aircraft.

TABLE 21. SUBGROUPS OF NON-HIERARCHICAL CAPABILITY GROUPS

CHARACTERISTICS					GROUPS								
	Primary Use	Hours Flown	Age in Years	Computed Aircraft Type[1]	NG	1	3	4	5	6	7	8	9
1.		Not Flown		1	7039 9.0%								
2.		Not Flown		2	2193 2.8%								
3.	Personal	1-100	26+	1	7190 9.2%								
4.	Personal	1-100	11-25								118 3.4%		
5.	Personal	1-100	11-25	2		1438 7.8%	2350 10.5%						
6.	Personal	1-100		2	7411 9.5%			2340 5.4%	1101 10.2%				
7.		1-100	0-10	1	4100 5.2%	1037 5.6%							
8.	Personal	100-400	11-25	2			2066 9.2%						
9.	Personal	100-400		2	3316 4.2%								
10.	Personal		0-10	2							330 3.4%		
11.	Business	100-400	11-25	2		1069 4.8%							
12.		100-400	0-10	1	4228 5.4%	1533 8.3%							
13.		100-400	11-25	2		1388 7.5%		3074 7.0%	837 7.8%		254 7.2%		
14.		1-100	0-10	2		932 5.0%	1844 8.2%						
15.		400+	0-10	1	2450 3.1%	1395 7.5%							
16.	Business	100-400	0-10	2							341 9.7%		
17.		100-400	0-10	2		1521 8.2%	4035 17.9%	6858 15.7%	1058 10.1%				
18.		100-400	11-25	3				2082 4.8%			202 5.7%		
19.		400+	0-10	2		604 3.3%	790 3.5%	2183 5.0%					
20.	Business		0-10	3							352 10.0%		
21.		100-400	0-10	3				3444 7.9%	657 6.1%	588 7.9%		378 7.3%	209 9.8%
22.		400+	0-10	3				1155 2.6%		326 4.4%		221 4.2%	105 4.9%
23.			0-10	4				1994 4.6%	537 5.0%	1272 17.0%	115 3.3%	845 16.2%	422 19.8%
24.			0-10	6				1103 2.5%	352 3.3%	1081 14.5%		732 14.0%	347 16.3%
				Counts	79276	18750	22610	44345	10894	7666	3565	5346	2185
				Unuseable	906	213	128	671	129	192	44	133	53
				% in Sub-Groups[2]	48.4	53.2	54.1	55.5	47.2	43.8	48.7	41.7	50.8

1. Type
   1 Fixed wing single engine piston 1-3 seats
   2 Fixed wing single engine piston 4+seats
   3 Fixed wing 2 engine piston 1-6 seats
   4 Fixed wing 2 engine piston 7+ seats
   6 Fixed wing 2 engine piston 1-12 seats

2. % is based on the capability group count minus the number of unuseable aircraft.

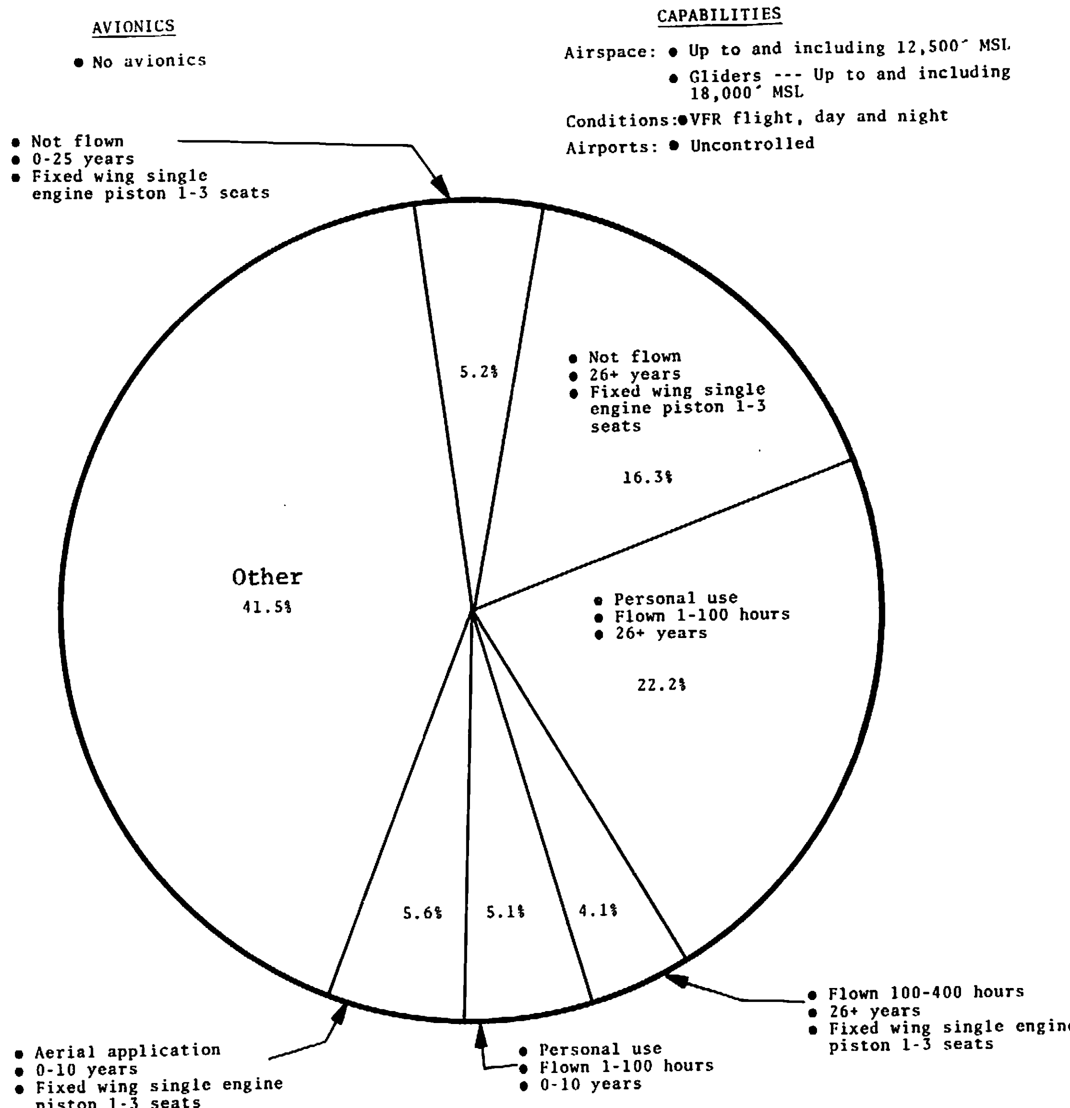


FIGURE 1. HIERARCHICAL CAPABILITY GROUP 1 (16 Percent)

AVIONICS

- Two-way communications

CAPABILITIES

Airspace:
- Up to and including 12,500´ MSL
- Gliders---Up to and including 18,000´ MSL

Conditions:
- VFR flight, day and night

Airports:
- Non-TCA controlled
- Helicopters with 4096 code transponders --- Group II TCA's
- All helicopters --- Groups I & II TCA's below 1000´ AGL

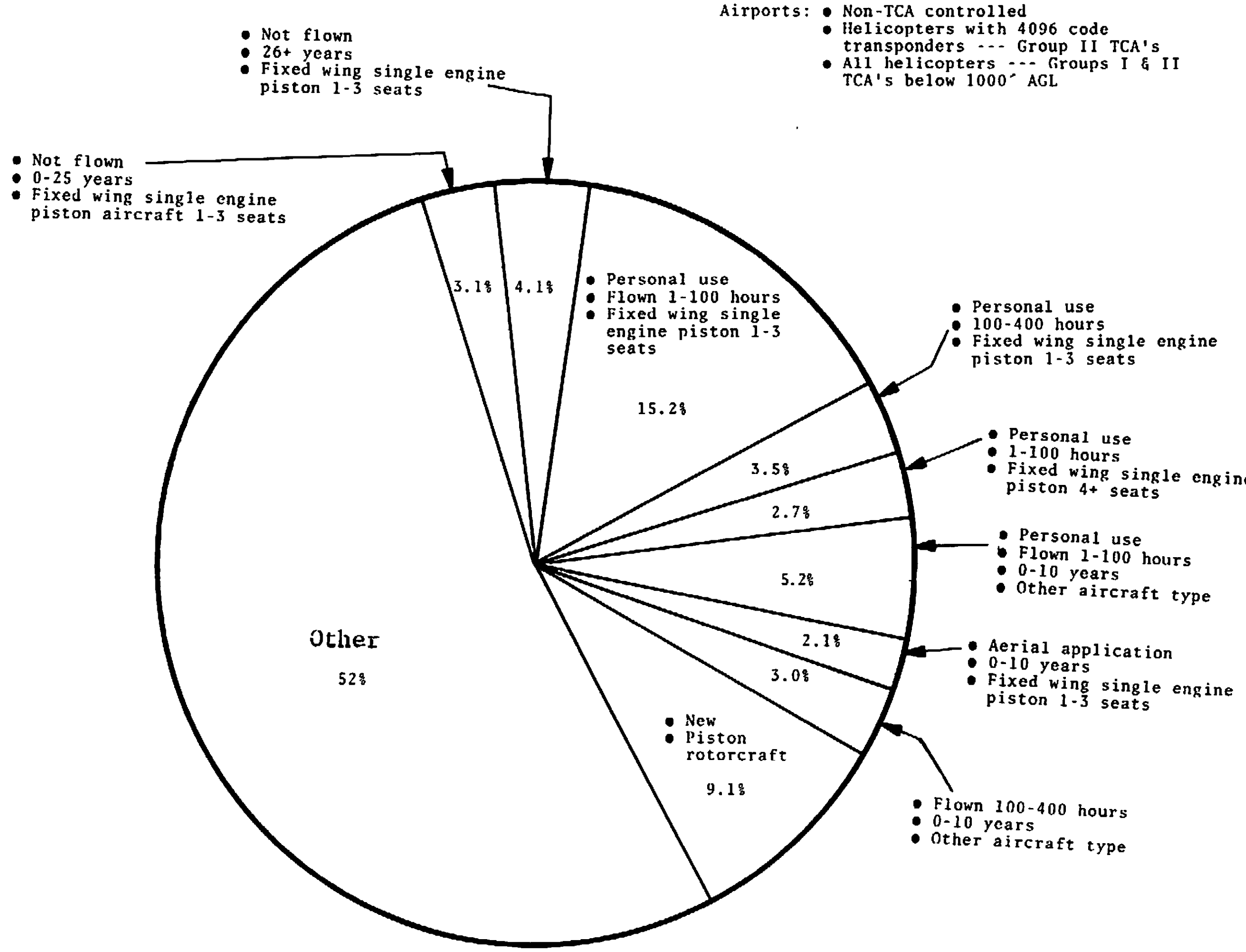


FIGURE 2. HIERARCHICAL CAPABILITY GROUP 2 (4 Percent)

AVIONICS

- Two-way communications
- VOR or ADF or RNAV

CAPABILITIES

Airspace:
- Up to and including 12,500' MSL
- Gliders---Up to and including 18,000' MSL
- ADF---Colored airways
- VOR or RNAV---VOR airways
- RNAV--Low altitude RNAV airways

Conditions:
- IFR flight

Airports:
- Non-TCA controlled
- Group III TCA's
- Helicopters with 4096 code transponders---Group II TCA's
- All Helicopters---Groups I and II TCA's below 1000' AGL

