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A STUDY OF COMMUTER AIR SERVICE

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A STUDY OF COMMUTER AIR SERVICE

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Air Carolina
Air Midwest (Certificated)
Air New England (Certificated)
Air Wisconsin
Alaska Aeronautical
Altair Airlines
Antilles Air Boats
Atlantic City Airlines
Bar Harbor Airlines
Cascade Airways
Catalina Airlines
Cochise Airlines
Cumberland Airlines
Execuair Airlines
Florida Airlines
Golden West Airlines
Metro Airlines
Midstate Airlines
New England Airlines
Pilgrim Airlines
Puerto Rico International Airlines
Rio Airways
Rocky Mountain Airways
Royal Hawaiian Airways
Scenic Airlines
Seaplane Shuttle Transport
SMB Stagelines
Swift Aire Lines
Sky West Aviation
Suburban Airlines
Tyee Airlines
Zia Airlines

Without their excellent cooperation, this study would not have been possible.

F.W. Belina
Project Manager

L.R. Bush
Associate Project Manager

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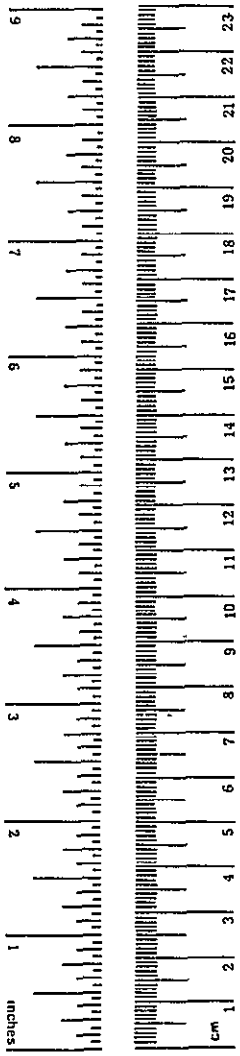
METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

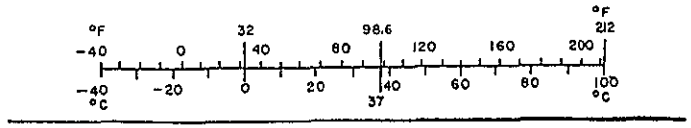
Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
		AREA		
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	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

*1 in = 2.54 (exactly). For other exact conversions and more detailed tables see NBS Misc. Publ. 286, Units of Weights and Measures. Price $2.25. SD Catalog No. C13.10:286



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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FIGURES

GLOSSARY

1. ATC - Air Traffic Control
2. BNI - Britten Norman Islander, a nine-passenger, twin engine, piston aircraft
3. B-99 - Beech 99, a 15-passenger, twin engine, turboprop aircraft
4. CAAA - Commuter Airline Association of America
5. CAB - Civil Aeronautics Board
6. C402 - A Cessna 8-passenger, twin engine, piston aircraft
7. DC-3 - A Douglas 30-passenger, twin engine, piston aircraft
8. DHC-6 - A DeHavilland 19-passenger, twin engine, turboprop aircraft
9. DME - Distance Measuring Equipment
10. FAA - Federal Aviation Administration
11. Grumman Goose - A Grumman 8-passenger, twin engine, piston amphibian aircraft
12. Heron - A DeHavilland, 15-passenger, four engine, piston aircraft
13. IFR - Instrument Flight Rules
14. ILS - Instrument Landing System
15. IMLS - Interim Microwave Landing System
16. MEA - Minimum Enroute Altitude
17. Metro - A Swearingen 19-passenger, twin engine, turboprop aircraft
18. M 404 - Martin 404, a 44-passenger, twin engine, turboprop aircraft
19. NASA - National Aeronautics and Space Administration
20. Navajo - A Piper 8-passenger, twin engine, piston aircraft
21. Non-CONUS - Non-Continental United States. Used in this report to define a region including Alaska, Hawaii, and U.S. territories in the Caribbean.
22. Nord 262 - A Nord 26-passenger, twin engine, turboprop aircraft
23. SD 3-30 - A Shorts 30-passenger, twin engine, turboprop aircraft
24. Twin Otter - a DHC-6 (See Above)
25. VFR - Visual Flight Rules

I. SUMMARY

This study was accomplished by The Aerospace Corporation for the Ames Research Center of the National Aeronautics and Space Administration (NASA) to provide a regionally oriented overview of the commuter air service industry. The purpose of this overview is to provide a framework for an eventual assessment of potential technology directions that may be of benefit to the industry. The study was not intended, at this point in time, to result in specific technology program recommendations but rather to provide data on the industry's market characteristics, service patterns, patronage characteristics, aircraft and airport needs, economic characteristics and institutional issues. An understanding of the present nature of the industry, its prospects, and its possible future needs, however, is necessary to effectively shape such programs.

Due to the diverse nature of commuter markets, aircraft applications and service philosophies, there is little "across the board" commonality within the commuter industry. Each market in each region is unique in its own right with each operator "tailoring" his aircraft selection and operating strategy to best serve that market. The observations of this report should therefore not be considered to be statistically significant for unqualified applications to the industry as a whole. However, using personal interview and literature survey methods, investigation of a considerable cross-section of the industry was made. Thirty-two operators were interviewed who represented examples of many of the different markets, service strategies, carrier sizes, and numbers and types of aircraft in each of the different regions of the continental United States, Alaska, Hawaii, and the Caribbean. Sufficient data was obtained to enable certain observations to be made, and to identify regional differences. Although many of these observations may be somewhat obvious (in particular, to an experienced commuter operator) they are backed up by a degree of quantified information that should aid in providing insight into a comprehensive cross-section of the industry operating in quite different regions and markets throughout

the country. A summary of these observations is as follows:

A. Market, Route, and Service Characteristics

Regarding populations of cities served by the interviewed commuters, almost 50% of the Middle Atlantic region service points exceeded populations of 500,000 persons. Alternatively, the majority of the West and non-CONUS[1] markets had less than 25,000 population.

The shorter stage lengths (< 100 miles) are prevalent in the Middle Atlantic region where denser population communities are in closer proximity and the non-CONUS region where most of the markets are separated by water barriers. As expected, the longer stage lengths (150-200 miles) are in the West and Midwest and involve linear route structures.

The largest market area boundaries appear to be in the New England, Midwest, and Southern regions. Minimum distances between markets required to attract air service patronage were the largest in the West and Midwest.

Patronage was predominately interlining, business travel in the shorter distance hub and spoke markets, with origin and destination, business travelers representing a higher percentage on linear routes. Non-business and O&D travelers were more prevalent in the West and non-CONUS regions.

B. Current and Desired Aircraft Characteristics

No strong regional orientation was evident among the operators interviewed in regard to current aircraft employed. Although operators in higher altitude markets used aircraft capable of good performance in such markets, the same aircraft were also employed in low altitude markets. This is partially attributable to the lack of a wide choice in aircraft suitable for commuter operations in each capacity range. However, the operators on longer, linear routes naturally favored the faster, smaller

(1) Non-Continental U.S. - For the purposes of this study, it includes Alaska, Hawaii, and the U.S. territories in the Caribbean.

aircraft, while hub and spoke operators, operating over shorter stage lengths, favored slower, higher capacity aircraft.

With regard to new aircraft, two Western operators serving the region's higher density markets favored an aircraft larger than 50 passengers but the majority of operators clearly favored the 19- to 30-passenger range -- particularly in the New England and Middle Atlantic regions. Most operators in the West's lower density markets and operators in the non-CONUS regions are content with less than 19-passenger aircraft.

Faster aircraft were only desired by the West and Midwest, linear route operators. Most operators desired a 400-500 mile IFR range with the shortest range requirements in the New England region. Pressurization was strongly desired by West and Midwest operators with many operators serving congested hubs also in favor. Almost all operators were content with piston or turboprop aircraft with a few desiring a low-cost, efficient, and quiet jet -- mostly for passenger appeal. Desired investment costs were $40,000 to $50,000/passenger seat.

C. Operational Reliability and Safety

Commuter air carrier completion factors (i.e., the percentage of flights completed compared with flights scheduled) were used as the primary measure of reliability. These factors were all 90% or above with many averaging 99%. The average of all carriers surveyed was 96.6% with the lowest average completion factors in the New England and Middle Atlantic regions (95%).

With respect to safety, NTSB data indicates that commuter passenger operation accidents per 100,000 departures were 1.35 in 1975 and 1.57 in 1976 (the latter being preliminary data). This compares with a ratio of 0.50 for trunk airlines in the 1969-1974 time period. Commuter fatalities per 100,000 departures for the same time periods were 0.16 and 0.43 as compared to 0.070 for trunk airlines.

Of the commuter accidents between 1973 and 1975, 60% were in the West and non-CONUS regions.

D. Airport Needs

No regional differences were noted regarding commuter air carrier airport needs. In outlying community airports, most operators naturally desired lower IFR operational minimums with considerable interest expressed in an Interim Microwave Landing System (IMLS) as an alternative to the more expensive and less flexible Instrument Landing System (ILS). Medium intensity runway lights were considered a minimum requirement as were related rotating beacons and appropriate obstruction lights. Minor maintenance capabilities were desired, with fuel availability generally not a major consideration. Elaborate terminal facilities were not considered necessary but sufficient separation of flight planning areas and passenger waiting areas were required.

In airline hub terminals, commuters object considerably to what they call their "second class citizen" status. More effective integration of commuter areas with certificated air carrier areas for interlining passengers are desired. Security screening and basic economics continue to hamper this integration but some certificated airlines, recognizing the benefit of the commuter feeder role, are assisting.

In some cases commuters are requested by ATC to make quite rapid descents in hub areas in order to blend into higher speed traffic (leading to a desire for pressurization). Alternatively, however, they can sometime enjoy faster processing due to their ability to use shorter runways.

E. Economic Characteristics

There did not appear to be any strong regional differences in direct operating costs (DOC's) for similar aircraft. Selected DOC's/block hour varied as follows:

Cessna 402	$75 - $100/hr

Piper Navajo	$ 89 - $125/hr
Beech 99	$130 - $175/hr
DHC-6 Twin Otter	$112 - $170/hr
Grumman Goose	$131 - $140/hr

Indirect to direct operating cost ratios (IOC/DOC) were assessed as a measure of indirect costs. Nine operators reported such ratios in the 0.8 to 1.0 range, six in the 0.6 to 0.8 range, and seven in the 0.4 to 0.6 range. Two reported ratios of less than 0.4.

Most all of the carriers interviewed derived over 90% of their revenue from passenger service with non-passenger revenue averaging 8.5%.

Fuel costs varied considerably. Variation of the lowest fuel price paid was between 33¢/gallon in the Midwest to 71¢/gallon in the New England region. The average, lowest price was 48¢/gallon.

F. Institutional Issues

The pros and cons of CAB certification appeared to be the major institutional issue of interest to the operators surveyed -- including the closely related issues of subsidy, equipment loan eligibility and route protection. Unionization was also expressed as a concern.

Six carriers interviewed favored full CAB certification with ten favoring a limited form and 13 against any form. Route protection was not of major concern to most commuters and the majority responding in the interviews were also against subsidy (18 out of 29). Most (21 out of 28) favored eligibility for loan guarantees. Regional distribution varied with most Western carriers interviewed favoring full certification and most non-CONUS against any form. The New England carriers favored subsidy more than carriers in other regions. Thirteen of the carriers were unionized with most unionized operators expressing resultant economic concerns.

II. INTRODUCTION

Since the early 1960's a new type of scheduled air carrier has been emerging throughout the U.S. and the Caribbean. These carriers are providing service to smaller communities and on shorter route segments than can be profitably served by the trunk and local service airlines. Originally called "scheduled air taxis" or "third level" carriers, such operators have exhibited significant growth in the last ten years. Typically using small (8- to 19-passenger) aircraft, they have been able to provide reliable, frequent service in short-haul markets, and have emerged as a significant part of the national transportation system.