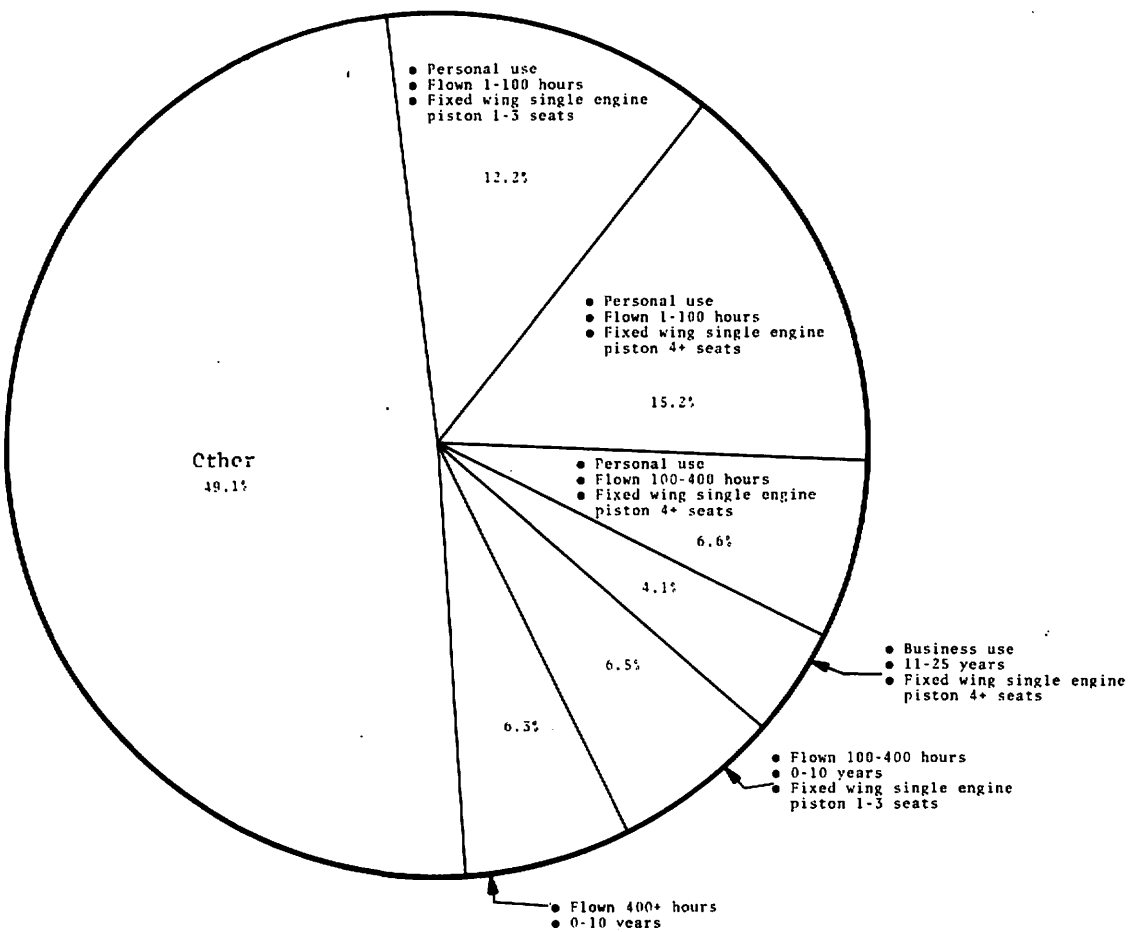


FIGURE 3. HERARCHICAL CAPABILITY GROUP 3 (41 Percent)

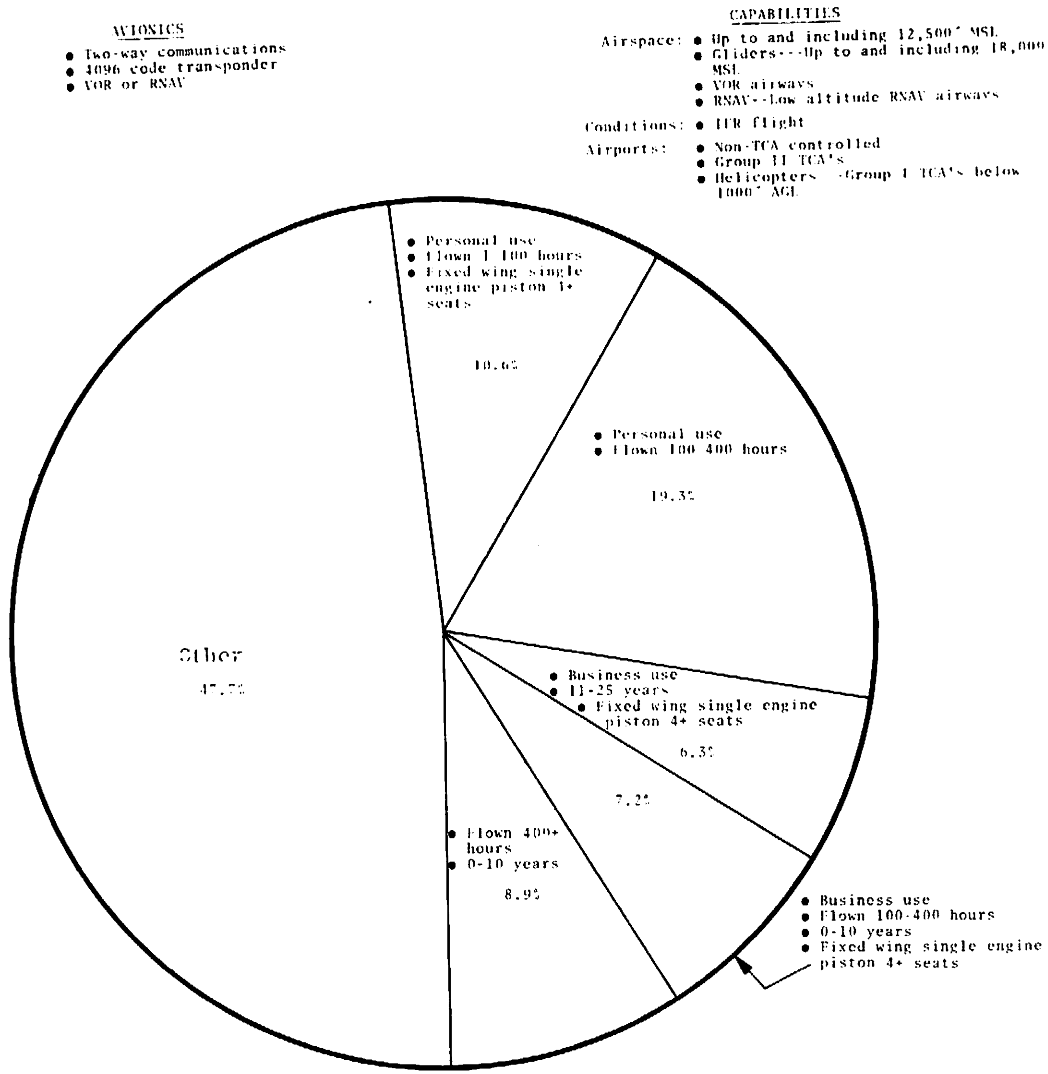


FIGURE 4. HIERARCHICAL CAPABILITY GROUP 4 (30 Percent)

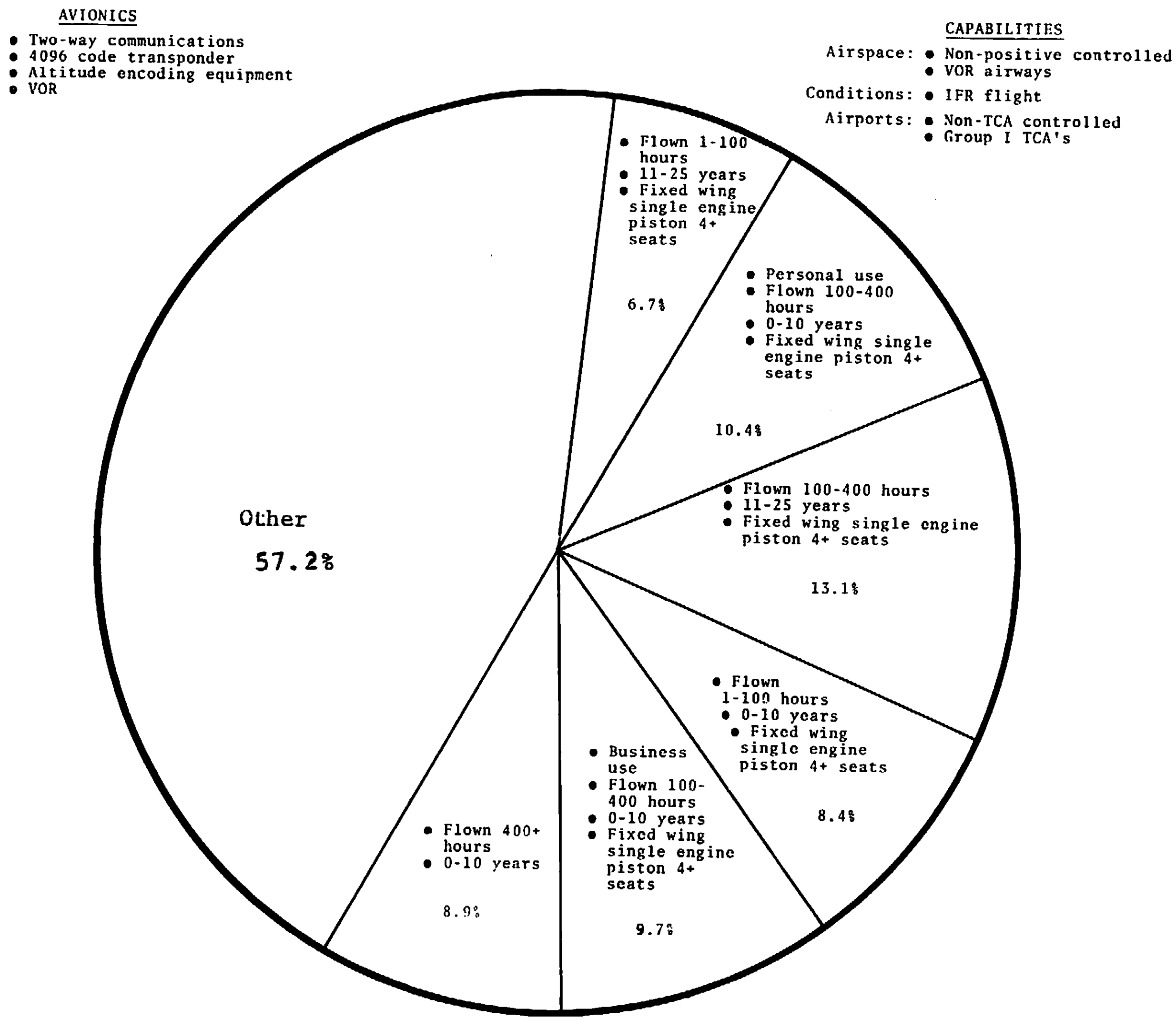


FIGURE 5. HIERARCHICAL CAPABILITY GROUP 7 (2 Percent)

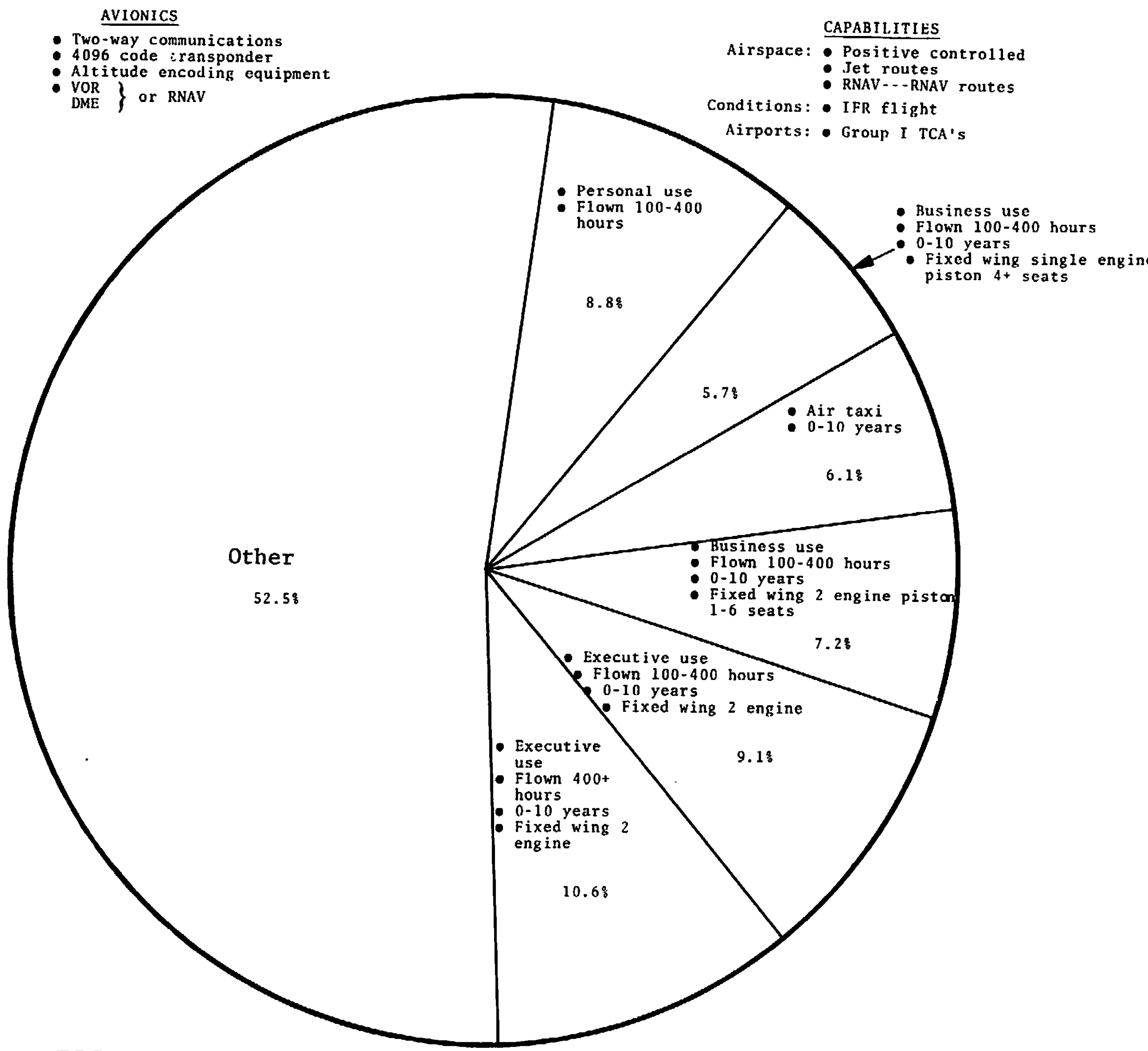


FIGURE 6. HIERARCHICAL CAPABILITY GROUP 8 (7 Percent)

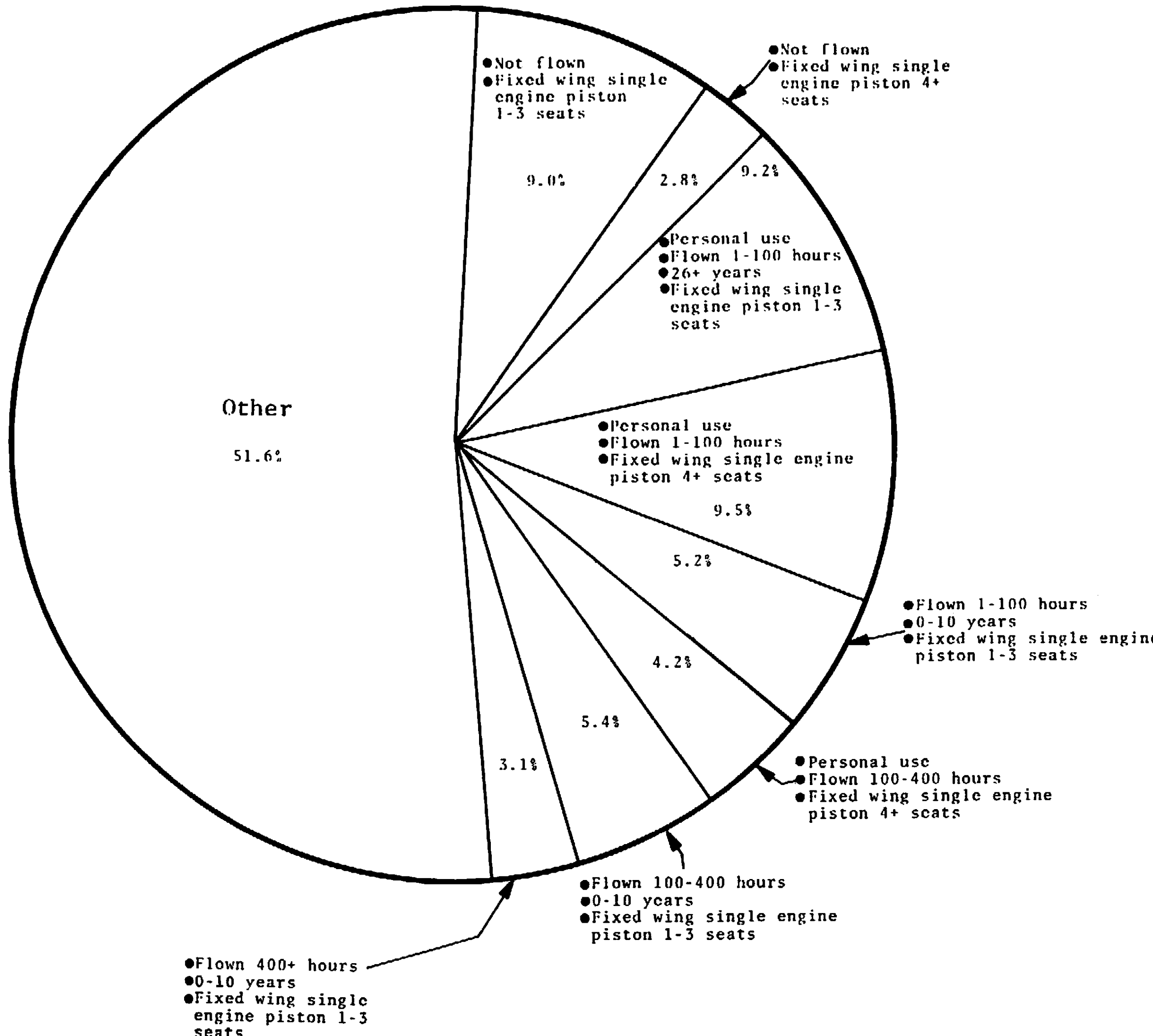


FIGURE 7. NON-HIERARCHICAL CAPABILITY GROUPS, NON-GROUPED AIRCRAFT (47 Percent)

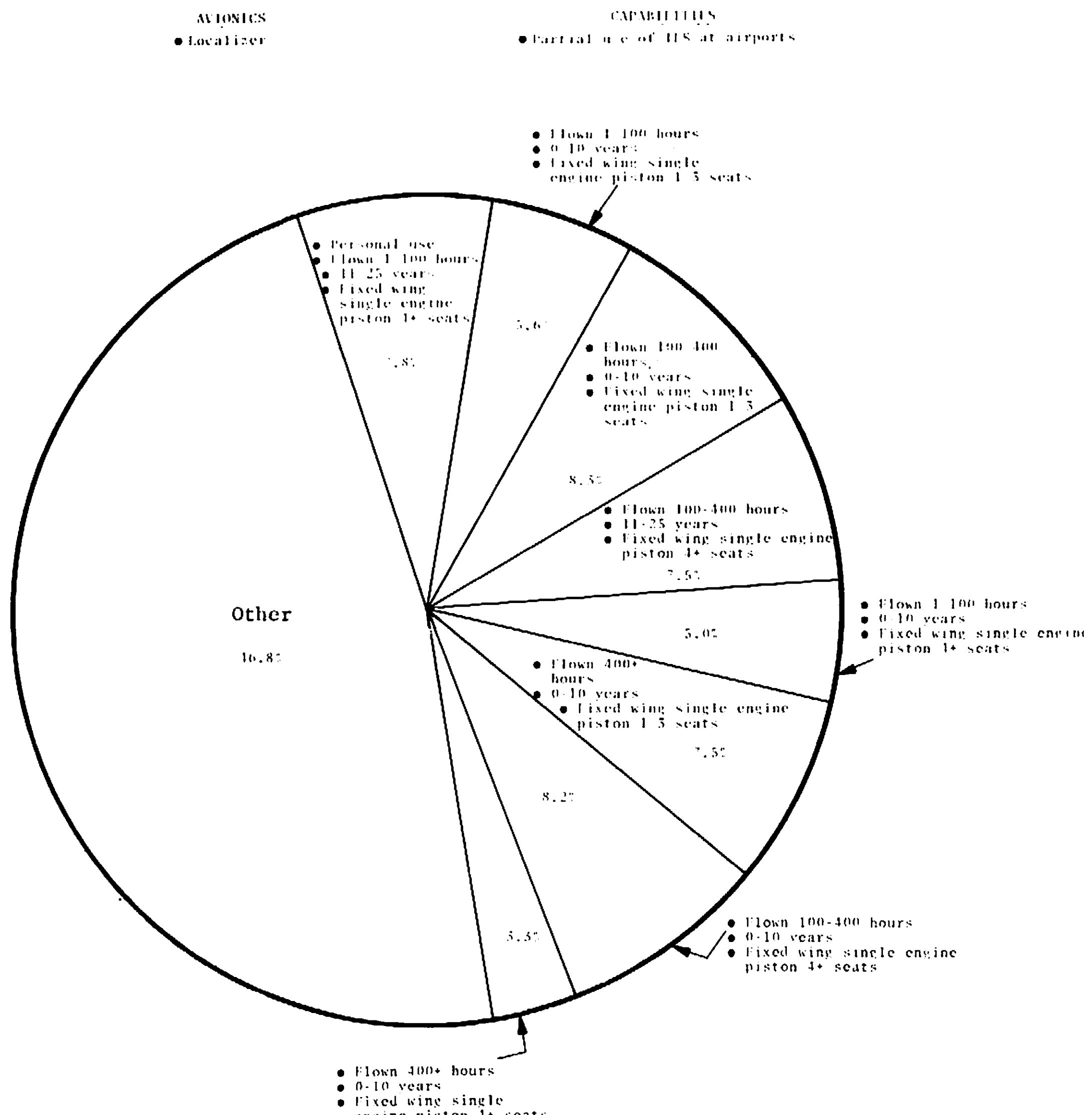


FIGURE 8. NON-HIERARCHICAL CAPABILITY GROUP 1 (11 Percent)

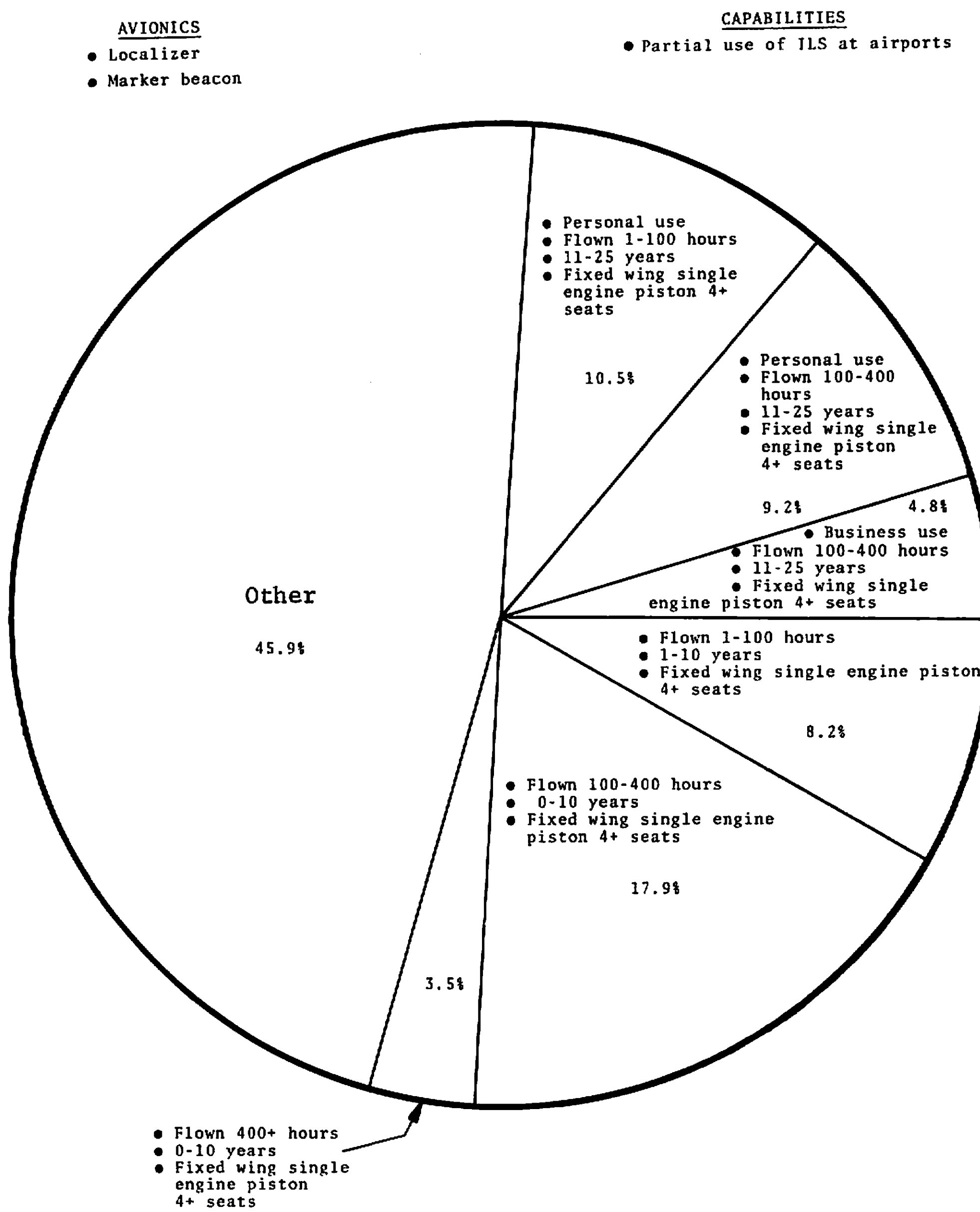


FIGURE 9. NON-HIERARCHICAL CAPABILITY GROUP 3 (13 Percent)