In 1969 the Civil Aeronautics Board (CAB) formally established such carriers as "commuter air carriers". They were formally defined as carriers who (1) performed at least five round trips per week between two or more points in accordance with published flight schedules, or (2) which transported mail under contract to the U.S. Postal Service. Unlike the trunk and local service carriers, commuters are not regulated, per se, by the CAB as long as they operate aircraft with capacities of less than 30-passengers (7500# payload). Basically, the commuters operate under an exemption to the Federal Aviation Act of 1958, which was enabled by CAB Economic Regulation (ER), Part 298. Although not regulated by the CAB, commuter air carriers are required to carry certain insurance minimums and report certain traffic statistics on a quarterly basis. (The reported data is held confidential for one year by the CAB to protect the commuter's competitive position.) Alternatively, commuter air carriers are not currently eligible for certain benefits of certification by the CAB such as subsidy, route protection, or equipment loan guarantees.

Commuter air carriers, as commercial operators, are required to operate under commercial operating rules and requirements specified in Federal Aviation Regulations (FAR's) Part 135 or Part 121. Carriers operating aircraft less than 12,500 pounds gross weight must conform with Part 135 which deals with personnel qualification and training requirements,

maintenance requirements, and certain aircraft operating rules. Operators of aircraft over 12,500 pounds gross weight are required to operate under a special part of FAR Part 135 (135.2) or FAR Part 121 with more stringent maintenance requirements, personnel qualifications and training, flight dispatch and safety related requirements. Currently, the FAA is taking steps to revise the basic Part 135 to permit operation of aircraft up to 30-passengers (7500 # payload) similar to the CAB requirements.

Table I provides a regulatory overview of commuter airlines in comparison with certificated and intrastate airlines insofar as primary CAB and FAA regulations are concerned. Figure 1 provides a further comparison of these primary CAB and FAA regulations in relation to aircraft size and operator cost.

In view of the rising significance of the commuter industry as a part of the national transportation system, NASA Ames requested The Aerospace Corporation to provide a concise overview of the industry in the United States and Puerto Rico to provide a framework for an eventual assessment of potential technology directions that may be of benefit to the industry. This overview is presented in this report in a manner that identifies the various carrier market characteristics, aircraft selection, and economic characteristics on an industry-wide as well as a regional basis. After a brief discussion of study methods and industry-wide statistics, the following sections present regional-level discussions of market characteristics, patronage characteristics, aircraft, operational reliability and safety, airport requirements, economic characteristics, and institutional issues.

TABLE I - REGULATORY OVERVIEW

CARRIER TYPE	ECONOMIC REGULATION	PRINCIPAL AIRCRAFT SIZE	FAA PRIMARY COMMERCIAL OPERATIONAL REGULATION
TRUNK	CAB, FEDERAL AVIATION ACT OF 1958 - CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY	>30 PASS.	FAR PART 121
LOCAL SERVICE	CAB, FEDERAL AVIATION ACT OF 1958 - CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY	>30 PASS.	FAR PART 121
INTRASTATE	STATE ONLY (IF REQUIRED)	>30 PASS.	FAR PART 121
COMMUTER	STATE ONLY (IF REQUIRED)(2)	>12,500 # GROSS WT. (APPROX. 19 PASS)(1)	FAR PART 121
		<12,500 # GROSS WT. (APPROX. 19 PASS.)	FAR PART 135

(1) AIRCRAFT EXEMPTION REQUIRED FROM CAB IF >30 PASSENGER (7,500 # PAYLOAD) AIRCRAFT IS USED

(2) COMMUTERS ARE EXEMPT FROM CAB CERTIFICATION AND ECONOMIC REGULATION VIA ER PART 298 BUT ARE REQUIRED TO REGISTER WITH CAB, CARRY MINIMUM INSURANCE AND REPORT SELECTED TRAFFIC STATISTICS

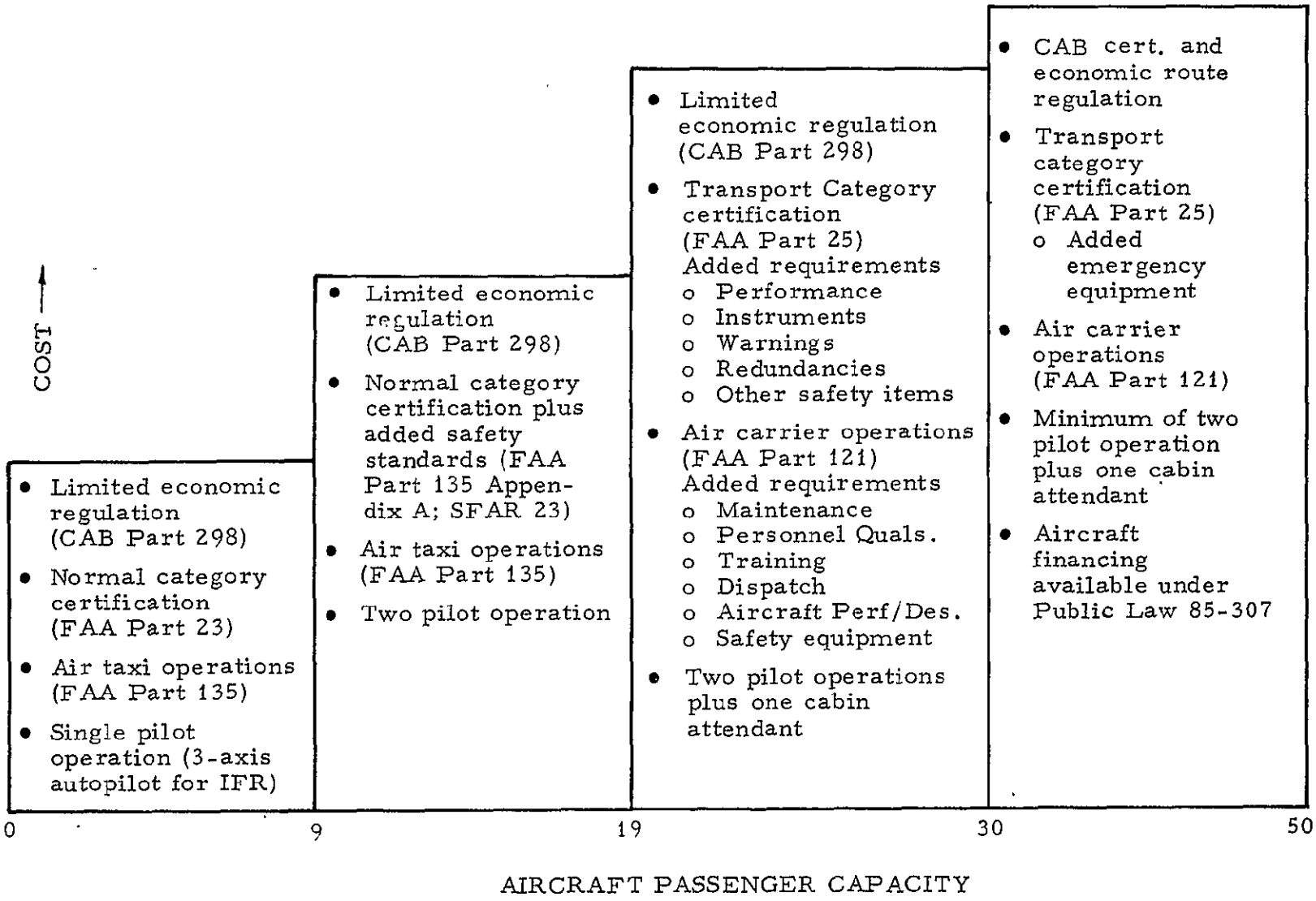

FIGURE 1 - IMPACT OF AIR CARRIER REGULATIONS ON COST

III. STUDY METHODS

A. Operator Interviews

In order to obtain information on commuter airline operations as a function of region and market type, an interview survey was designed and conducted. Although a statistically significant sample size was not possible, commuter carriers were selected which appeared to represent a good cross-section of different type and sizes of operations in each region, including hub and spoke, linear, shuttle, and recreational markets. Prior to the interviews, pre-contact letters were sent to each of 32 airlines, outlining discussion topics and data needs. Personal interviews were conducted with the management of 24 airlines, and telephone interviews were conducted with the remaining eight airlines (the latter were primarily those outside of the contiguous 48 states). The sample represented approximately 20% of all passenger-carrying commuters, and included two recently certificated carriers and one all-cargo airline.

Tables II and III list the participating commuters and the major discussion topics. With few exceptions, all of the airlines were extremely cooperative and considerable data was obtained. In order to generally preserve the anonymity of the participants, airlines have been designated by number or letter rather than name in the subsequent sections. Regions were also defined as shown in the map of Figure 2 to provide a framework for regional data aggregations. Kentucky and West Virginia were included in the Southern Region due to similarities of market type and size in these states with other Southern states. Alaska, Hawaii, and the Caribbean were considered as a single group, since they share some common characteristics as far as commuter air service is concerned. Table IV summarizes the distribution of the surveyed commuters based in each region, as well as their traffic statistics. Note that the sample includes 48% of all commuter traffic (including nine of the 13 most active commuter airlines). Aggregation by market type indicates that there are ten hub and spoke, 15 linear, three shuttle, and four recreational operators.

TABLE II - COMMUTER AND CERTIFICATED AIRLINE CONTACTS

Air Carolina
*Air Midwest
*Air New England
Air Wisconsin
Alaska Aeronautical
Altair Airlines
Antilles Air Boats
Atlantic City Airlines
Bar Harbor Airlines
Cascade Airways
Catalina Airlines
Cochise Airlines
Cumberland Airlines
Execuair Airlines
Florida Airlines
Golden West Airlines
Metro Airlines
Midstate Airlines
New England Airlines
Pilgrim Airlines
Puerto Rico International Airlines
Rio Airways
Rocky Mountain Airways
Royal Hawaiian Airways
Scenic Airlines
Seaplane Shuttle Transport
+SMB Stagelines
Swift Aire Lines
Sky West Aviation
Suburban Airlines
Tyee Airlines
Zia Airlines

* Currently certificated

+ Cargo only

TABLE III - INTERVIEW DISCUSSION TOPICS

- Current Route and Traffic Characteristics
  - Current and historical patronage (e.g., CAB Form 298C data)
  - Weekly and seasonal variations
  - Traveler characteristics (trip purpose, aprty size, etc.)
  - Market growth since service institution
  - Market boundaries
  - "Rules of thumb" in assessing market opportunities (e.g., minimum distance from major hub, minimum community population, non-stop vs. multi-stop service, minimum service frequencies)
- Airport Requirements
  - Minimum facility requirements (required landing/navigational aids, lighting, terminal facilitity, access modes)
  - Future airport needs
- Current and Desired Aircraft Characteristics
  - Reasons for current aircraft selection and comments on acceptability, utilization, maintenance, etc.
  - Desired future aircraft capacity (30-passengers; 55-passengers)
  - Comments on operating under FAR Part 121 using aircraft heavier than 12,500 lbs.
  - Desired future aircraft features (capacity, speed, range, avionics, type of propulsion, desired investment and operating costs, etc.)
  - Comments on where technology development is required
- Institutional Issues
  - Discussion of current institutional issues facing the industry
    - / CAB certification (full, partial)
    - / Subsidy needs (federal, state, local)
    - / Joint fares, other interline agreements
    - / State regulation
    - / Equipment loan guarantees
    - / Unionization
    - / Equal OAG listings
    - / Fuel allocation and pricing
  - Potential impacts of regulatory reform as proposed by the Aviation Act of 1975 or other pending legislation
- Economic Characteristics
  - Direct operating costs, aircraft utilization, indirect operating costs
  - Revenue sources (passenger, cargo, mail, other)
  - Return on investment

Regional Groupings for Commuter Airline Survey

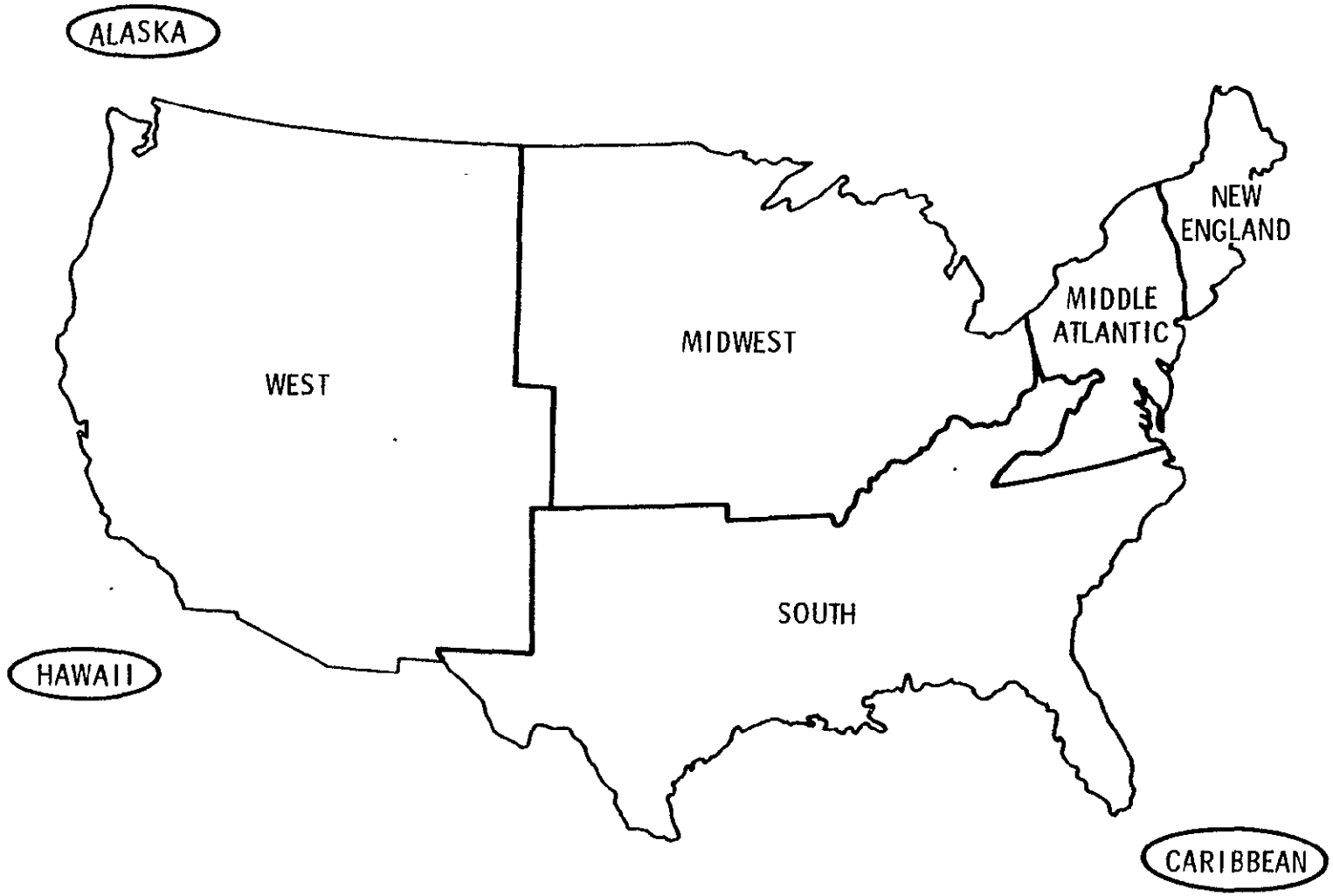

FIGURE 2

TABLE IV - COMMUTER AIRLINE SURVEY

REGION	NO. OF COMMUTERS SURVEYED	ANNUAL PASSENGERS CARRIED(000)	% OF TOTAL REGIONAL PASSENGERS
NEW ENGLAND	5	733	91
MIDDLE ATLANTIC	4	333	15
SOUTH	4	534	44
MIDWEST	4	301	25
WEST	10	1018	69
ALASKA, HAWAII AND TERRITORIES	5	1391	79
TOTALS	32	4310	48

B. Government/Industry Association Interviews and Literature Surveys

In addition to the visits and telephone interviews with the commuter air carriers, a number of interviews were held with personnel of government agencies and industry associations which interact with the commuter airline industry. Discussions were held with representatives of the CAB, the FAA, and the NTSB regarding institutional, regulatory and safety issues. Interviews were also held with representatives of the Commuter Airlines Association of America to obtain current industry-wide viewpoints and positions on operational matters, as well as institutional and regulatory issues.

In addition to the data obtained by the aforementioned methods, literature surveys were accomplished. Commuter industry publications were reviewed, as well as a number of reports published by the CAB and the DOT regarding the commuter industry in general, service to small communities and regulatory issues. Periodicals, including Aviation Daily, were also reviewed to obtain current information on many of the issues investigated.

Data developed as a result of a number of commuter air service studies accomplished by The Aerospace Corporation were also reviewed for relevance to this study. These studies involved extensive analyses of commuter air service in various regions of the country and were used to provide background data to supplement the information obtained from other sources.

IV. INDUSTRY OVERVIEW

As shown in Table V, the number of commuter air carriers involved principally with passenger service has increased approximately 42% to the 1975 level of 163. In addition to these carriers, there are currently 70 more than are registered with the CAB but carry only cargo and/or mail. Over 6.7 million passengers were carried in 1975, representing a 56% increase over the previous five years. The amounts of mail and cargo carried also showed significant advances. Almost 70% of the passengers carried by the commuter air carriers were interlining at a major airport - either returning from, or going to, a further destination on a certificated carrier. This statistic illustrates the "feeder" nature of commuter carriers. It should be pointed out, however, that over 2 million passengers (the remaining 30%) used the air service to directly access the commuter's service points for business or pleasure purposes (origin and destination passengers).

Table VI illustrates the significant impact that commuter air carriers have over the provision of scheduled air service to smaller communities. Without commuters, approximately 32% of the 970 communities in North America that are currently served would receive no scheduled air service whatsoever. Some 66% are receiving better service by virtue of the commuter air carrier industry. In particular, the smaller community that cannot profitably be served by the trunk and local service carriers operating their larger prop jet and jet equipment particularly benefits. In 1975, of the served communities with populations under 50,000 persons, 273 were served by commuters.

Table VII illustrates the regional distribution of this service. Slightly smaller regions were used for this overview presentation than were used to aggregate the survey data as CAB data was readily available by state. As would be expected, the higher percentage of passengers carried are in the denser population regions of the mid-Atlantic Coast. The islands in the Caribbean, with no significant high speed alternative to

TABLE V - THE COMMUTER AIR CARRIER INDUSTRY[1]

	1970	1975	%INCREASE
NUMBER OF CARRIERS[2]	115	163	+42
PASSENGERS CARRIED (65-70% CONNECTING, 30-35% O&D)	4.3 MILLION	6.7 MILLION	+56
MAIL	73,479 LBS	164,682 LBS	+124
CARGO	43,527 LBS	169,203 LBS	+289

(1) PER CAAA ANNUAL REPORT "TIME FOR COMMUTERS", OCTOBER 1976

(2) PUBLISHED SCHEDULES IN OAG

TABLE VI - THE COMMUTER AIR CARRIER INDUSTRY[1]

- O 970 COMMUNITIES IN NORTH AMERICA RECEIVE SCHEDULED PASSENGER SERVICE
  - o COMMUTERS SERVE 636 OR 65.6%
  - o COMMUTERS EXCLUSIVELY SERVE 314 OR 32.4%
- O 647 COMMUNITIES IN THE CONTIGUOUS 48 STATES RECEIVE SCHEDULED PASSENGER SERVICE
  - o COMMUTERS SERVE 414 OR 64% (218 EXCLUSIVELY)
  - o LOCAL SERVICE CARRIERS SERVE 391 OR 60% (151 EXCLUSIVELY)
  - o TRUNK CARRIERS SERVE 195 OR 30% (13 EXCLUSIVELY)
  - o INTRASTATE CARRIERS SERVE 27 OR 4%
- O IN TERMS OF COMMUNITY POPULATION:
  - o 0 - 25,000 PERSONS - COMMUTERS SERVE 193, LOCAL SERVICE 131, TRUNKS 19
  - o 25,000 - 50,000 PERSONS - COMMUTERS SERVE 80, LOCAL SERVICE 88, TRUNKS 30
  - o OVER 50,000 PERSONS - COMMUTERS 141, LOCAL SERVICE 172, TRUNKS 146

[1]PER CAAA ANNUAL REPORT, "TIME FOR COMMUTERS", OCTOBER 1976

aircraft, also exhibit a high use of commuter air carriers. The less population-dense regions in the Pacific Northwest and West result in a lower percentage of total passengers carried but involve the larger distances from the smaller communities to the major population centers. Average trip lengths of 150 miles are not unusual in the larger Western states as compared to trip lengths of 109 miles in the mid-Atlantic Coast region and even shorter average trip lengths in the Caribbean and Hawaii. Tables VIII and IX further illustrates the service and patronage distribution among the noted regions.

Table X illustrates typical characteristics of the aircraft used by commuters in 1975. Although the highest number of aircraft type was the older Beech 18, most of these are used in non-passenger service by the cargo and mail carriers. In the 8- to 10-passenger category, the Cessna 402 and Piper Navajo series are very popular. The Beech 99 dominates the 15-passenger category with the DeHavilland Twin Otter preferred in the 19-passenger category. The recently introduced Swearingen Metro, however, is gaining popularity in the latter category due to its higher speed, pressurization, and aesthetic design. The Nord 262 is the most popular 19- to 30-passenger aircraft but the new Shorts SD 3-30 is expected to see significant application.

TABLE VII - NATIONAL COMMUTER DATA (1975)

Region	No. States	Points[1] Served	Markets Served	Pass.[2]	No. of Based Carriers[3]	Avg. Trip Length
PACIFIC NORTHWEST (IA, OR, WA)	3	28	112	310,000	11	153
WEST COAST (CA)	1	49	123	712,000	14	77
WEST (NV, UT, AZ, NM, CO, WY, MT)	7	63	217	464,000	16	161
SOUTHWEST (OK, TX, AR, LA)	4	43	84	580,000	12	106
MIDWEST (ND, SD, NE, KS, IA, MO)	6	33	121	331,000	12	115
GREAT LAKES (MN, WI, IL, MI, IN, OH)	6	52	177	898,000	23	153
NEW ENGLAND (ME, NH, MA, CT, VT, RI)	6	26	114	397,000	13	132
MID ATLANTIC COAST (NY, NJ, PA, DE, DC, MD, VA)	6 + DC	60	356	2,224,000	25	109
SOUTH (WV, KY, TN, NC, SC, GA, AL, MS, FL)	9	59	216	363,000	20	125
ALASKA (AK)	1	153	N/A	196,000	6	80
HAWAII (HI)	1	12	69	174,000	3	81
CARIBBEAN (PR, VI, BH, ETC.)	--	31	112	1,400,000	6	70

(1) CAAA ANNUAL REPORT, "TIME FOR COMMUTERS" 10/76 - ALL OTHER DATA, "COMMUTER AIR CARRIER TRAFFIC STATISTICS, YEAR ENDING 12/31/75

(2) INTERSTATE PASSENGER DOUBLE COUNTED IN EACH STATE IN REGION

(3) INCLUDES CARGO AND MAIL CARRIERS

TABLE VIII - NATIONAL COMMUTER DATA (1975)

REGION	AVG. PASS. PER MARKET	AVG. PASS. PER POINT	AVG. PASS. PER BASED CARRIER
PACIFIC NORTHWEST (IA, OR, WA)	2,800	11,100	28,200
WEST COAST (CA)	5,800	14,500	50,900
WEST (NV, UT, AZ, NM, CO, WY, MT)	2,100	7,400	29,000
SOUTHWEST (OK, TX, AR, LA)	6,900	13,500	48,300
MIDWEST (ND, SD, NE, KS, IA, MO)	2,700	10,000	27,600
GREAT LAKES (MN, WI, IL, MI, IN, OH)	5,073	17,300	39,000
NEW ENGLAND (ME, NH, MA, CT, VT, RI)	3,500	15,300	30,500
MID ATLANTIC COAST (NY, NJ, PA, DE, DC, MD, VA)	6,200	37,100	89,000
SOUTH (WV, KY, TN, NC, SC, GA, AL, MS, FL)	1,700	6,200	18,000
ALASKA (AK)	1,700	N/A	32,700
HAWAII (HI)	2,500	14,500	58,000
CARIBBEAN (PR, VI, BH, ETC.)	12,500	45,200	233,300

TABLE IX - NATIONAL COMMUTER DATA[1]

REGION	PASSENGERS CARRIED[2]	% OF TOTAL
PACIFIC NORTHWEST	310,000	4
WEST COAST	712,000	9
WEST	464,000	6
SOUTHWEST	580,000	7
MIDWEST	331,000	4
GREAT LAKES	898,000	11
NEW ENGLAND	397,000	5
MID ATLANTIC COAST	2,224,000	28
SOUTH	363,000	5
ALASKA	196,000	2
HAWAII	174,000	2
CARIBBEAN	1,400,000	17