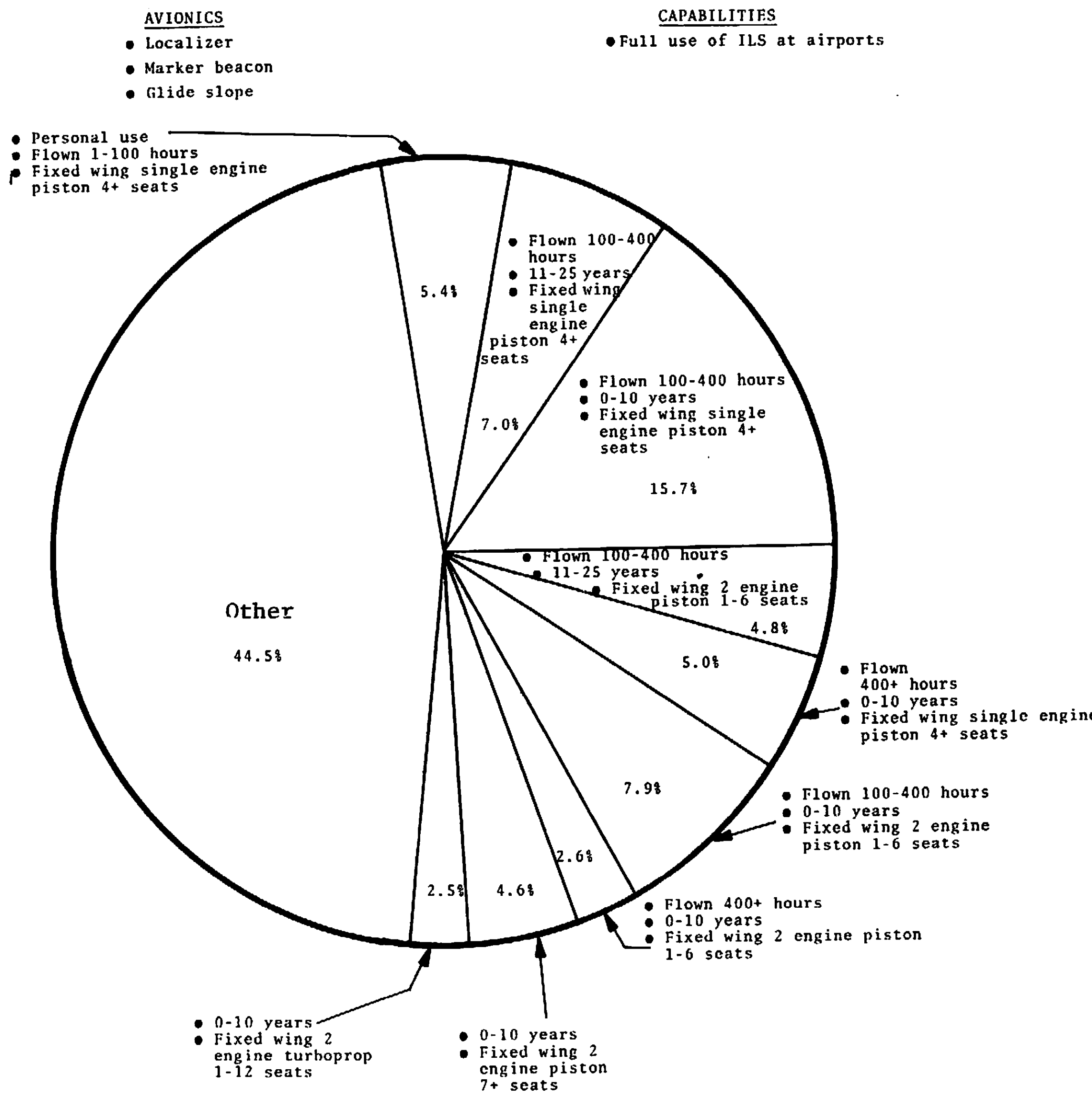


FIGURE 10. NON-HIERARCHICAL CAPABILITY GROUP 4 (26 Percent)

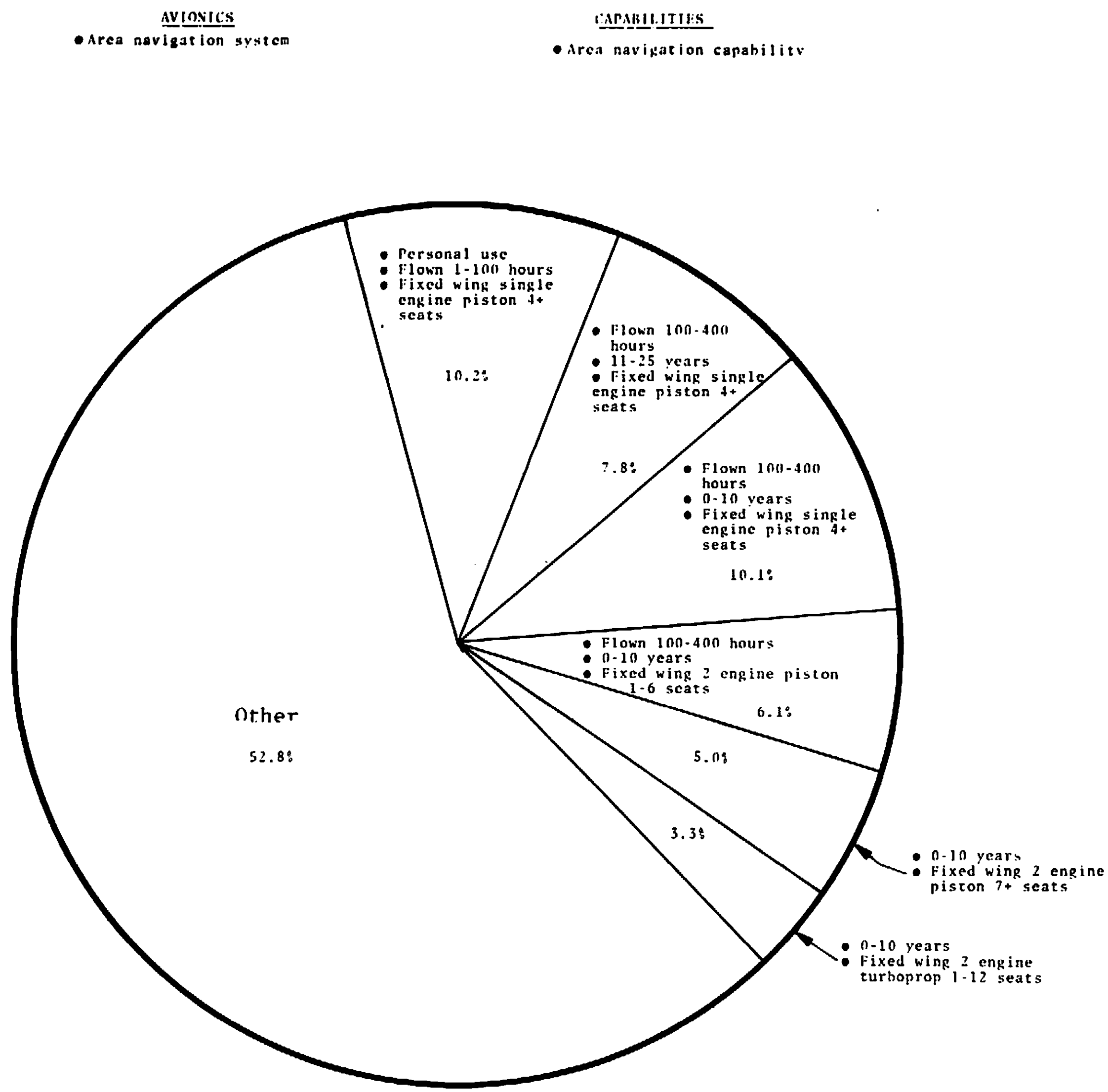


FIGURE 11. NON-HIERARCHICAL CAPABILITY GROUP 5 (6 Percent)

AVIONICS

- Weather radar

CAPABILITIES

- Detection of storms in aircraft's route

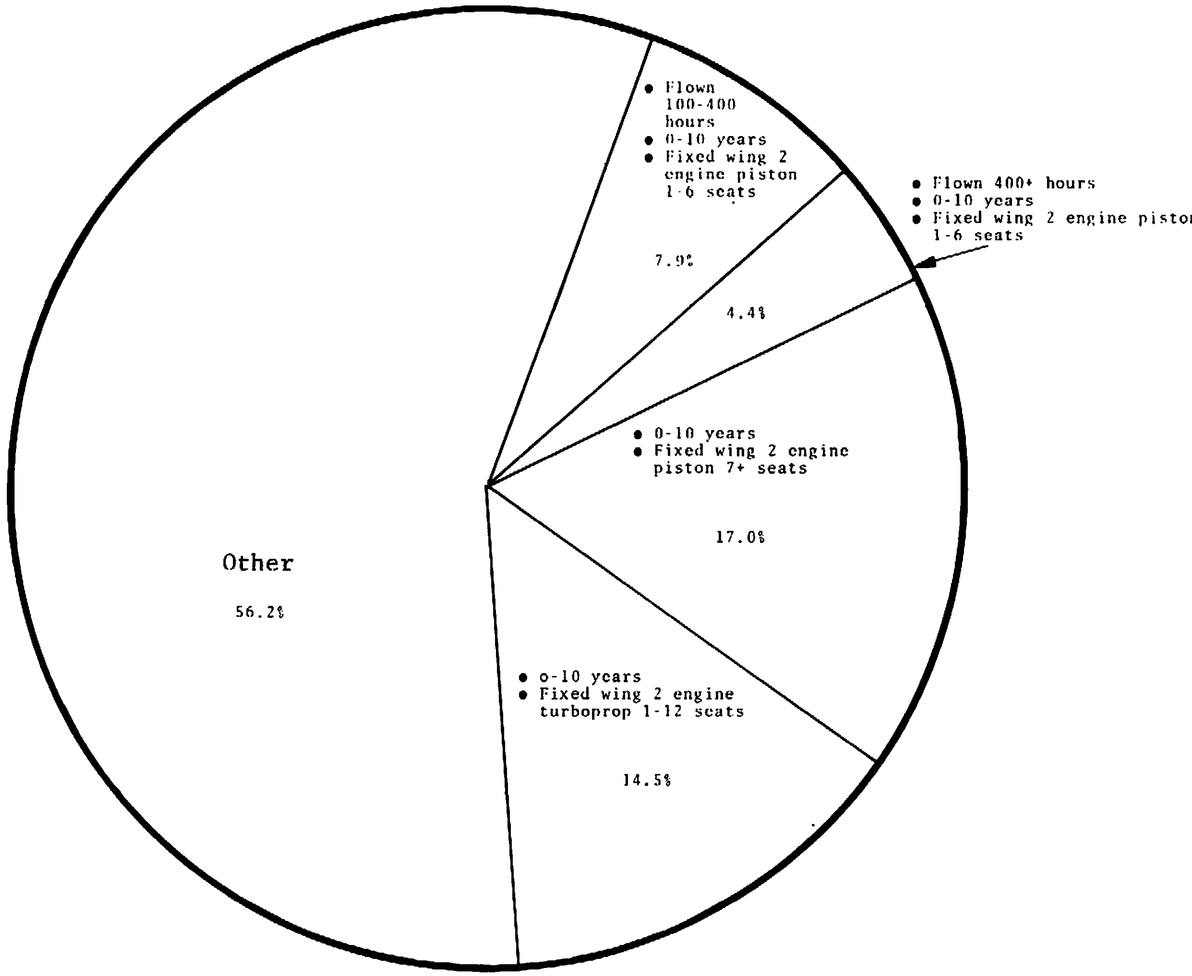


FIGURE 12. NON-HIERARCHICAL CAPABILITY GROUP 6 (5 Percent)