[1] "COMMUTER AIR CARRIER TRAFFIC STATISTICS, YEAR ENDING 12/31/75"

[2] INTERSTATE PASSENGERS DOUBLE COUNTED

TABLE X - REPRESENTATIVE COMMUTER AIRCRAFT

Passenger Capacity	Aircraft	No. Used by Commuters in 1975	Approximate 1975 New Investment Cost (Equipped) ($)	Direct 1975 Operating Cost ($/hr)[a]	Approximate Cruise Speed (MPH)
4-6	Piper Aztec E (Turbo)	51	134,000	65	210
	Aero Commander	11	172,000	56	203
	Cessna 310	9	134,000	52	213
8-10	Beech 18	185	59,000 (used)	61	214
	Cessna 402B	89	177,000	67	215
	Piper Navajo (Turbo)	65	180,000	72	218
	Piper Navajo (Chieftan)		218,000	85	246
	Britten Norman Islander (BNI)	30	171,000	64	160
10-15	Beech 99	93	700,000	152	282
	DH 104 Dove (Riley Conversion)	7	b	b	250
15-19	DHC-6 Twin Otter	59	769,000	161	197
	DH 114 Heron	44	b	b	183
	Shorts Skyvan	10	829,000	159	195
	Swearingen Metro	15	874,000	182	296
19-30	Nord 262	10	2,000,000[c]	b	233
	Mohawk 298	0	b	b	b
	SD3-30	0	1,500,000	b	227

[a] 2,500 hours yearly utilization [b] Not available [c] New production cost

V. MARKET AND PATRONAGE CHARACTERISTICS

A. General Market, Route, and Service Features

Due to the diverse nature of the nation's smaller communities' varying service needs, commuter air carrier market characteristics, route structures, and service pattterns will vary considerably across the country. Markets that have a potential for successfully supporting commuter air service will range from very short haul markets serving interlining passengers to the longer distance, linear route structures oriented toward collecting passengers to permit the conduct of a day's business in a major population center and a return on the same day. Special recreational markets also exist involving air service from a major population center to a resort area. In general, however, there are certain common characteristics that define any market with a potential for successful commuter air service. Table XI summarizes a few of these generalized features which are discussed below.

All major commuter markets and route structures have the common characteristics of connecting outlying communities with a major city or airline hub. Although the purposes for travel may differ somewhat, such a population center is fundamental at one or both ends of a commuter route structure. Additionally, the markets must not be a significant distance from this hub. Not only does the propensity for travel to a particular city decrease as distance increases, but commuter air carriers are confronted with passenger tolerance limits associated with long travel times in smaller, slower aircraft. Noise levels and effects of turbulence are also more pronounced in these aircraft. Typical stage lengths flown by commuters are discussed in more detail in later sections but will range from less than 100 miles in some regions to over 200 miles in others.

A minimum distance also exists that is necessary to attract a traveler from his automobile or slower surface transportation modes. The effective minimum distance will vary from region to region and is, in fact, a direct function of trip purpose, available alternative modes, and relative costs

TABLE XI - TYPICAL COMMUTER MARKET CHARACTERISTICS

- O MAJOR CITY OR AIRLINE HUB REQUIRED AT ONE OR BOTH ENDS OF ROUTE
- O SHORT HAUL (AVERAGE 1975 STAGE LENGTH WAS 110 MILES)
  - o AIRCRAFT LIMITATIONS
  - o PROPENSITY FOR TRAVEL
  - o CERTIFICATED AIRLINE COMPETITION
- O ISOLATED COMMUNITY WITH FEW TRANSPORTATION ALTERNATIVES
- O MINIMUM COMMUNITY DISTANCE FROM POPULATION CENTER OR HUB (DEPENDING ON TRAVEL TIME AND AVAILABLE ALTERNATIVES MODES)
  - o EAST - 50-60 MILES
  - o WEST - 75-100 MILES
- O PHYSICAL BARRIERS (WATER, MOUNTAINS)
- O MAJOR BUSINESS OR RECREATIONAL ATTRACTION

and travel times. Normally, however, distances must exceed 50-60 miles to divert a traveler to air service and may exceed 100 miles in Western regions where travelers are more used to driving long distances. This distance will also vary with trip purpose. An interlining passenger that will not require his car at the commuter's destination will be attracted to commuter air service at a lesser distance than the passenger who wishes his car available at the destination to conduct a day's business.

Physical barriers also play a prominant part. Islands or peninsula communities separated from a major hub by bodies of water or communities separated by mountain ranges are normally good candidates for air service consideration. Isolation and available transportation alternatives available to the community also become important considerations. A small community with little or no bus service and a reasonable distance from a hub is naturally a better candidate for air service than the same community with reasonably frequent (and lower cost) surface modes available. Communities that have major business activities or nearby recreational attractions (and are a reasonable distance from a hub), also become attractive candidates.

Depending upon the geographic characteristics of the primary markets and the hubs to which they are attracted, a number of routing and service concepts may be used. Close-in communities geographically located around an airline hub and which generate significant interlining travel, will normally be served by a "hub and spoke" route structure. This is also true of relatively short stage length markets around a hub that may exhibit significant origin and destination travel. Alternatively, smaller communities spaced greater distances from a hub will be normally served by a more linear route structure. Such route structures may involve one or two stops oriented toward "collecting" passengers to attain appropriate load factors for the operator. Linear route structures are also used to serve smaller communities between two large hubs with scheduling more oriented toward non-stop service in each direction. Either linear or hub

and spoke routes can serve recreation markets depending upon their geographic characteristics. Finally, some operators have instituted short distance "shuttle type" service by providing high frequency flights from close-in outlying points to a transportation hub or major population center when significant travel is generated or major physical barriers are involved. Table XII identifies typical examples of these types of route structures as well as the type of patronage served in selected areas of the country.

Most commuter operators will provide no less than two round trips per day between outlying communities and the major population center of interest. Many feel that three of four round trips per day are necessary to further develop and manitain any market. Such service must further be scheduled to provide a businessman with early morning departures from the outlying community and evening returns. It is also fundamentally necessary to provide timely interline connections to serve the interlining passenger.

Although most operators prefer to serve their passengers with non-stop flights to their destination, some markets and route structures dictate the necessity of enroute stops. Depending upon the stage length and available transportation alternatives, one stop is usually tolerated by a passenger with two stops very marginal. More than two will almost always seriously degrade patronage.

B. Regional Market Analysis

The routes served by the surveyed commuter operators were analyzed to determine how they differed by region. Figure 3 shows the number of cities currently served in each region, grouped by city size. As expected, in the Middle Atlantic region, which is the most populous, almost 50% of the cities served have populations in excess of 500,000, while in the West and non-CONUS[1] regions, most of the cities served have less than 25,000

[1] Non-continental United States and Caribbean - Alaska, Hawaii, and U.S. Caribbean territories.

TABLE XII - TYPICAL COMMUTER ROUTE STRUCTURES

TYPE	EXAMPLES	PREDOMINANT PATRONAGE
HUB AND SPOKE (INTERCITY)	RANSOME (PHILA/WASH., D.C.)	O&D
	AIR ILLINOIS (SPGFLD-CHICAGO)[1]	O&D
HUB AND SPOKE (INTERCITY)	METRO AIRLINES (HOUSTON/DFW AREA)	INTERLINE
	EXECUAIR (CENT. WASH.-SEATTLE/ PORTLAND)	INTERLINE
HUB AND SPOKE (INTRAURBAN)	GOLDEN WEST (L.A. AREA)	INTERLINE
HUB AND SPOKE (RECREATIONAL)	KEY AIRLINES (S.L.C.-SUN VALLEY)	INTERLINE
	ROCKY MTN AIRWAYS (DEN-COLO. SKI RESORTS)	INTERLINE
	SIERRA PACIFIC (L.A.-SKI RESOURTS)	INTERLINE/O&D
LINEAR (INTERCITY)	AIR WISCONSIN (WISCONSIN-MINN/CHI)	INTERLINE/O&D
	CASCADE (EAST. WASH.-SEATTLE/ PORTLAND)	INTERLINE/O&D
	SKY WEST (S.W. UTAH-S.L.C.)	O&D
LINEAR (RECREATIONAL)	AIR WISCONSIN (NORTHERN WISC.)	O&D
SHUTTLE (RECREATIONAL)	CATALINA AIR (LONG BCH-CATALINA IS.)	O&D
SHUTTLE (INTERCITY)	SEAPLANE SHUTTLE (NEW YORK CITY AREA)	O&D

(1) CURRENTLY OPERATING AS AN INTRA-STATE AIRLINE ON THIS ROUTE

Survey Data
Commuter Air Service to Cities by City Size and Region

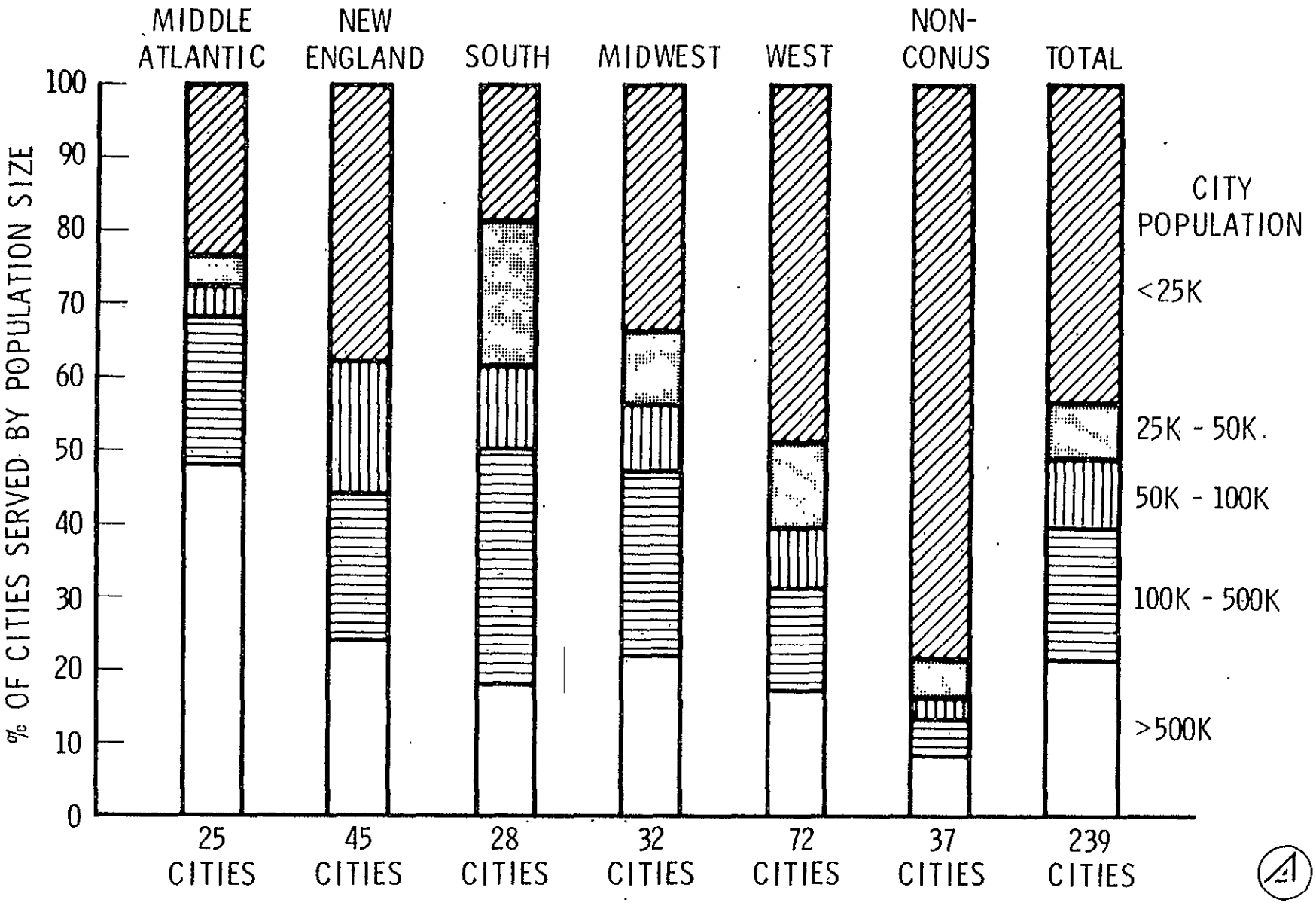

FIGURE 3

population. For analyzing many of the other airline characteristics, a matrix technique was developed in which a characteristic was grouped in rows by region, and in columns by market type. Table XIII shows this technique as applied to average stage length. It is easily seen that the shorter stage lengths apply to the Middle Atlantic, where the cities are most dense, and the non-CONUS region, where there are many islands close together, and no competition from other intercity travel modes. It is further seen that linear routes usually involve the larger stage lengths, while shuttle service is generally quite short.

Two of the market-related survey questions dealt with "rules of thumb" developed by commuter airline operators when instituting new service. The first of these addressed the minimum intercity distance for such service, while the second related to the market area radius from which patronage is drawn (in miles, or minutes of driving time). Although some operators did not have such rules, others did, and their responses are shown in the region/market type matrix format in Table XIV. It is seen that markets served by linear routes in the Midwest and West are fairly large, with shorter routes predominant for hub and spoke and shuttle operations, and for all operations in Alaska, Hawaii, and the Territories. No strict rules of thumb were developed in regard to growth of new routes. In some cases as much as 80% of the final patronage developed in the first few months of operation, while others took one or two years of steady growth to reach maturity. The biggest factors seemed to be competition (other ground transportation modes as well as other airlines) and service frequency, rather than distance or population per se. Some operators also observed that moderate fare changes had little effect on patronage. Adding an intermediate stop to a non-stop route also generally had little effect, but more than one stop would seriously degrade the demand.

C. Patronage

The results of the survey indicated that on a market-type basis, the

TABLE XIII

AIRLINES SURVEYED BY MARKET TYPE (32 TOTAL)

AVERAGE STAGE LENGTH (MI)

REGION	HUB AND SPOKE	LINEAR	SHUTTLE	RECREATIONAL
NEW ENGLAND	137	126 , 179 , 117	17	
MIDDLE ATLANTIC	49 , 74	93	60	
SOUTH	108 , 71 , 121			117
MIDWEST		144 , 206 , 203		
WEST	51 , 152	214 , 145 , 165 , 167 , 159	32	176 , 114
ALASKA, HAWAII AND TERRITORIAL	78 , 85	53 , 85		73

TABLE XIV

AIRLINES SURVEYED BY MARKET TYPE (32 TOTAL)

MARKET RULES-OF-THUMB

REGION	HUB AND SPOKE	LINEAR	SHUTTLE	RECREATIONAL
NEW ENGLAND	80 60 MIN.	55 100 - 70	18	
MIDDLE ATLANTIC	55 55 (30 MIN) (30 MIN)	40 (30 MIN)	60	
SOUTH	50 23 50 30 50 50			80 30
MIDWEST		50 100 90 - 70 20		
WEST	24 60 -- (30 MIN)	100, 60, 80, 100 20 - (30MIN) 15	22 -	100 - - -
ALASKA, HAWAII AND TERRITORIAL	50 10 10 -	28 16 - -		52 -

UPPER NUMBER - MINIMUM DISTANCE REQUIRED TO INSTITUTE AIR SERVICE IN MILES

LOWER NUMBER - MARKET AREA RADIUS MI. OR (MINUTES)

linear and hub and spoke markets jointly accounted for the largest portion of the travel demand, with the recreational market next, and the shuttle market least.

The survey attempted to define the characteristics of trip purpose and type of trip, i.e., connecting versus origin and destination (O&D) passengers, and to classify these by market type and region. Very little "hard" data was collected on trip purpose since the commuter airlines' budgets do not generally permit extensive passenger surveys. Most of the airlines operators had a good "feel" for their clientele, however, and provided estimates of business versus non-business travel. Data on connecting versus O&D trips was much easier to obtain as it could be derived from ticket sale information. On a market-type basis, the hub and spoke operations are primarily business-oriented, and consist largely of connecting rather than O&D passengers. Of the ten airlines conducting hub and spoke operations, the average business fraction was 75%. The average percent connecting totaled 81% (unweighted), but of the ten airlines, seven out of the ten reported a connecting fraction of 94% or greater. The 15 airlines in the linear markets had an unweighted business fraction averaging 66%, and an average connect percentage of 68%. As expected, the recreational markets were primarily non-business, and most were O&D type trips rather than connecting trips.

In examining the regional aspects of the travel characteristics, it was observed that there appears to be more non-business travel in the West and non-CONUS regions than in the East or South. The same observation was true in regard to O&D trips as opposed to connecting trips, with more of these taking place in the West and non-CONUS regions.

The survey also obtained data on both weekly and seasonal demand levels for commuter airlines. With respect to the weekly variations, there seems to be no correlation on either a regional or market-type basis. In 90% of the responses, Friday was listed as the heaviest travel demand for the week with Monday second, Thursday third and Saturday being the

least traveled day. Seasonal variations did not appear to be correlated with market type. On a regional basis, however, summer travel was listed as heaviest in the Midwest, West, and non-CONUS regions, while in the Northeast, Middle Atlantic and South regions, there were many airlines which experienced uniform demand over all seasons as well as some which still listed summer as the heaviest.

D. Regional Survey Summary Data

Tables XV to XX summarize the individual carrier market and patronage data by region as obtained from the interview surveys.

TABLE XV - NEW ENGLAND REGIONAL MARKET AND PATRONAGE CHARACTERISTICS

	A	B	C	D
Route Type	Hub & Spoke	Linear	Linear	Shuttle
Average Stage Length (MI)	140	180	120	20
Passengers/Year (000)	125-150	50-75	100-125	0-25
% Business	90	60	50	---
% Connecting	67	75 (Hub Route)	90, 30 (Hub Routes)	0
Heaviest Days	Thurs, Fri	Weekdays	Thurs, Fri	Fri, Sun.
Heaviest Season	Fall/Spring	Summer	Uniform	Summer
Minimum Distance for Air Service (MI)	80	100	(1/3 auto time)	18
Market Area	60 Minutes	70 Miles	---	---
Completion Factor (%)	---	98	---	95
Number of Cities Served (By 1970 City Population)				
< 25,000	2	3	1	3
25-50,000	0	0	0	0
50-100,000	4	1	1	0
100-500,000	3	1	3	0
> 500,000	3	2	4	0

TABLE XVI - MID-ATLANTIC REGION MARKET AND PATRONAGE CHARACTERISTICS

	A	B	C	D
Route Type	Hub & Spoke	Hub & Spoke	Linear	Shuttle
Average Stage Length	50	75	95	60
Passenger/Yr. (000)	50-75	125-150	75-100	0-25
% Business	50	Majority	80	100
% Connecting	99.5	98, 35 (major & minor hubs)	90	0
Heaviest Days	Mon, Fri	Mon, Fri	Mon, Fri	Tues, Wed, Thurs
Heaviest Season	Summer	Uniform	Summer	Uniform
Minimum Distance for Air Service (MI)	55	55	40	60
Market Area	30 Min	30 Min	30 Min	---
Completion Factor	98	98	95	90
No. of Cities Served (By 1970 City Population)				
< 25,000	1	0	5	0
25-50,000	0	0	1	0
50-100,000	0	0	1	0
100-500,000	1	4	0	0
> 500,000	1	3	6	2

TABLE XVII - MIDWEST REGION MARKET AND PATRONAGE CHARACTERISTICS

	A	B	C
Route Type	Linear	Linear	Linear
Average Stage Length (MI)	140	210	200
Passenger/Yr. (000)	200-225	25-50	50-75
% Business	80	65	60-85
% Connecting	67	75-80	---
Heaviest Days	---	Mon, Thurs, Fri	Fri, Sun
Heaviest Season	---	Summer	Summer
Minimum Distance for Air Service (MI)	50	100	90
Market Area	---	70-80 MI	20 Miles
Completion Factor	98	---	99
No. of Cities Served (By 1970 City Population)			
< 25,000	0	5	6
25-50,000	1	2	0
50-100,000	0	0	3
100-500,000	6	2	0
> 500,000	3	1	3

TABLE XVIII - WEST REGION MARKET AND PATRONAGE CHARACTERISTICS

	A	B	C	D
Route Type	Hub & Spoke	Hub & Spoke	Linear	Linear
Average Stage Length (MI)	50	150	210	145
Passenger/Yr (000)	350-375	25-50	0-25	0-25
% Business	70	85	90,50	85
% Connecting	94	50, 30 (major & minor hubs)	80, 10 (major & minor hubs)	50
Heaviest Days	Thurs, Fri, Mon	Thurs, Fri	Wed, Thurs, Fri	Mon, Fri
Heaviest Season	Summer	Summer	Summer	Summer
Minimum Distance for Air Service (MI)	25	60	100-125	60
Market Area	---	30 min.	20-25 min.	---
Completion Factor	---	---	---	98
No. of Cities Served (By 1970 City Population)				
25,000	4	0	8	2
25-50,000	0	1	0	2
50-100,000	3	1	0	0
100-500,000	3	0	0	1
500,000	1	2	1	0

TABLE XVIII - WEST REGION MARKET AND PATRONAGE CHARACTERISTICS (CONT'D)

	E	F	G	H	I
Route Type	Linear	Linear	Linear	Shuttle	Recr.
Average Stage Length (MI)	165	170	160	30 (Water Barrier)	180
Passenger/Yr (000)	125-150	125-150	25-50	50-75	100-125
% Business	---	65-70	75	40	20
% Connecting	60	75, 50	60	0	Small
Heaviest Days	Thurs, Fri	Fri, Mon	Mon, Fri	Fri, Sun.	Weekdays
Heaviest Season	Summer	Summer	Uniform	Summer	Summer
Minimum Distance for Air Service (MI)	80	100	110	22	100-200
Market Area	30 Min.	15 Min.	15-20 Min.	---	---
Completion Factor	95+	98+	---	---	99
No. of Cities Served (By 1970 City Population)					
< 25,000	3	0	6	1	6
25-50,000	1	3	2	0	0
50-100,000	2	0	0	0	0
100-500,000	1	3	1	0	1
> 500,000	2	3	1	1	0

TABLE XIX - SOUTHERN REGION MARKET AND PATRONAGE CHARACTERISTICS

	A	B	C	D
Route Type	Hub & Spoke	Hub & Spoke	Hub & Spoke	Recreational
Average Stage Length (MI)	110	70	120	120
Pass/Yr (000)	0-25	225-250	175-200	100-125
% Business	90	80	70-85	20
% Connecting	95+	95	99	80
Heaviest Days	Fri, Mon	Fri, Tues	---	Fri, Sun
Heaviest Season	Uniform	Uniform	Summer	Winter
Minimum Distance for Air Service (MI)	50	23	50	80
Market Area	30 Mi	50 Mi	50 Mi	30 Mi
Completion Factor	99	97	99	95-98
No. of Cities Served (By 1970 City Population)				
< 25,000	0	2	0	4
25-50,000	1	1	2	1
50-100,000	2	0	0	1
100-500,000	2	2	1	4
> 500,000	1	1	1	2

TABLE XX - NON-CONUS AND CARIBBEAN[1] REGION MARKET AND PATRONAGE CHARACTERISTICS

	A	B	C	D	E
Route Type	Hub & Spoke	Hub & Spoke	Linear	Linear	Recr.
Average Stage Length (MI)	80	85	85 (Water Barrier)	50 (Water Barrier)	75 (Water Barrier)
Passenger/Yr (000)	100-125	0-25	150-175	250-275	800-825
% Business	---	50	50	70-75	50
% Connecting	---	30	40	10	50
Heaviest Days	Mon, Fri	Uniform	Fri, Sun	---	Sat, Fri
Heaviest Season	Summer	Summer	Aug, Feb-Apr	Winter	Summer
Minimum Distance for Air Service (MI)	50	10	16	28	52
Market Area	10 Mi	---	---	---	---
Completion Factor	---	90	---	99+	99.9
No. of Cities Served (By 1970 City Population)					
< 25,000	6	4	8	6	5
25-50,000	0	0	1	0	1
50-100,000	0	0	0	0	1
100-500,000	1	0	0	0	1
> 500,000	0	0	1	1	1

(1) Non-Continental U.S. and Caribbean - Alaska, Hawaii, Puerto Rico, etc.