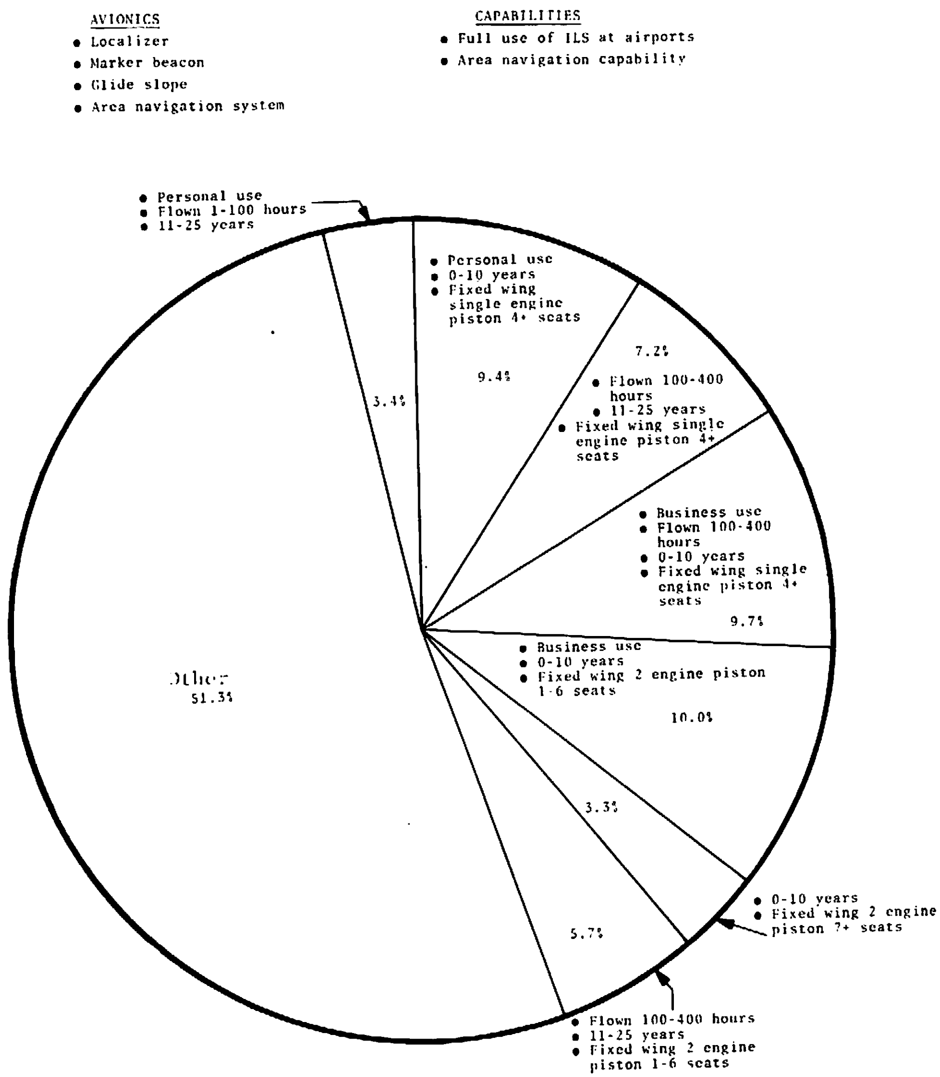


FIGURE 13. NON-HIERARCHICAL CAPABILITY GROUP 7 (2 Percent)

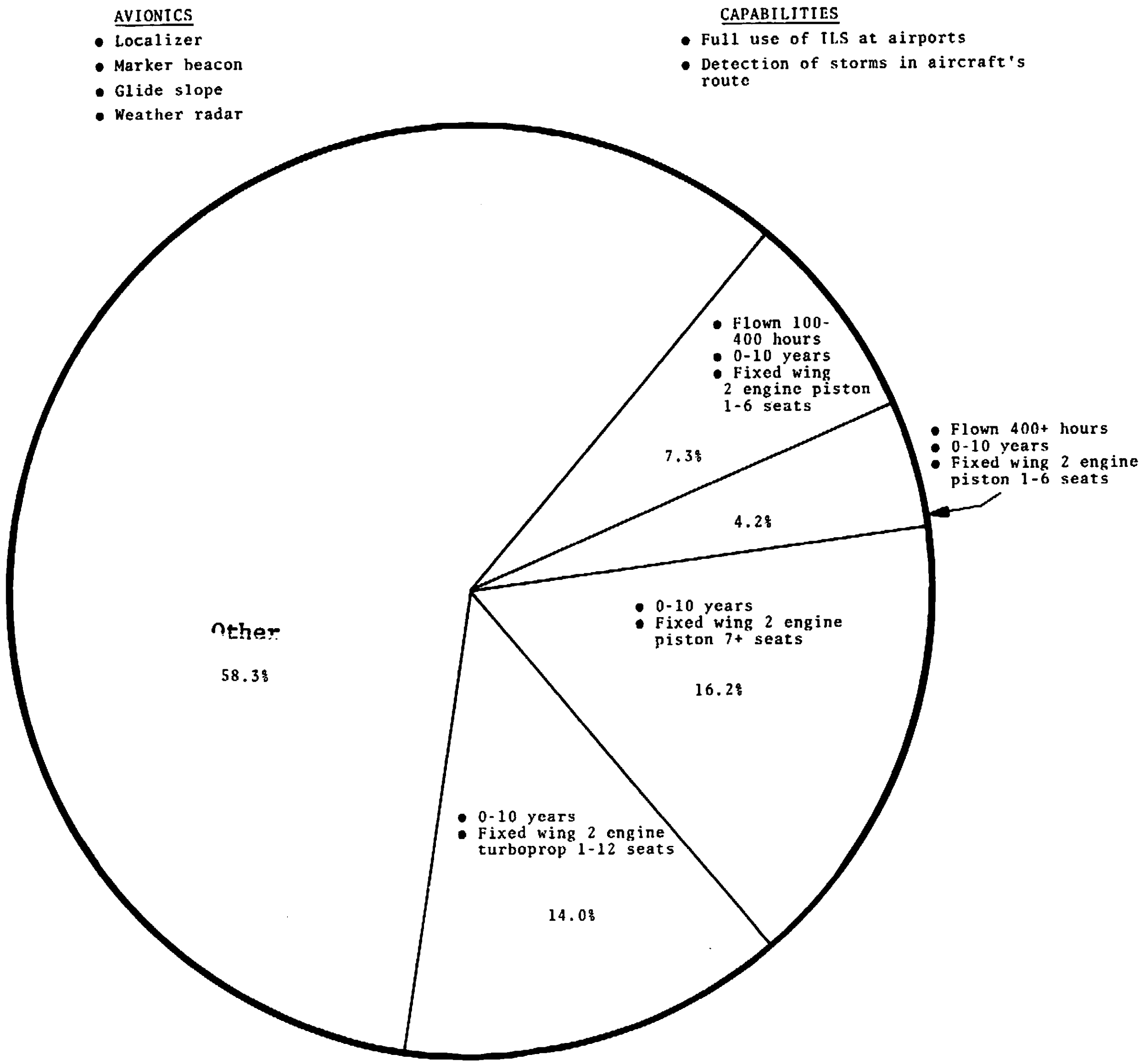


FIGURE 14. NON-HIERARCHICAL CAPABILITY GROUP 8 (3 Percent)

AVIONICS

- Localizer
- Marker beacon
- Glide slope
- Area navigation system
- Weather radar

CAPABILITIES

- Full use of ILS at airports
- Area navigation capability
- Detection of storms in aircraft's route

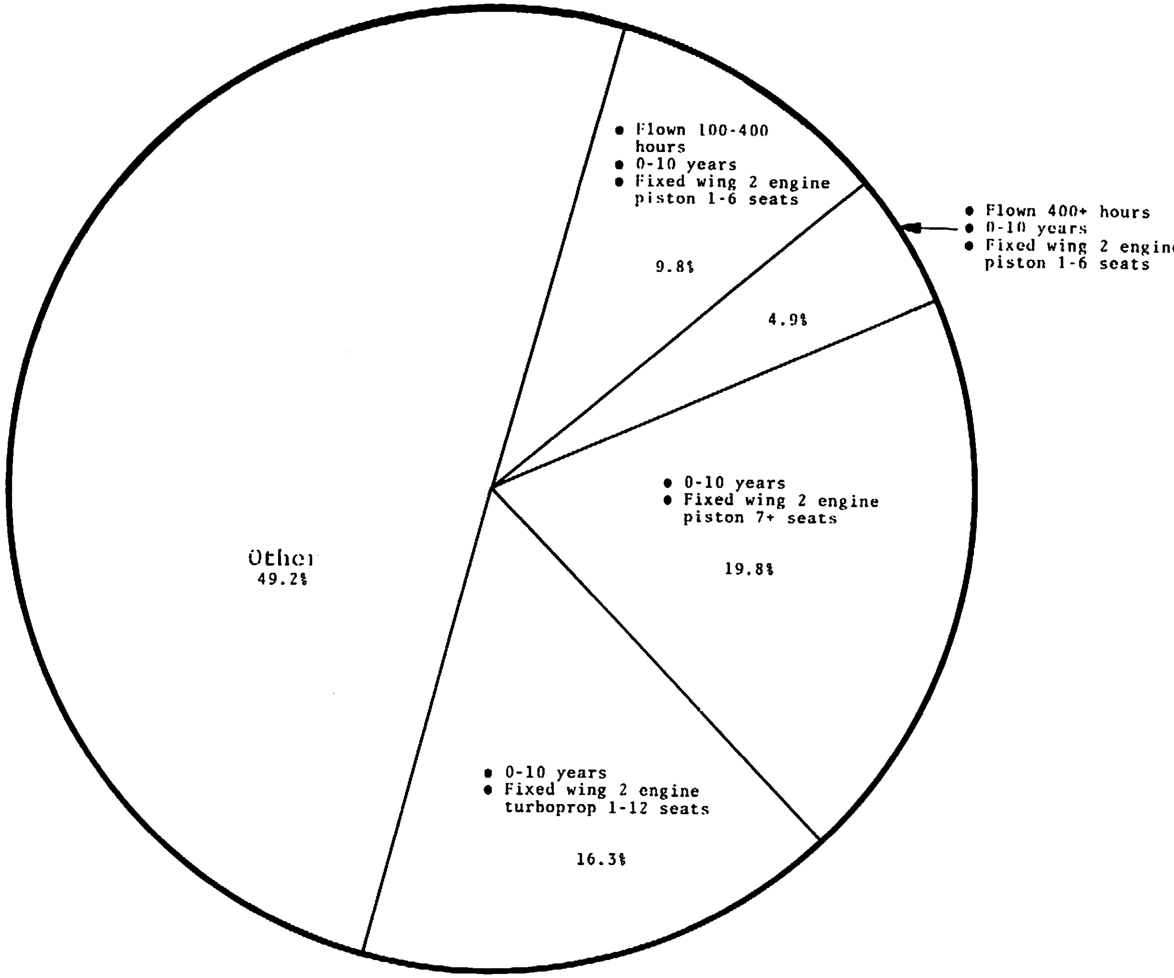


FIGURE 15. NON-HIERARCHICAL CAPABILITY GROUP 9 (1 Percent)

APPENDIX A
AIRCRAFT REGISTRATION ELIGIBILITY, IDENTIFICATION, AND ACTIVITY REPORT

Please read the instructions at the beginning of each part and on the reverse side before completing this form.

DEPARTMENT OF TRANSPORTATION – FEDERAL AVIATION ADMINISTRATION

AS OF DECEMBER 31, 1973

FORM APPROVED
OMB NO. 04-R0185

PART 1 - REGISTRATION INFORMATION *FAR 47.44 requires each holder of a U.S. Civil Aircraft Certificate to submit this part of the form by April 1, 1974*

Correct any pre-printed data here. ⇨

1 REG. NO. N
2 AIRCRAFT SERIAL NUMBER
3 AIRCRAFT MANUFACTURER, MODEL, AND SERIES
9

12 NAME AND ADDRESS OF CERTIFICATE HOLDER(S).

Corrected address (if needed).
13 NUMBER AND STREET, P.O. BOX, ETC.
14 CITY
15 STATE
ZIP

CANCELLATION OF REGISTRATION REQUESTED.
17a. ☐ SOLD *(Show purchaser's name and address in remarks.)*
17b. ☐ DESTROYED/SCRAPPED
17c. ☐ STOLEN/LOST
17d. ☐ EXPORTED
17e. ☐ OTHER
17f. REMARKS: *(Give details.)*

I (WE) REQUEST CANCELLATION OF REGISTRATION FOR THE ABOVE REASON.
SIGNATURE X
19 TITLE

18 REGISTRATION ELIGIBILITY. *I (we) certify that: (1) I am a (we are) U.S. citizen(s); (2) I (we) own the aircraft identified above; and (3) to the best of my (our) knowledge it is not registered under the laws of any foreign country.*
SIGNATURE X
19 TITLE

20 DATE

SIGN ONLY ONE. *See instructions on reverse of form.*

PART 2 - ACTIVITY & RELATED INFORMATION 21 *FAR 91.53 requests each owner to submit the information indicated below. For air carrier aircraft (operating under FAR 121 or 127) check here* ☐ *and fill in Block 32.*

22 BASE AIRPORT OF AIRCRAFT *(Correct below if changed.)*
23 ☐ NOT BASED AT ANY AIRPORT
24 AIRPORT NAME
25 CITY
26 ZIP
27 COUNTY
28 STATE
29

30 ENGINE MFGR. & MODEL GROUP
31
32 *Correct here.* (FAA FORM 8130–6, APPLICATION FOR AIRWORTHINESS, MUST BE ON FILE TO EFFECT CHANGE.)

AVIONICS EQUIPMENT CAPABILITY *(Check all boxes that reflect this aircraft's current capability.)*

VHF COMMUNICATIONS EQUIPMENT
VHF Receiver Capability
- *Tuner* ☐
- *180 channels or less* ☐
- *181 channels or more* ☐
- *No VHF Receiver Capability* ☐

VHF Transmitter Capability
- *20 channels or less* ☐
- *21 thru 180 channels* ☐
- *181 or more channels* ☐
- *No VHF Transmitter Capability* ☐

ILS RECEPTION CAPABILITY
- *Localizer* ☐
- *Glide slope* ☐
- *Marker beacon* ☐
- *No ILS Reception Capability* ☐

TRANSPONDER EQUIPMENT
- *64 code* ☐
- *4096 code* ☐
- *Altitude reporting* ☐
- *No Transponder Equipment* ☐

NAVIGATION EQUIPMENT
VOR Receiver
- *One* ☐
- *More than one* ☐
- *Distance Measuring Equipment (DME)* ☐
- *Automatic Direction Finder (ADF)* ☐
- *Weather Radar* ☐
- *Approved Area Navigation Equipment Advisory Circular 90-45* ☐
- *No Navigation Equipment* ☐

LONG TERM (3+MONTHS) LESSEE/OPERATOR IF NOT OWNER
CURRENT LESSEE/OPERATOR'S NAME
STREET ADDRESS
CITY
59 STATE
60 ZIP

HOURS FLOWN BY THIS AIRCRAFT JAN. 1 - DEC. 31, 1973
(Report whole hours (not fractions) while you owned this aircraft.)