VI. AIRCRAFT CHARACTERISTICS

A. Current Aircraft

Table X of Section IV identifies representative aircraft used by commuters in 1975 along with selected investment and operating cost estimates and approximate cruise speeds. As can be seen from this table, the more popular contemporary aircraft are the Piper Aztec in the 4- to 6-passenger capacity range, the Cessna 402 and the Piper Navajo series in the 8- to 10-passenger range, the turboprop Beech 99 in the 10- to 15-passenger range and the turboprop Nord 262 in the 19- to 30-passenger range. As indicated earlier, however, the Swearingen Metro is gaining popularity in the 15- to 19-passenger range and the SD3-30 in the 19- to 30-passenger range.

Commuter's generally favor twin engine aircraft, although some single engine aircraft are selectively employed in the smaller markets. Passenger acceptance and speed/capacity considerations preclude any wide employment of a single engine aircraft. Further, the smaller 4- to 6-passenger twins are not favored extensively by commuters due principally to the need for "over the wing" passenger loading. Commuter airlines consider fuselage loading important. In the 8- to 10-passenger range, the Cessna 402 and Piper Navajo are generally preferred over other executive model twins in the same category due to their higher density seating. These aircraft also represent good performance characteristics short of upgrading to turboprop aircraft. Under VFR conditions, most carriers operate these aircraft with no more than nine passenger capacity to preclude the need for a second pilot as required under FAR Part 135 for aircraft carrying 10 or more passengers. Although most operators and aircraft in this category are qualified for single pilot IFR operations, many will still use a co-pilot under actual IFR conditions for obvious safety and redundancy reasons. The Beech 99, being the only contemporary aircraft bridging the gap between 10 and 19 passengers, dominates the market for those operators with seating capacities optimal in this range. The DeHavilland Twin Otter has been extremely popular in the 15- to 19-passenger category due to its reputation for good reliability, minimal

maintenance and short field performance. It is, however, a relatively slow aircraft with a low wing loading which makes it most suited for shorter haul, high density commuter markets with little or no turbulent weather conditions. The pressurized and much faster Swearingen Metro is being purchased in increasing quantities to serve the longer haul, 19 passenger markets. The Nord 262 dominates the higher density markets (principally in the East) although the newly introduced 30 passenger SD3-30 is gaining popularity. A new turboprop version of the Nord 262 (Mohawk 298) is also being introduced by Allegheny.

A few commuter operators currently operate aircraft with passenger capacities in excess of 30 which requires a specific exemption from the CAB. Commuters report that such exemptions take about 4 months to process with costs ranging from $8,000 in one case to almost $50,000 in another.

The current aircraft used by the commuter airlines participating in the survey activities are shown in Table XXI as a function of market type and region. It can be observed that no particular aircraft is used exclusively in any one market type or region. Discussions with the commuter operators indicated that the Twin Otter with its larger capacity and short field length capability (but slower speed) is generally more desirable for the shorter distance hub-and-spoke operations. The Beech-99 is used in the Midwest and the West on linear routes, primarily because of its higher speed. In some cases the maintainability and low operating costs were cited as primary reasons for selecting their existing aircraft. Special features dictated use of certain aircraft in unique situations. One example of this is the Grumann Goose which has a deep V-hull and corrision resistance which is optimally suited for water landings in rough sea states.

B. Future Aircraft

The survey requested comments from the commuter operators on those aircraft characteristics they felt would be important for their operations in the next five to ten-year period. Their answers were categorized by market type and region and are summarized in Table XXII. It can be seen that most

TABLE XXI

AIRLINES SURVEYED BY MARKET TYPE (32 TOTAL)

CURRENT AIRCRAFT

REGION	HUB AND SPOKE	LINEAR	SHUTTLE	RECREATIONAL
NEW ENGLAND	B-99 Nord 262	Twin Otter B-99	BNI	
MIDDLE ATLANTIC	Twin Otter	B-99 Navajo	Twin Otter	
SOUTH	Twin Otter Navajo B-99			DC-3 M-404
MIDWEST		Metro Cessna 402 B-99		
WEST	Twin Otter Navajo	Navajo Cessna 402 B-99 Heron	Grumman Goose	Metro Twin Otter
ALASKA, HAWAII, AND TERRITORIAL	Twin Otter DHC-2 (Floats)	Grumman Goose Cessna 402		Heron

of their needs can probably be satisfied by existing technology. Sixty percent felt that aircraft in the 19-to-30 passenger class would satisfy their capacity needs, 20% desired smaller aircraft and only 20% wanted aircraft with a passenger capacity larger than 30. The larger capacity was primarily needed in the Western Region for linear and recreational markets. Most operators prefer to increase frequency to accommodate increased passenger demand rather than employing a larger capacity aircraft.[1] Higher speed was only desired in 20% of the cases, primarily for those conducting linear operations in the Midwest and the Western regions.

As for aircraft range, the current range capability is generally adequate. Extended range was quoted as a desirable feature in some cases (1) to accommodate diversion of aircraft to alternate airports in bad weather conditions, (2) to take advantage of more inexpensive "home base" fuel, or (3) to reduce turn-around time. Most operators still desire a short take-off capability, especially in hub-and-spoke operations or where airports are at high altitudes. Comments on pressurization were evenly divided with only half of the total number surveyed indicating a need for pressurization. Most of this need was in the Midwest and Western regions (high MEA's, low-altitude turbulence), although many carriers operating into large hubs desired pressurization to permit rapid descents and thus reduce holds and ATC processing time. Although many operators considered pressurization a comfort feature, one Western operator points out the inherent safety in being able to more flexibly adjust altitude to avoid icing conditions. Table XXII also indicates that only 25% of those surveyed were willing to pay more than the current $40,000 to $50,000 per seat costs of existing commuter aircraft.

Specific comments were solicited on the technology improvements

[1] Some operators stated that, as a "rule of thumb," frequencies should be increased to approximately six round trips per day (at about 60% average load factors) before employing larger aircraft. Daily round trip frequencies should then be reduced to no less than four with the larger aircraft.

TABLE XXII - SUMMARY OF DESIRED AIRCRAFT CHARACTERISTICS

CHARACTERISTIC	BY REGION	BY MARKET TYPE	TOTAL SURVEY
CAPACITY (> 30 PASS)	REQ'T PREDOMINANT IN WEST, NON IN MID-ATLANTIC AND NON-CONUS	NEEDED FOR LINEAR & RECR'L, NOT FOR MOST HUB AND SPOKE OR SHUTTLE	> 30: 6
CAPACITY (19-30 PASS)	REQ'T PRINCIPALLY IN NEW ENGLAND AND MID-ATLANTIC	PRINCIPALLY IN HUB & SPOKE & LINEAR	19-30: 17
CAPACITY (< 19 PASS)	REQ'T PRINCIPALLY IN WEST AND WESTERN NON-CONUS REGIONS	ALL MARKETS EXCEPT RECREATIONAL	< 19: 6
SPEED	FASTER A/C ONLY NEEDED IN WEST AND MIDWEST	FASTER A/C REQ'D. FOR LINEAR OPERATIONS ONLY	< 200 KNOTS: 6 200-250: 16 > 250: 5
RANGE	SHORTEST RANGE IN NEW ENGLAND	NO CLEAR DIVISION BY MARKET TYPE	< 400 MI.: 8 400 TO 500: 11 > 500: 4
TAKE-OFF DISTANCE	NO CORRELATION BY REGION	SHORTER DISTANCES REQ'D FOR HUB AND SPOKE MARKETS, HIGH ALTITUDE MARKETS	< 3000 FT.: 9 3000 TO 4000: 5 > 4000: 3
PRESSURIZATION	MIDWEST AND WEST REQUIRE PRESS., NONE FOR NON-CONUS	NOT REQ'D FOR SHUTTLE MARKET, OTHER MARKETS MIXED	FULL: 13 PARTIAL: 2 NONE: 14
INVESTMENT COST $(000)/SEAT	NEW ENGLAND DESIRES LOWEST COST, WEST WOULD PAY HIGHEST	NO CLEAR DIVISION BY MARKET TYPE	< 40: 8 40 TO 50: 8 > 50: 5

which the operators would desire in the future. These are grouped according to subcategory of improvements in the paragraphs below.

1. Engine/Airframe Improvements

A number of operators commented on the need for a lighter weight airplane, such that the full rated capacity could be achieved. Their comments on existing aircraft indicated that a full passenger load, baggage, fuel reserves, and operations under summer conditions, would require off-loading of three or more revenue seats in order to stay within FAA required performance limits. At least four of those surveyed suggested that there be increased space for baggage and cargo. Some of these also suggested that the aircraft be designed for a rapid cargo conversion. A few operators who had had many problems with retractable landing gear on their aircraft suggested that such gear be redesigned for a much more reliable operation.

One innovative operator suggested a "stretchable" airframe wherein passenger capacities of 15-to-30 could be varied by the manufacturer (using the same type of engine) without sacrificing standardization. Engine commonality could be maintained by derating the twin engines for smaller versions and adding an engine for the larger version.

2. Engine

Most of the operators were content with turboprops although four in the survey indicated they would like to have low cost jets, primarily for passenger appeal (but only incidentally for the increased speed capability). The majority of the operators, however, rejected jets as too expensive, too inefficient at the lower altitudes and short stage lengths flown by commuters, excessive fuel consumption, and excessive noise. For those operators contending with salt-air environment, a corrision-resistant turbo-prop development would be highly desirable, since current designs are extremely susceptible to corrosion. In other areas of engine design, four operators suggested an increase in fuel efficiency, three would like to have

engines with quieter operation, and three indicated a need for better engine maintainability.

3. Interior

Most of the operators were satisfied with the comfort afforded by the existing commuter aircraft, and felt that the seats were adequate for the shorter trips involved in commuter operations. Three of those polled in the survey, however, suggested need for improved passenger comfort. For those having experience with larger aircraft, there appeared to be a need for a low cost, self-contained auxiliary power unit (APU) which would allow them to conduct operations with a minimum of reliance on airport ground equipment. Some pointed to the interior as an excellent plan to conserve extra weight (e.g., panelling, seat design, etc.).

4. Avionics

For reliability and safety reasons, the majority of commuter operators equip their aircraft with relatively extensive avionics when compared with basic general aviation applications of the same aircraft. In addition to redundant IFR panels, most operators also add transponders, DME's, encoding altimeters, etc. to facilitate operations out of major hub airports. Many also use weather radar, flight directors, etc. to reduce cockpit loads and enhance safety factors (weather radar being used or desired in selected Western, Mid-West and Great Lakes states where storm cells can be most readily spotted and avoided). Although most operators appear to be satisfied with the types of avionic equipment available for commuter aircraft, a number commented that they were plagued by reliability problems unless they bought the top-of-the-line product at a fairly high price. They, therefore, suggested that avionic development address higher electronic reliability under a commuter's high use conditions at lower cost rather than more sophisticated capabilities.

C. Individual Survey Data

Individual operator data, by region, related to desired aircraft characteristics are shown in Tables XXIII-XXIX.

TABLE XXIII - NEW ENGLAND REGION AIRCRAFT CHARACTERISTICS

	A	B	C	D
Route Type	Hub and Spoke	Linear	Linear	Shuttle
Passengers/Year (000)	125-150	50-75	100-125	0-25
Current Aircraft	B-99/Nord 262	B-99	DHC-6	BNI
Average Stage Length (MI)	135	180	120	20
Desired Aircraft Capacity (Passengers)	30	30	30	9
Cruise Speed (Kts)	250	250	200	165
Range (S. MI)	200	---	400	---
Cost ($)	---	---	$0.5-0.8M	$0.24M
T/O (Ft. S.L.)	---	5,000	---	BNI OK
Pressurization	Partial	Partial	---	No
Engine Type	Jet	Jet	Turboprop	Piston OK
Special Features	Good air cond., better heating, more comfortable seats	---	---	Quieter, quick freight conversion

TABLE XXIV - MIDDLE ATLANTIC REGION AIRCRAFT CHARACTERISTICS

	A	B	C	D
Route Type	Hub & Spoke	Hub & Spoke	Linear	Shuttle
Passengers/Yr (000)	50-75	125-150	75-100	0-25
Current Aircraft	DHC-6	DHC-6	Navajo/ B99	DHC-6
Average Stage Length (MI)	50	75	95	60
Desired Aircraft Capacity (Passengers)	30	30	20-25	20
Cruise Speed (Kts)	172	250	250	240
Range (S. MI)	--	200	500	---
Cost ($)	$1.2M	$1.5M	$0.8M	$1.0M
T/O (Ft. S.L.)	2000	---	3000	---
Pressurization	No	Yes	No	No
Engine Type	Turboprop	Turboprop	Turboprop	Jet
Special Features	---	More attractive interiors	Better cargo doors, and conversion crew doors	More comfortable seats and headroom

TABLE XXV - MIDWEST REGION AIRCRAFT CHARACTERISTICS

	A	B	C
Route Type	Linear	Linear	Linear
Passenger/Yr (000)	200-225	25-50	50-75
Current Aircraft	Metro	402/Metro	B-99
Average Stage Length (MI)	140	210	200
Desired Aircraft Capacity (Passengers)	55-60	25-30	25-30
Cruise Speed (Kts)	255	260	260
Range (S. Mi)	500	600-700	---
Cost ($)	---	---	$1-3M
T/O (Ft. S.L.)	Metro OK	---	---
Pressurization	Yes	Yes	Yes
Engine Type	Turboprop OK Efficient jet desired	Turboprop	Jet
Special Features	---	Better fuel efficiency, maintainability	40% breakeven load factor

TABLE XXVI - WESTERN REGION AIRCRAFT CHARACTERISTICS

	A	B	C	D	E
Route Type	Hub & Spoke	Hub & Spoke	Linear	Linear	Linear
Passengers/Yr (000)	350-375	25-50	0-25	0-25	125-150
Current Aircraft	DHC-6	Navajo	Navajo	402	B-99
Average Stage Length (MI)	50	150	210	145	165
Desired Aircraft Capacity (Passengers)	55	30	15-19	15	26
Cruise Speed (Kts)	172	250	260	150-200	200
Range (S. Mi)	300	300	450-500	500	400-500
Cost ($)	---	$1.5M	---	---	$1.4M
T/O (Ft. S.L.)	3100	4000	---	---	---
Pressurization	No	Yes	Yes	Yes	Yes
Engine Type	Turboprop	Turboprop	Turboprop	Turboprop	Turboprop
Special Features	Lighter weight	Better baggage space	3000# useful load	Better pass. comfort & freight conversion, weather radar	More reliable landing gear.

TABLE XXVII - WESTERN REGION AIRCRAFT CHARACTERISTICS (CONT'D)

	F	G	H	I
Route Type	Linear	Linear	Shuttle	Recreational
Passengers/Yr (000)	125-150	25-50	50-75	100-125
Current Aircraft	Heron	402/DHC-6	Goose	402/Metro
Average Stage Length (MI)	170	160	30	180
Desired Aircraft Capacity (Passengers)	45-50	Stretchable 15/19/30	18-19	30
Cruise Speed (Kts)	200	300	---	260
Range (S. Mi)	500-600	300	---	600
Cost ($)	$3M	$40-50K/seat	$1.25M	$1.5M
T/O (Ft. S.L.)	5000	4000	---	---
Pressurization	Yes	Yes	No	Yes
Engine Type	Turboprop	Turboprop or Prop-Fan	Turboprop	Turboprop
Special Features	More cargo space, contained APU	Standardization, lower landing speed	Corrision resistance	Lighter weight

TABLE XXVIII - SOUTHERN REGION AIRCRAFT CHARACTERISTICS

	A	B	C	D
Route Type	Hub & Spoke	Hub & Spoke	Hub & Spoke	Recreational
Passengers/Yr (000)	0-25	225-250	175-200	100-125
Current Aircraft	Navajo/DHC-6	DHC-6	B-99	DC-3/M404
Average Stage Length (MI)	110	70	120	120
Desired Aircraft Capacity (Passengers)	19-30	19-30	19	40-56
Cruise Speed (Kts)	140-150	250	160	250
Range (S. Mi)	500-600	600	---	450
Cost ($)	---	$0.75M (19 Pass)	$1M	$1.5-2.0M
T/O (Ft, S.L.)	2500	2000	4000	4000-5000
Pressurization	No	Yes	No	Yes
Engine Type	Flat Piston	Turboprop	Turboprop	Turboprop
Special Features	Reduced Maintenance	Weather Radar	---	Contained APU, weather radar, solid state avionics

TABLE XXIX - NON-CONUS AND CARIBBEAN REGION AIRCRAFT CHARACTERISTICS

	A	B	C	D	E
Route Type	Hub & Spoke	Hub & Spoke	Linear	Linear	Recr.
Passengers/Yr (000)	100-125	0-25	150-175	250-275	800-825
Current Aircraft	DHC-6	DHC-2 (floats)	402	Goose	Heron
Average Stage Length (MI)	80	85	85	50	75
Desired Aircraft Capacity (Passengers)	19	15	8-19	20	30
Cruise Speed (Kts)	185-200	150-200	180	200	150
Range (S. Mi.)	400/500	200+	300-400	200	---
Cost ($)	$0.75M	$0.5-0.75M	---	$0.5M	$1.0M
T/O (Ft. S.L.)	2000	---	2600	1500	5000
Pressurization	No	No	No	No	No
Engine Type	Turboprop	Turboprop	Turboprop	Turboprop	Turboprop
Special Features	---	Corrison resistance - more baggage and cargo space	Lower Eng. maint. - better landing gear	Corrison resistance, minimum electronics	Corrison resistance, more baggage space

VII. OPERATIONAL RELIABILITY AND SAFETY

A. Reliability

One of the measures of an airline's reliability is its completion factor, i.e., the percentage of scheduled flights which are actually completed. The completion factor includes affects of both mechanical reliability and weather conditions. For seaplanes, there is the additional factor of sea state, since moderate wind conditions which are safe for flying can cause waves which make water landings hazardous. Small airlines may also experience lower completion factors because they do not have back-up aircraft in the event of mechanical problems.

Completion factor data was obtained for twenty airlines from the survey, and is shown in Table XXX. Most airlines exhibit high completion factors, despite their use of smaller aircraft and airports. Despite the small sample size, there appears to be a trend to lower factors in the North Atlantic and New England regions compared to other regions, and is probably correlated to the more severe weather experienced in these areas. Although the average completion factor for all twenty airlines was 96.6%, the median value was 98.3%, which is a better indication of the commuter airlines' high level of service.

The completion factor statistics were also grouped and analyzed by market type, with hub and spoke operations showing the best completion factor. Recreational operations ranked next, and shuttle was lowest. The latter was probably due to small airline size, rather than any inherent characteristic of shuttle operations, since the airlines reporting completion factors in this market type transported less than 30,000 passengers per year. One also operated seaplanes.

B. Safety

Detailed accident data for trunks, regional and commuter carriers are available from the National Transportation Safety Board (NTSB). Information is available on the carrier and type of aircraft involved, location and details of the accident, probable cause, related factors, and

TABLE XXX - REGION COMPLETION FACTOR STATISTICS

Region	Completion Factor by Airline (%)	Average (%)
New England	91, 95, 98	95
Middle Atlantic	90, 95, 98, 98	95
South	95-98, 97, 99, 99	98
Midwest	98, 99	98.5
West	95, 98, 98, 99	97.5
Non-CONUS	90, 99+, 99.9	96.5
Total		96.6(1)

(1) Median = 98.3%

weather conditions. Care must be taken in analyzing the data to distinguish between passenger and cargo service, and whether non-safety factors were involved (sabotage, hijacking, etc.).

The Aviation Consumer Action Project (ACAP) has analyzed commuter airline safety and compared it with that of the trunks. Data from their report for the 1969 through 1974 period is shown in Table XXXI. Two sets of figures are presented; the "gross" figures including all accidents, and the "base" figures which include only those accidents for which the probable cause (as determined by the NTSB) involves airline personnel and/or equipment. Thus, all trunk accidents involving turbulence are excluded in the "base" category. In terms of accidents per departure, it is seen that the rate is approximately twice as high for the commuter compared to the trunks in the "gross" case, and three times as high in the "base" case. Discussions with CAB and FAA personnel have indicated that these conclusions must be considered tentative, since it was very difficult to determine whether the commuter accidents occurred in scheduled or unscheduled service, and eliminating a small part of the data base could significantly affect the results. Subsequent to the publication of the ACAP report, the NTSB released commuter carrier accident statistics for 1975, as well as preliminary data for 1976. These are shown in Table XXXII, and it should be noted that the accident rates per 100,000 departures of 1.35 and 1.57 for 1975 and 1976 respectively are consistent with the figures from the previous five years in the ACAP report. NTSB data for 1973-1975 was also filtered to eliminate all non-passenger service accidents and aggregated by region. The results are shown in Table XXXIII, where it should be noted that the West and non-CONUS regions account for 60% of both the fatal and non-fatal accidents. Since commuters in these two regions carry only 40% of the total passengers, further analysis is suggested. Such an analysis is beyond the scope of this report, but would involve such factors as number of departures, average stage length, weather, and probable cause, as well as a review of data for other years.

TABLE XXXI - AIRLINE ACCIDENT STATISTICS,
1969 - 1974

	Gross Accidents		Base* Accidents	
	Trunks	Commuters	Trunks	Commuters
ACCIDENTS				
Total	170	117	94	104
Fatal	18	24	13	20
FATALITIES				
Passengers	734	87	654	70
Crew	69	26	60	23
Others	18	8	14	5
Total	821	121	728	98
DEPARTURES (Millions)	18.69	6.74	18.69	6.74
ACCIDENT RATE PER 100,000 DEPARTURES				
Total	.91	1.74	.50	1.54
Fatal		.356	.070	.297

*Excludes accidents due to non-airline causes

TABLE XXXII - U.S. COMMUTER CARRIERS
ACCIDENTS, ACCIDENT RATES AND FATALITIES
YEARS 1975 VS. 1976

	All Revenue Operations		Passenger Operations	
	1975	1976*	1975	1976*
Accidents				
Total	43	36	17	22
Fatal	11	12	2	6
Fatalities				
Passengers	13	20	11	19
Crew	12	10	3	7
Others	2	2	2	0
Total	27	32	16	26
Aircraft Hours Flown	961,781	1,090,000	745,915	845,000
Aircraft Miles Flow (000)	163,210	185,700	117,073	131,000
Revenue Passenger Miles Flown (000)	N/A	N/A	750,048	840,000
Departures	1,477,952	1,655,000	1,262,588	14,00,000
Accident Rate Per 100,000 Million Miles Flown				
Total	4.47	3.30	2.25	2.60
Fatal	1.14	1.10	0.27	0.71
Accident Rate Per 100,000 Departures				
Total	2.91	2.18	1.35	1.57
Fatal	0.74	0.73	0.16	0.43
Passenger Fatality Rate Per 100 Million Passenger Miles	N/A	N/A	1.47	2.26

* All 1976 Data Preliminary

TABLE XXXIII - COMMUTER AIRLINE ACCIDENT STATISTICS, 1973 - 1975

Region	Number of Accidents			
	Fatal	Non-Fatal	Total	%
New England	0	2	2	4
Middle Atlantic	1	3	4	8
South	1	5	6	12
Midwest	2	7	9	18
West	3	14	17	33
Non-CONUS	3	10	13	25
TOTALS	10	41	51	100

*In-passenger service - does not include cargo flights.

As to the reliability and safety of the smaller aircraft used by commuter airlines, the record shows these to be quite high. Table XXXIV reviews the ten fatal accidents which occurred in the 1973 through 1975 calendar years. It is observed that only one accident was the result of a mechanical failure. Furthermore, of the remaining nine accidents attributable to pilot error, severe weather conditions were a contributing factor in five of these.

TABLE XXXIV

COMMUTER AIRLINE FATAL ACCIDENTS IN PASSENGER OPERATIONS

1973 THROUGH 1975

Number	Year	Location	Weather	Probable Causes
①	1973	Iowa		Propeller failure/improper maintenance
②	1973	Hawaii		Ran out of fuel/pilot error
③	1974	Penn.	Snow, Fog	Lost speed/improper IFR operations
④	1974	Texas		Pilot misused or failed to use flap
⑤	1974	Alaska		Pilot failed to retract wheels in water landing
⑥	1974	Oklahoma	Rain, Fog	Pilot performed improper IFR operations
⑦	1974	Alaska	Snow	Pilot improper in-flight decisions
⑧	1974	Wash.	Snow, Fog	Pilot improper operation of aircraft
⑨	1975	Calif.		Collision with other A/C
⑩	1975	Nev.	Snow, Zero Ceiling	Pilot performed improper IFR operations

VIII. AIRPORT NEEDS

Airport needs by commuter operators can be classified in two distinct categories - those related to the outlying communities that they serve and those quite different needs and issues related to effectively integrating the smaller commuter operators into the large hub airports.