EXECUTIVE *(Corporate flying by professional pilots)*	62	Hrs.
BUSINESS *(Individual flying for business reasons)*	63	Hrs.
PERSONAL *(Individual flying for personal reasons)*	64	Hrs.
AERIAL APPLICATION *(Agriculture, health, forestry)*	65	Hrs.
INSTRUCTION *(Excludes proficiency)*	66	Hrs.
AIR TAXI *(Part 135 operations including charter services)*	67	Hrs.
INDUSTRIAL/SPECIAL *(Patrol, survey, photo, hoist, etc.)*	68	Hrs.
AIRCRAFT RENTAL BUSINESS	69	Hrs.
OTHER *(R&D, demonstrations, sport parachuting, etc.)*	70	Hrs.
IF YOU OWNED THIS AIRCRAFT LESS THAN 12 MONTHS LAST YEAR, SHOW PREVIOUS OWNER'S HOURS BETWEEN JANUARY 1 - DECEMBER 31 HERE →	71	

IF AIRCRAFT NOT FLOWN LAST YEAR, CHECK HERE → ☐

After completion & signature mail the original copy to: Department of Transportation, FAA Aircraft Registry, AAC-250, P.O. Box 25045, Oklahoma City, Okla. 73125

AC FORM 8050-73 (8-73) SUPERSEDES PREVIOUS EDITION (0052-549-3003)

APPENDIX A. CONTINUED

> NOTE: *Entries made on the original will appear on the second copy without using carbon paper. The second copy of this form is for the aircraft owner. Shaded areas are for FAA use only.*

INSTRUCTIONS FOR COMPLETING AND SIGNING THE FORM ON THE REVERSE.

For your convenience this form has been preprinted with all available information in FAA records as of December 31, 1973. Where the preprinted information is correct, no entry is needed. Where the information is incorrect or out-of-date insert the correct information in the space provided. Where no information is preprinted please enter the information requested in the space provided.

GUIDELINES FOR COMPLETING SIGNATURE BLOCKS 17 AND 18.

1. *If this aircraft is still eligible for registration, and you wish to continue its registration, sign Block 18 and enter the date in Block 20. Follow the guidelines for signature below.*
2. *If the aircraft is now ineligible for registration in your name or you wish to cancel its registration for other reasons, complete and sign Block 17 and enter the date in Block 20, following the guidelines for signature below.*

GUIDELINES FOR SIGNATURE

1. *INDIVIDUAL OWNER. An individual owner whose name appears in Block 12 must sign his name.*
2. *PARTNERSHIP. Any general partner may sign for the partnership but must show his title "partner."*
3. *CORPORATIONS. Any corporate officer or person holding a managerial position with the corporation may sign for the corporation. He must also indicate the title of his office below his signature.*
4. *CO-OWNER. Unless cancellation of registration is requested, any co-owner may sign certifying citizenship and ownership for all co-owners. If cancellation is requested, the signature of each co-owner must appear on this form or on an attached sheet.*
5. *GOVERNMENT. Any authorized person may sign showing his title.*

After you complete and sign the form send the original (first copy) to:

DEPARTMENT OF TRANSPORTATION
FAA AIRCRAFT REGISTRY AAC-259
P.O. BOX 26045
OKLAHOMA CITY, OKLAHOMA 73126

> THIS IS AN ANNUAL REPORTING FORM ONLY AND IS NOT TO BE SUBMITTED WITH OTHER AIRCRAFT REGISTRATION DOCUMENTS OR MONEY.

APPENDIX B. AIRCRAFT STATISTICAL MASTER FILE RECORD LAYOUT

Data Element	Field Description	Position	Length	Comments
1. N-Number	A/N	1-5	5	Left adjusted.
2. Serial Number	A/N	6-20	15	Right adjusted.
3. Aircraft				
Manufacturer	N	21-23	3	Type Codes (Aircraft Type): 1 - Glider 2 - Balloon 3 - Blimp/Dirigible 4 - Fixed Wing Single 5 - Fixed Wing Multi Engine 6 - Rotorcraft
Model	N	24-25	2	
Series	A/N	26-27	2	
Type	N	28	1	
4. Engine				
Type	N	29	1	Type Codes (Engine Type): 1 - Reciprocating 2 - Turbopropeller 3 - Turboshaft 4 - Turbojet 5 - Turbine Air Generator 6 - Ram Jet 9 - Unknown
Manufacturer	N	30-32	3	
Model	N	33-34	2	
5. Engine Horse Power (each)	N	35-39	5	Lbs. of thrust for turbo only.
6. Number of Engines	N	40-41	2	
7. Number of Seats	N	42-44	3	
8. Weight	N	45-51	7	Maximum gross takeoff
9. Cruise Speed	N	52-55	4	75% of average cruising speed X hours flown = miles flown
10. Wing Code	A/N	56	1	1 - Low Wing 2 - High Wing 3 - Biwing

Data Element	Field Description	Position	Length	Comments
11. Aircraft Category Code	N	57	1	1 - Land 2 - Sea 3 - Amphibian
12. Amateur Certification Code	A/N	58	1	Blank - Not Amateur 1 - Amateur Certification
13. Fuel Consumed	N	59-64	6	Fuel consumed per engine. Gallons of fuel consumed per hour, recorded in 2 decimal positions, decimal assumed.
14. Airworthiness Class	N	65	1	1 - Standard 2 - Limited 3 - Restricted 4 - Experimental 5 - Provisional 6 - Multiple 8 - Special Flight Permit
15. Approved Operations Code	A/N	66	1	See Enclosure 1
16. Year Manufactured	N	67-68	2	ØØ if Unknown

Data Element	Field Description	Position	Length	Comments
17. G/A Indicator	A/N	69	1	1 - Air Carrier Aircraft Type Unknown X - Air Carrier Aircraft Type Passenger Y - Air Carrier Aircraft Type Passenger/Cargo Z - Air Carrier Aircraft Type Cargo 2 - General Aviation Aircraft D - Dealer Aircraft 3 - General Aviation Aircraft continuous maintenance
18. Type of Registrant	A/N	70	1	1 - Individual 2 - Partnership 3 - Corporation 4 - Coownership 5 - Government
19. Base Airport ID	A/N	71-75	5	
20. Base Airport				
Region	A/N	76	1	
State	N	77-78	2	
GADO	A	79-81	3	
County	N	82-84	3	
Site	A/N	85-93	9	

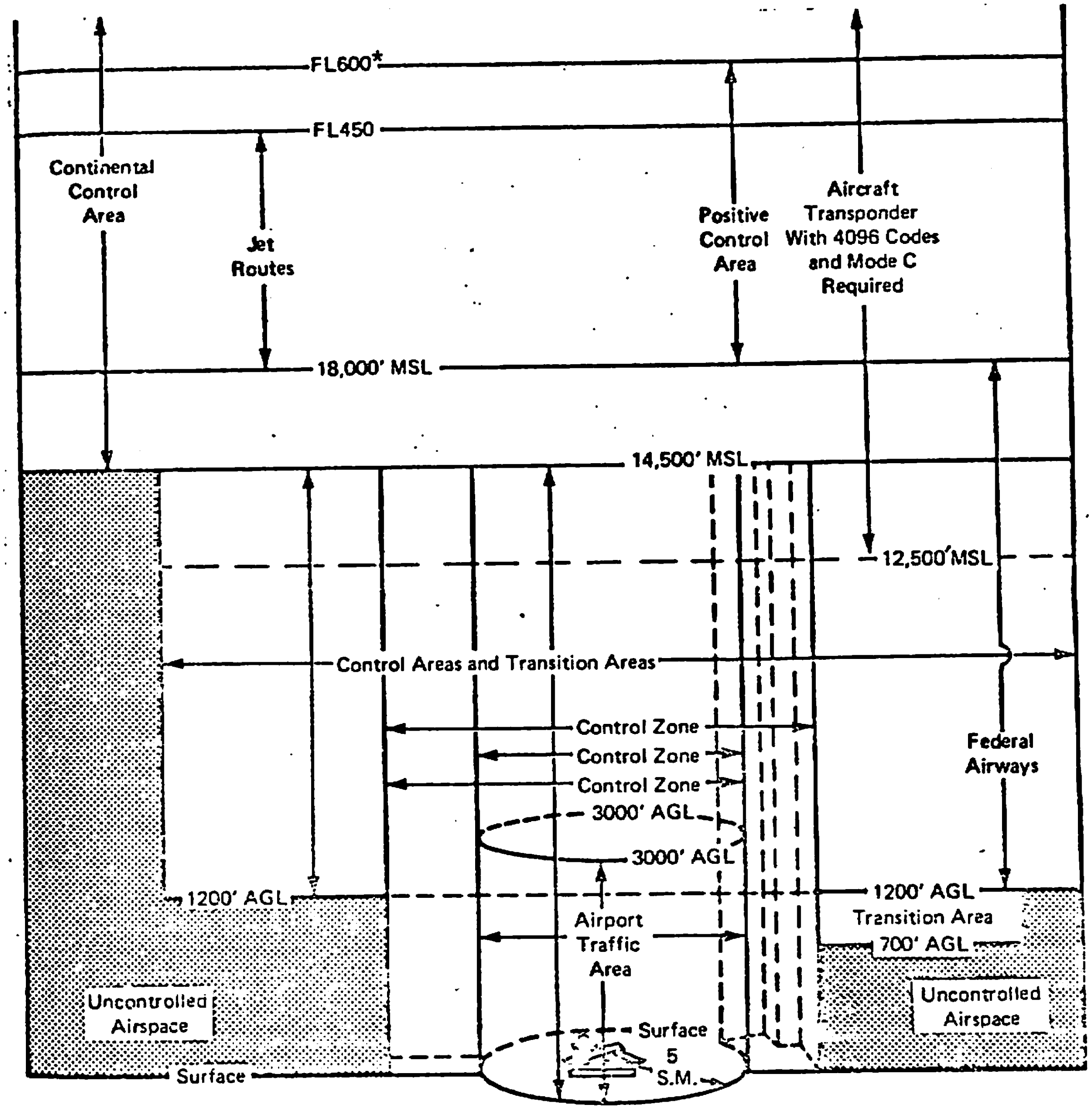
Data Element	Field Description	Position	Length	Comments
21. Owner				
Zip	A/N	94-98	5	
Region	N	99	1	
State	N	100-101	2	
GA Distr. Office	A	102-104	3	
County	N	105-107	3	
22. Operator				
Zip	A/N	108-112	5	
Region	N	113	1	
State	N	114-115	2	
GADO	A	116-118	3	
County	N	119-121	3	
23. Hours Flown by Use				
Executive	A/N	122-125	4	Distribution of previous owner's hours included in other 9 use categories
Business	A/N	126-129	4	
Personal	A/N	130-133	4	
Aerial Application	A/N	134-137	4	
Instructional	A/N	138-141	4	
Air Taxi	A/N	142-145	4	
Industrial/Special	A/N	146-149	4	
Rental	A/N	150-153	4	
Other	A/N	154-157	4	
Previous Owner	A/N	158-161	4	
24. Not Flown	A	162	1	1 - Inactive blank - Active

Data Element	Field Description	Position	Length	Comments
25. Primary Use	N	163	1	Ø - Unknown or Not Reported 1 - Executive 2 - Business 3 - Personal 4 - Aerial Application 5 - Instruction 6 - Air Taxi 7 - Industrial/Special 8 - Aircraft Rental Business 9 - Other
26. Communication Equipment				
VHF Tuner	N	164	1	Blank - Not Reported, 1 - Yes, 0-None
VHF Receiver	N	165	1	Blank - Not Reported, 0-None 1 - 180 channels or less 2 - 181 channels or more
VHF Transmitter	N	165	1	Blank - Not Reported 1 - 20 channels or less 2 - 21 through 180 channels 3 - 181 channels or more 0 - none
27. ILS				
Localizer	N	167	1	Blank - Not Reported, 1 -Yes, 0-None
Glide Slope	N	168	1	Blank - Not Reported, 1 -Yes, 0-None
Marker Beacon	N	169	1	Blank - Not Reported, 1 -Yes, 0-None

Data Element	Field Description	Position	Length	Comments
28. Transponder				
64 or 4096 code	N	170	1	Blank - Not Reported, 0-None 1 - 64 codes 2 - 4096 codes
Altitude Reporting	N	171	1	Blank - Not Reported, 1 - Yes, 0 - None
29. Navigational Equipment				
VOR	N	172	1	Blank - Not Reported, 0-None 1 - One 2 - More than One
DME	N	173	1	Blank - Not Reported, 1 - Yes, 0 - None
ADF	N	174	1	Blank - Not Reported, 1 - Yes, 0 - None
Weather Radar	N	175	1	Blank - Not Reported, 1 -Yes, 0-None
Area Navigation	N	176	1	Blank - Not Reported, 1 - Yes, 0 - None
30. Certification Issue Date				
Month	N	177-178	2	
Day	N	179-180	2	
Year	N	181-182	2	
31. Date Entered System				
Month	N	183-184	2	
Day	N	185-186	2	
Year	N	187-188	2	
32. Statistical Year	N	189-190	2	

Data Element		Field Description	Position	Length	Comments
33.	Imputed Hours	A/N	191	1	1 - Yes(Imputed) Ø - No(Reported)
34.	Imputed Airport	A/N	192	1	1 - Yes(Imputed) Ø - No(Reported)
35.	Type Aircraft Sort	A/N	193-195	3	Enclosure 2
36.	Aircraft Manufacturer Name	A/N	196-225	30	
37.	Aircraft Model & Series Name	A/N	226-245	20	
38.	Engine Manufacturer Name	A/N	246-255	10	
39.	Engine Model Name	A/N	256-268	13	
40.	Airport State Name	A	269-283	15	
41.	Airport County Name	A	284-305	22	
42.	Airport Name	A	306-335	30	
43.	Blank	A	336	1	
44.	Random Number	A/N	337-342	6	
45.	Engine Sort Code	N	343	1	
46.	Total Recalcitrant	N	344	1	
47.	Blank	A	345-354	10	

APPENDIX C. AIRSPACE STRUCTURE



General Dimensions of Control Zones, Airport Traffic Areas, and the Vertical Extent of Airspace Segments

* FL600 means "Flight Level 60,000 feet MSL"

Airman's Information Manual, Basic Flight Manual and ATC Procedures, Part 1, (May, 1976), p. 1-23.

APPENDIX C, CONTINUED

Summary of Major Airspace Designated Areas

Designation	Measure	Present system 1975	Future system In plan 1976-85	Future system Total 1985
En route:				
Jet routes	Number	216	−66	150
Jet area navigation routes	Number	163	+47	200
Low altitude routes:				
Low frequency	Number	24	−24	0
VHF/UHF	Number	462	−214	248
Area navigation VHF	Number	8	+192	200
Area positive control	Altitude (FL)			
Conterminous U.S.		180-600	—	180-600
Alaska		240-600	—	240-600
Parallel	Number	0	+500	500
Three dimensional	Number	0	+1000	1000
Terminal:				
Control zones	Number	806	+287	1093
Transition areas	Number	1,495	−9	1486
Control area extension	Number	1	—	1
Terminal control areas (Group I & II)	Number	18	3	21
STARs/SIDs	Number	414	−239	175
RNAV STARs/SIDs	Number	2	+448	450
Special use:				
Prohibited areas	Number	7	+2	9
	Square Miles	1,626	—	—
Restricted areas	Square Miles	77,639	—	—
Joint use	Number	163	+6	169
Nonjoint use	Number	29	−18	11
Warning areas	Number	68	−33	35
	Square Miles	408,970	—	—
Alert areas	Number	35	−5	30
Jet training areas	Number	35	−5	30
	Square Miles	87,183	—	—

The National Aviation System Plan Fiscal Years 1976-1985, (March, 1975), p. 6-3.

APPENDIX C, CONTINUED

Airborne Equipment Requirements

Types of Airspace	Flight condition	Equipment Requirements 1975		1985
Uncontrolled	VFR (day)	1. Airspeed indicator 2. Altimeter 3. Compass 4. Tachometer 5. Oil temperature 6. Emergency locator transmitter [1]	7. Manifold pressure 8. Fuel gage 9. Landing gear 10. Belts 11. Special equipment for over water flights (FAR 91.33)	Same as 1975
Uncontrolled	VFR (night)	All above plus: 1. Position lights 2. Anti-collision light	3. Landing light (if for hire) 4. Electrical source	Same as 1975
Uncontrolled	IFR	Same as VFR plus: 1. Two-way radio 2. Navigation system 3. Gyro turn/bank 4. Sensitive altimeter adjustable for barometric pressure 5. Clock with sweep second hand	6. Artificial horizon 7. Directional gyro or equivalent 8. Generator	Same as 1975
Controlled (non-positive)	VFR	Same as uncontrolled VFR plus transponder [2]		Same as 1975
	IFR	Same as uncontrolled IFR plus transponder [2]		Same as 1975
Positive control	VFR	Requires prior ATC approval		Same as 1975
	IFR	Same as uncontrolled IFR plus: 1. DME (if VOR/TACAN equipment not carried) 2. Transponder [2] 3. VOR (In TCA's) 4. ADF (Air Carrier only) 5. ILS (Air Carrier only)		Same as 1975

[1] Does not apply to turbojet aircraft, scheduled air carriers (except charter), or certain training and agricultural flights.

[2] 4096 code, Mode 3A transponder with Mode C automatic altitude reporting capability will be required at Group I and II TCA Locations and in APC, and in controlled airspace of the 48 States above 12,500 feet. All non-participating aircraft operating within Group III TCA's will be transponder equipped with Mode C capability.

The National Aviation System Plan Fiscal Years 1976-1985, (March, 1975), p. 13-5.

National Terminal Radar Programs

Location	Terminal airspace designation	Equipment Requirements: Present	Equipment Requirements: Under Consideration	Services provided
Top 9 Large Hub locations.	Group I TCA	(Effective Jan 1. 1975) 4096 Code Transponder and Mode C Automatic Altitude Reporting Capability; Two-way Radio; VOR or TACAN Receiver.	Relaxation of Transponder Requirements During Periods of Low Activity.	TCA Procedures
Next 12 Large Hub locations	Group II TCA	(Effective July 1, 1975) 4096 Code Transponder and Mode C Automatic Altitude Reporting Capability; Two-way Radio; VOR or TACAN Receiver.	Deletion of Altitude Encoding Requirement. (Has been Deleted)	TCA Procedures
Remaining 42 ARTS-III locations.	Group III TCA	(Effective July 1, 1975) 4096 Code Transponder and Mode C Automatic Altitude Reporting Capability *or* Two-way Radio Communications.		TCA Procedures
All other radar facilities	TRSA where Stage III service is provided	--------------------	--------------------	Stage II or III service

<u>The National Aviation System Plan Fiscal Years 1976-1985</u>, (March, 1975), p. 6-4.

APPENDIX C. CONCLUDED

Designated Terminal Airspace (All ARTS-III Locations); Terminal Control Areas

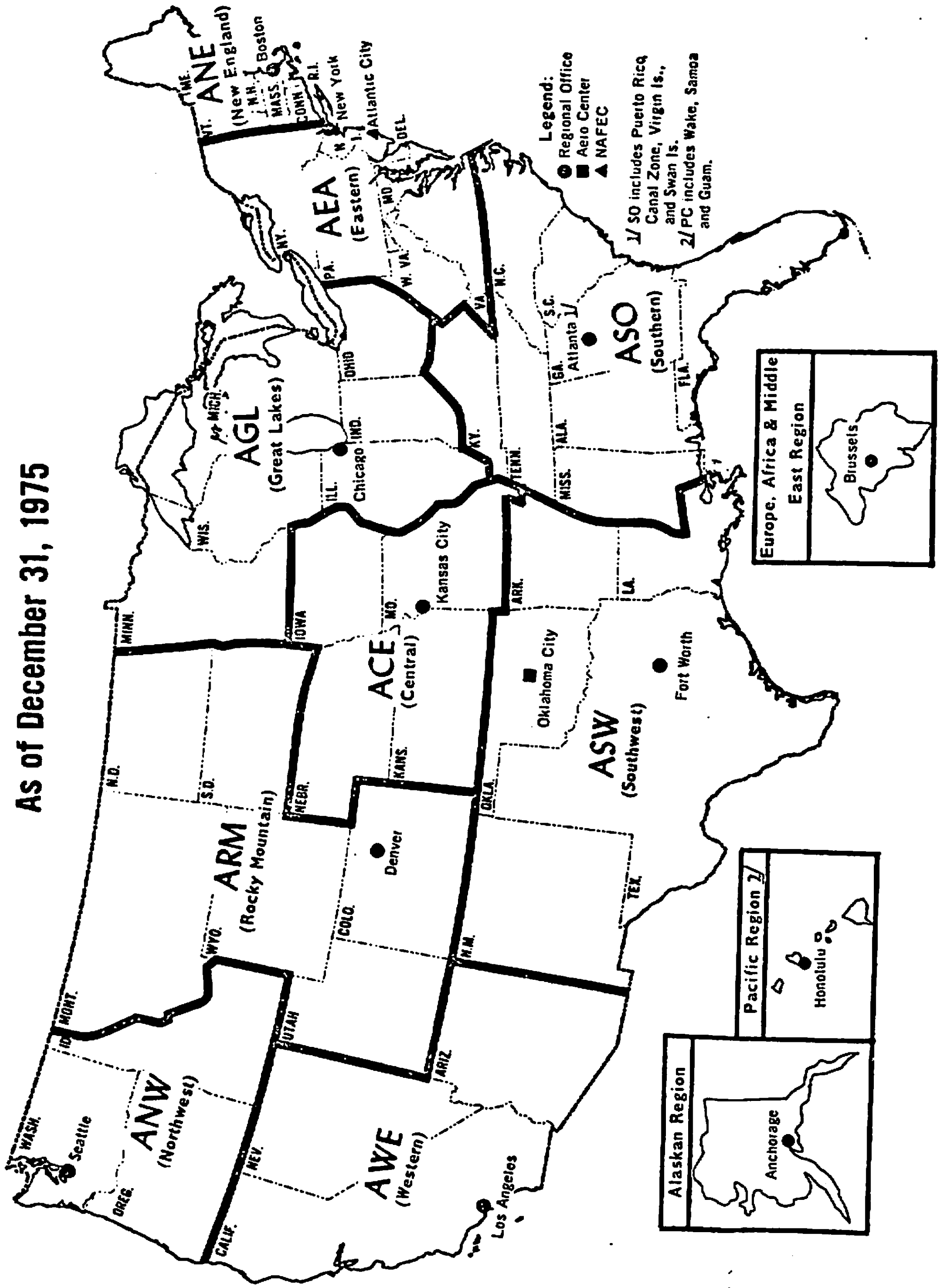
GROUP I	Date designated or planned	GROUP II	Date designated or planned
1. Atlanta	June 1970	1. St. Louis	Jan. 1974
2. Chicago	Aug. 1970	2. Seattle	Jan. 1974
3. Washington National	Feb. 1971	3. Minneapolis	Feb. 1974
4. New York (LGA, JFK, EWR)	Sept. 1971	4. Denver	Mar. 1974
5. Los Angeles	Sept. 1971	5. Houston	Mar. 1974
6. San Francisco	Dec. 1972	6. Cleveland	May 1974
7. Boston	Feb. 1973	7. Detroit	May 1974
8. Miami	Apr. 1973	8. Pittsburgh	May 1974
9. Dallas	Jan. 1974	9. Las Vegas	Nov. 1974
		10. Philadelphia	Mar. 1975
		11. Kansas City	Mar. 1975
		12. New Orleans	Jul. 1975

Group III Terminal Areas (42 locations)

Albany	El Paso	Omaho	San Diego
Albuquerque	Hartford	Orlando	San Juan
Baltimore	Honolulu	Portland, Oreg.	Santa Ana/Long Beach
Birmingham	Indianapolis	Phoenix	Shreveport
Buffalo	Jacksonville	Providence	Syracuse
Burbank	Louisville	Raleigh-Durham	Tampa
Charlotte	Memphis	Ontario, California	Tucson
Cincinnati	Milwaukee	Rochester, N.Y.	Tulsa
Columbus, Ohio	Nashville	Sacramento	Washington-Dulles
Dayton	Norfolk	Salt Lake City	
Des Moines	Oklahoma City	San Antonio	

<u>The National Aviation System Plan Fiscal Years 1976-1985</u>, (March, 1975), p. 6-5.

APPENDIX D. FEDERAL AVIATION ADMINISTRATION REGIONS AND REGIONAL OFFICES



FAA Air Traffic Activity Calendar Year 1975, (March, 1975), p. 10.

APPENDIX E. COMPUTED AIRCRAFT TYPES

TYPE	DESCRIPTION
1.	Fixed wing single engine piston 1-3 seats
2.	Fixed wing single engine piston 4+ seats
3.	Fixed wing two engine piston 1-6 seats
4.	Fixed wing two engine piston 7+ seats
5.	Fixed wing other
6.	Fixed wing two engine turboprop 1-12 seats
7.	Fixed wing two engine turboprop 13+ seats
8.	Fixed wing turboprop other
9.	Fixed wing two engine turbojet
10.	Fixed wing turbojet other
11.	Rotorcraft piston
12.	Rotorcraft turbine
13.	Other aircraft

APPENDIX F. SAMPLING AND CONTINGENCY TABLE METHODOLOGY

Because of the large number of GA aircraft (169,030) assigned to CG's, it would have been cumbersome to use all of them in the CG analysis. Consequently, a contingency table analysis was performed on a sample of aircraft to identify homogeneous subgroups of aircraft within each CG. The results of the analysis were then applied to all 169,030 aircraft with the results appearing in Tables 20 and 21 and Figures 1 through 15. Sampling and contingency table analysis are discussed thoroughly below.

Sampling

The sampling criterion used was a desired standard error of 0.25 percent when estimating proportions with 95 percent confidence. This criterion yielded a sample size of 1537 aircraft for each hierarchical group when uncorrected for finite population. In the interest of conservation 1537 aircraft were drawn from each hierarchical CG regardless of its size. The calculations used for determining sample size are shown in the box below.

The sampled aircraft were then regrouped by non-hierarchical CG's to obtain samples for the non-hierarchical analysis. A better method would have been to sample 1537 aircraft from each of the original non-hierarchical CG's, but this was constrained by the design of the computerized data base in hierarchical group order. Nonetheless, a precision of 0.05 percent or less was achieved using the regrouped samples with only two exceptions at 0.06 percent.

Contingency Tables

Large groups of homogeneous aircraft within CG's were discovered through contingency table analysis. Contingency tables are simply a means for displaying large amounts of categorical data. In this case, each GA aircraft can be described in terms of the nine characteristics, or factors, discussed in the previous within an airport traffic area except for the purpose of landing at, or taking off from, an airport within that area. ATC authorizations may be given as individual approval of specific operations or may be contained in written agreements between airport users and the tower concerned. (Refer to FAR Parts 1 and 91.)

6. Airport Traffic Control Tower - A central operations facility in the terminal air traffic control system, consisting of tower cab structure, including an associated common IFR room if radar equipped, using air/ground communications and/or radar, visual signalling and other devices, to provide safe and expeditious movement of terminal air traffic.

7. Air Taxi Operations - Air taxi operations and commuter air carrier operations (takeoffs and landings) carrying passengers, mail or cargo for revenue in accordance with FAR Part 135 or Part 121.

8. Airway/Federal Airway - A control area or portion thereof established in the form of a corridor, the centerline of which is defined by radio navigational aids (Refer to FAR Part 7.)

9. Altitude - The height of the level, point or object measured in feet Above Ground Level (AGL) or from Mean Sea Level (MSL).
   1. MSL Altitude - Altitude, expressed in feet measured from mean sea level.
   2. AGL Altitude - Altitude, expressed in feet measured above ground level.
   3. Indicated Altitude - The altitude as shown by an altimeter. On a pressure or barometric altimeter it is altitude as shown uncorrected for instrument error and uncompensated for variation from standard atmospheric conditions.

10. Area Navigation/RNAV - A method of navigation that permits aircraft operations on any desired course within the coverage of station-referenced navigation signals or within the limits of self-contained system capability (Refer to FAR Part 71.)

a. Area Navigation Low Route - An area navigation route within the airspace extending upward from 1,200 feet above the surface of the earth to, but not including, 18,000 feet MSL.

b. Area Navigation High Route - An area navigation route within the airspace extending upward from and including 18,000 feet MSL to flight level 450.

c. Random Area Navigation Routes/Random RNAV Routes - Direct routes, based on area navigation capability, between waypoints, defined in terms of degree/distance fixes or offset from published or established routes/airways at specified distance and direction.

d. RNAV Waypoint/W/P - A predetermined geographical position used for route or instrument approach definition or progress reporting purposes that is defined to a VORTAC station position.

11. Automatic Altitude Reporting - That function of a transponder which responds to Mode C interrogations by transmitting the aircraft's altitude in 100-foot increments.

12. Automatic Direction Finder/ADF - An aircraft radio navigation system which senses and indicates the direction to a L/MF nondirectional radio beacon (NDB) ground transmitter. Direction is indicated to the pilot as a magnetic bearing or as a relative bearing to the longitudinal axis of the aircraft depending on the type of indicator installed in the aircraft. In certain applications, such as military, ADF operations may be based on airborne and ground transmitters in the VHF/UHF frequency spectrum.

13. Balloon - A lighter-than-air aircraft that is not engine driven.

14. Business Transportation - Any use of an aircraft not for compensation or hire by an individual for the purposes of transportation required by a business in which he is engaged.

15. Certificated Pilot - A person who holds a certificate issued by FAA, which qualifies him to operate aircraft within the limitations prescribed on the certificate.

16. Colored (L/MF) Airway - Low altitude airway over the state of Alaska predicated on L/MF navigation aids. It is depicted on aeronautical charts by color and number.

17. Continental United States - The 49 states located on the continent of North America and the District of Columbia.

18. Conterminous U.S. - The forty-eight adjoining states and the District of Columbia.

19. Controlled Airport - An airport at which a control tower is in operation.

20. Controlled Airspace - Airspace, designated as a continental control area, control area, control zone, terminal control area, or transition area, within which some or all aircraft may be subject to air traffic control (Refer to FAR Part 71).

Types of U.S. Controlled Airspace:

a. Continental Control Area - The airspace of the 48 continguous states, the District of Columbia and Alaska, excluding the Alaska peninsula west of Long. 160 00'00"W at and above 14,500 MSL, but does not include:

   1. The airspace less than 1,500 feet above the surface of the earth or,

   2. Prohibited and restricted areas, other than the restricted areas listed in FAR Part 71.

b. Control Area - Airspace designated as Colored Federal Airways, VOR Federal Airways, Terminal Control Areas, Additional Control Areas, and Control Area Extensions, but not including the Continental Control Area. Unless otherwise designated, control areas also include the airspace between a segment of a main VOR airway and its associated alternate segments. The vertical extent of the various categories of airspace contained in control areas are defined in FAR Part 71.

c. Control Zone - Controlled airspace which extends upward from the surface and terminates at the base of the continental control area. Control zones that do not underlie the continental control area have no upper limit. A control zone may include one or more airports and is normally a circular area within a radius of 5 statute miles and any extensions necessary to include instrument approach and departure paths.

27. Flight Service Station/FSS - Air Traffic Service facilities within the National Airspace System (NAS) which provide pre-flight pilot briefing and en route communications with VFR flights, assist lost IFR/VFR aircraft, assist aircraft having emergencies, relay ATC clearances, originate, classify, and disseminate Notices to Airmen, broadcast aviation weather and NAS information, receive and close flight plans, monitor radio NAVAIDS, notify search and rescue units of missing VFR aircraft, and operate the national weather teletypewriter systems. In addition, at selected locations FSS's take weather observations, issue airport advisories, administer airman written examinations, and advise Customs and Immigrations of transborder flight.

28. General Aviation/GA - That portion of civil aviation which encompasses all facets of aviation except air carriers holding a certificate of public convenience and necessity from the Civil Aeronautics Board, and large aircraft commercial operators.

29. General Aviation Aircraft - All civil aircraft except those classified as air carrier.

30. Group I Terminal Control Area - A TCA representing one of the nine busiest locations in the U.S. in terms of aircraft operations and passengers carried within which it is necessary for safety reasons to have strict requirements for operation.

31. Group II Terminal Control Area - A TCA representing one of the twelve less busy locations than a Group I TCA and requiring less strigent pilot and equipment requirements.

32. Group III Terminal Control Area - One of the 43 least busy TCA's where an ARTS-III system exists.

33. IFR Conditions - Weather conditions below the minimum for flight under visual rules.

34. Industrial/Special - Any use of an aircraft for specialized work allied with industrial activity; excluding transportation and aerial application. (Examples: pipe line patrol; survey; advertising; photography; helicopter hoist; etc.)

35. Instructional Flying - Any use of an aircraft for the purposes of formal instruction with the flight instructor aboard, or with the maneuvers on the particular flight (s) specified by the flight instructor.

36. Instrument Flight Rules/IFR - Rules governing the procedures for conducting instrument flight. Also a term used by pilots and controllers to indicate type of flight plan (See Visual Flight Rules).

37. Instrument Landing System/ILS - A precision instrument approach system consisting of the following electronic components and visual aids:

    a. Localizer
    b. Glide Slope
    c. Outer Marker
    d. Middle Marker
    e. Approach Lights

    Refer to FAR Part 91.

38. Jet Route - A route designed to serve aircraft operations from 18,000 MSL up to and including flight level 450. The routes are referred to as "J" routes with numbering to identify the designated route, e.g., J 105. (Refer to FAR Part 71.)

39. Low Altitude Airway Structure/Federal Airways - The network of airways serving aircraft operations up to but not including 18,000 MSL. (See Airway.)

40. Microwave Landing System/MLS - An instrument landing system operating in the microwave spectrum which provides lateral and vertical guidance to aircraft having compatible avionics equipment. (See Instrument Landing System.)

41. Non-Positive Controlled Airspace - Controlled airspace below 18,000 feet MSL.

42. Personal and Pleasure Flying - Any use of an aircraft for personal purposes not associated with business or profession, and not for hire. This includes maintenance of pilot proficiency.

43. Pilot Briefing - Information furnished a pilot to assist in flight planning. Principal items are weather conditions, notices to airmen, routes, and preparation and handling of the flight plan.

44. Piston-Powered Aircraft - An aircraft operated by engines in which pistons moving back and forth work upon a crank shaft or other device to create rotational movement.

45. Positive Controlled Area/PCA - Airspace designated in Far Part 71 wherein aircraft are required to be operated under Instrument Flight Rules (IFR). Vertical extent of PCA is from 18,000 feet to and including flight level 600 throughout most of the conterminous United States and from flight level 240 to and including flight level 600 in designated portions of Alaska.

46. Radio Altimeter/Radar Altimeter - Aircraft equipment which makes use of the reflection of radio waves from the ground to determine the height of the aircraft above the surface.

47. Region (FAA) - A principal subdivision of the Federal Aviation Administration organized to carry out FAA programs under the executive direction of a regional director within the specific geographic boundaries.

48. Registered Aircraft - Aircraft registered with FAA.

49. Rotorcraft - A heavier-than-air aircraft that derives lift from one or more revolving "wings" or blades, engine-driven about an approximately vertical axis. A rotorcraft does not have conventional fixed wings, nor in any but some earlier models is it provided with a conventional propeller, forward thrust

and lift being furnished by the rotor. The powered rotor blades also enable the machine to hover, and to land and take off vertically.

50. Transponder - The airborne radar beacon receiver/transmitter portion of the Air Traffic Control Radar Beacon System (ATCRBS), which automatically receives signals from interrogations being received on the mode to which it is set to respond.

51. Turbine-Powered Aircraft - Includes aircraft with either turbojet, turbofan, turboprop, or turboshaft engines.

52. Turbojet - Aircraft operated by jet engines incorporating a turbine-driven air compressor to take in and compress the air for the combustion of fuel, the gases of combustion (or the heated air) being used both to rotate the turbine and to create a thrust-producing engine.

53. Turboprop - Aircraft in which the main propulsive force is supplied by a gas turbine-driven conventional propeller. Additional propulsive force may be supplied from the discharge turbine exhaust gas.

54. Uncontrolled Airport - Also known as a non-tower airport, an airport at which no control tower is in operation. It may have an FSS, UNICOM operator, or no facility at all.

55. Uncontrolled Airspace - That portion of the airspace that has not been designated as continental control area, control area, control zone, terminal control area, or transition area. (See Controlled Airspace)

56. Unicom - A non-government air/ground radio communication facility, which may provide airport advisory service at certain airports. Locations and frequencies of UNICOM's are shown on aeronautical charts and publications.

57. U.S. Civil Aircraft Fleet - All aircraft under U.S. registry exclusive of Military.

58. Visual Flight Rules/VFR - Rules that govern the procedures for conducting flight under visual conditions. The term "VFR" is also used in the United States to indicate weather conditions that are equal to or greater than minimum VFR requirements. In addition, it is used by pilots and controllers to indicate type of flight plan. (See Instrument Flight Rules) (Refer to FAR Part 91.)

59. VOR Airway - Low altitude airway designated from 1,200 feet AGL to 18,000 feet MSL predicated on VOR/VORTAC navigation aids. Also known as a "Victor" airway, it is indicated by a "V" on aeronautical charts and is numbered similarly to the U.S. highway system.

60. VOR/Very High Frequency Omnidirectional Range Station - A ground-based electronic navigation aid transmitting very high frequency navigation signals, 360 degrees in azimuth, oriented from magnetic north. Used as the basis for navigation in the national airspace system. The VOR periodically identifies itself by morse code and may have an additional voice identification feature. Voice features may be used by ATC or FSS for transmitting instructions/information to pilots.

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