A. Community Airports

Many of the communities served by commuter air carriers are small with many of their respective airports barely meeting minimum requirements. Other communities, in recognition of the value of scheduled commuter airline service, have provided more than adequate facilities. During the interview and literature survey activities, there are no regionally distinct needs or current airport features identified that could be uniquely associated with particular airports served in any particular region. Rather, a common set of criteria appeared to emerge. All commuters naturally desired runway lengths that would in no way limit their safe operation, at gross weight, during even the highest density altitude days. Particular attention was made to avoid having to sacrifice revenue seats in order to meet takeoff requirements. In even those areas evidencing small periods of IFR weather, an instrument approach capability was considered mandatory. Precision approach capabilities (e.g., ILS) were, of course, desired but most operators realistically agreed that such precision approaches could not be feasibly expected at many of the smaller airports. Alternatively, VOR approaches were considered acceptable or, less desirably, Non-Directional Beacon (NDB) approaches. Considerable interest was exhibited in the relatively low cost and flexible Interim Microwave Landing System (IMLS) as an inexpensive way of obtaining more precise approaches and thus significantly lower minimums at a number of airports. In particular, those airports that currently have only NDB or circling VOR approaches were singled out as primary candidates. Concern was expressed by some operators, however, as to the extra weight that would have to be added to the aircraft in order to use an IMLS system

(approximately 5-10 lbs.). As indicated earlier, most operators are extremely weight conscious and are hesitant to add even small amounts to their current aircraft.

Regarding runway lights, almost all operators indicated the need for medium intensity runway lights as a minimum for instituting service. Additional minimum lighting needs included rotating beacons and appropriate obstruction lights.

Insofar as terminal and other service related needs were concerned, most operators preferred some minor maintenance capability to handle minor contingencies at the airport. Fuel availability also was desired but, since most operators are already scheduling around fuel availability and price at this time, it was not considered a major prerequisite for instituting service. Regarding terminal needs in the smaller communities, most operators were reasonably satisfied with current accommodations with many indicating that they would even be willing to operate out of trailer facilities. Such facilities must, however, provide sufficient space for passenger service and waiting areas, and importantly, insure appropriate separation between the public and commuter office areas to facilitate privacy. In some cases, commuter facilities are somewhat intermixed, resulting in a lack of operator privacy in their day-to-day flight planning operations.

B. Hub Terminal Facilities

A major problem almost universally cited by commuter operators serving larger airline hubs was their treatment as "second-class citizens" during both the planning phase of new facilities or their allocation of space in existing terminal facilities. As the majority of the commuter passengers into a large hub are interlining, commuters naturally want to minimize the difficulty of processing them to the certificated airline gates. Two problems complicate this interface. The first is an apparent lack of planning during the airport design or modification process which would specifically consider commuter operators and their special needs. As

commuter operators are not in a financial position to pay the higher cost of more elaborate and strategically located terminal space (if it is even available), they are often relegated to inconvenient areas of the airport which complicate the interline transfer. The second problem is one of security. Currently, the FAA requires screening of all passengers boarding certificated air carrier aircraft (FAR Part 139). Commuter passengers are currently not required to undergo screening. This screening requirement commonly precludes the direct transfer of passengers from commuter aircraft to the certificated air carrier aircraft with which they are interlining without either lengthy detours to re-enter the certificated carrier gate areas, or alternatively, the implementation of security screening by the commuter at outlying communities. As such screening is expensive, most commuters are opting not to implement such procedures. This decision is also influenced by the fact that, even if a passenger is screened, the commuter may still have to unload his passengers in outlying gate areas requiring lengthy walks by the passengers or expensive transport to certificated carrier gate areas. Some commuters, however, have instituted such screening procedures where direct access in sterile areas is possible and, in a few cases, the certificated carriers (recognizing the feeder advantage from the commuter), are providing financial assistance or sharing security facilities. Many certificated carriers are also sharing terminal space with commuters where they realize a financial advantage from the commuters' interlining passengers.

Other comments received from commuters that were related to hub airport operations concerned ATC handling of commuter aircraft. Many operators indicated that rather steep descents were often required of commuter aircraft in order to blend in with other certificated aircraft and thus avoid lengthy holds. Such rapid descents enhanced the desire of many commuters for pressurized aircraft to avoid passenger discomfort. On the other hand, however, the ability of commuters to land their smaller aircraft on the shorter general aviation runways available at some hub airports, resulted in quicker processing time by ATC than was available to certificated air carriers.

IX. ECONOMIC CHARACTERISTICS

A. General

Airline operating costs are composed of direct and indirect costs. Direct operating costs are aircraft-related and provide a means for assessing and comparing the operating economics of various aircraft over a given distance. Indirect operating costs cover general airline support services and administrative operations. Each category is discussed further below.

1. Direct Operating Costs

Direct operating costs (DOC) normally consist of three elements of cost: flying operations, direct maintenance, and depreciation. Flying operations include flight crew costs, fuel and oil, and insurance. Flight crew costs include both pilot salaries and appropriate fringe benefits. In actual commuter airline operations, a pilot's salary does not usually vary with the type of aircraft flown but is generally based on the largest aircraft in the airline's fleet. This results in flight crew costs for smaller aircraft being at the same level as that of larger aircraft for some airlines. Fuel costs normally vary widely depending upon whether the airline acts as a distributor or fuels extensively at stations away from its main fueling station. Commuter airline fuel is subject to both federal and state taxes and also to airport fuel flowage fees. Direct insurance costs are normally for hull insurance.

Commuter airlines report a wide range of direct maintenance costs because of differing operational use and the expensing of airframe and engine overhaul costs. Some carriers specify overhaul costs as incurred while others utilize an annual reserve for such costs. Depending upon the year of overhaul and the method used, overhaul costs will vary considerably.

Commuter airline accounting practices regarding depreciation generally reflect an eight-year depreciation period with a 20% residual value.

2. Indirect Operating Costs

Indirect operating costs (IOC) consist of the costs of passenger service, aircraft and traffic servicing, reservations and ticket sales, sales and advertising, general and administrative services, and depreciation of ground property. These costs vary widely as a result of differences in the number of aircraft operated, airports served, frequency of service, average stage length, and various services provided on the aircraft or at terminals. In addition, commuter airlines serving some large airports are subject to substantially higher landing, fuel flowage, and airport terminal fees.

Passenger service consists of activities contributing to the comfort, safety, and convenience of passengers while in-flight and when flights are interrupted. Commuter airline costs generally are limited to passenger liability insurance and interrupted trip expenses. Since FAA regulations do not require cabin attendants for aircraft equipped with less than 20 seats, cabin attendants are not generally provided. Passenger liability insurance rates for commuter air carriers are considerably higher than for CAB certified carriers, as their passenger liability rates tend to be based on the number of seats flown whether occupied or not. CAB certificated carriers receive the benefit of a payload variation formula based on revenue passenger miles.

Aircraft and traffic servicing covers costs of ground personnel for handling and servicing aircraft, scheduling, landing and parking of aircraft, and rental of facilities. Commuter air carrier costs generally are for salaries and benefits of ground personnel or contracted services, landing fees, hanger rental, and station maintenance. At airports with infrequent commuter airline service, part-time personnel may be used to service the aircraft or the commuter airline may contract all aircraft and traffic scheduling to another carrier. At some airports, a CAB certificated airline sometimes will provide a commuter airline with terminal, gate and airport servicing.

Reservation and ticket costs cover the staffing and operation of a reservation and ticket sales system and the development of tariffs and operating schedules. For commuter air carriers, these costs are generally limited to salaries and benefits of reservationists, communications, commissions, space rental, and ticket supplies. While some commuter airlines are tied in with a CAB certified air carrier's reservation system, many are not.

It should be noted that a new or existing carrier developing new markets can also incur one-time, organizational, market development, and training costs ranging from $10,000 to $20,000 in order to initially institute service. He must further be able to withstand one to two years of reduced revenue during the market development and maturation period.

B. Regional Economic Characteristics

The commuter airline survey attempted to collect detailed economic data on both aircraft economics and airline operations, with varying degrees of success. Almost all operators provided direct operating cost (DOC) figures for their aircraft, and two-thirds of them supplemented this with a detailed breakdown of expenses by flight crew, fuel and oil, direct maintenance, insurance and depreciation. Total indirect operating expenses were also provided, but due to the differences in accounting procedures, no consistent breakdown of IOC was obtained. Return on investment information was generally considered proprietary, and no figures were released. Data was generally available on percentage of revenue by category (passengers, cargo, charter, mail, other).

1. Direct Operating Costs

DOC's for 26 of the 32 airlines in the survey are shown in Table XXXV, identified by region, market type, and aircraft. For those airlines which operate similar aircraft, there does not appear to be a direct correlation with either region or market type. Sufficient data was available on the DHC-6 and B-99 to tabulate a detailed DOC breakdown, and this is shown in Table XXXVI, along with utilization per aircraft in

TABLE XXXV - AIRLINES SURVEYED BY MARKET TYPE (32 TOTAL)

AIRCRAFT ECONOMICS

REGION	HUB AND SPOKE	LINEAR	SHUTTLE	RECREATIONAL
NEW ENGLAND	133 B-99	150 130 122 DHC-6 B-99 DHC-6	75 BNI	
MIDDLE ATLANTIC	112 140 DHC-6 DHC-6	175 B-99	170 DHC-6	
SOUTH	80 132 138 DHC-6 DHC-6 B-99			176 DC-3
MIDWEST		150 104 200 METRO METRO B-99		
WEST	135 DHC-6	89 75 124 NAV 135 103 NAV. C402 DH-114 B-99	140 GR-GOOSE	
ALASKA, HAWAII AND TERRITORIAL	-- 67 DHC-6 DHC-2	131 100 GR-GOOSE C-402		180 DH-114

UPPER: DOC in $ /Hr.

LOWER: Aircraft type

TABLE XXXVI - AIRCRAFT OPERATING COSTS

DHC-6 Twin Otter (19 Passenger)

Airline	D-1*	D-2	D-3	D-4	D-5*	D-6*	Average	% of Total DOC
UTILIZATION (Hrs/Yr)	2340	2220	1240	1560	2000	2600	2078	
TOTAL DOC ($/Hr)	150	112	122	170	140	132	138	
Flight Crew	42	24	27	27	35	30	31	22
Fuel and Oil	33	37	35	42	39	36	37	26
Direct Maintenance	56	28	43	17	40	59	41	29
Insurance	----	2	2	17	5	3	6	4
Depreciation	19	21	15	67	21	4	25	18
ANNUAL DOC/SEAT ($)	18,700	13,000	11,200	14,000	18,700	18,100	15,000	

B-99 Beech Airliner (15 Passengers)

Airline	B-1*	B-2	B-3	B-4	B-5*	Average	% of Total DOC
UTILIZATION (Hrs/Yr)	----	1800	581	1935	2400	1679	
TOTAL DOC ($/Hr)	133	130	175	138	155	149	
Flight Crew	37	19	21	**	65	34	24
Fuel and Oil	34	45	60	**	50	47	30
Direct Maintenance	50	21	32	26	40	34	22
Insurance	2	5	8	**	----	5	3
Depreciation	10	40	54	26	----	33	21
ANNUAL DOC/SEAT ($)		15,600	6,800+	17,800	24,800	19,400	

*Airlines with Unionized Pilots

**Total of $86/Hr. No breakdown available.

+Not included in average annual DOC/seat calculation.

block hours per year, and annual DOC's per seat in dollars. In computing an average of the latter quantity for the B-99, airline B-3 was excluded, since much of its operations involved cargo rather than passenger operations. It is seen from the table that the Twin Otter is less expensive to operate than the B-99, and utilization is higher. This is offset by the higher speed of the B-99, which means it can fly more passenger miles per hour, and thus earn more revenue per seat, other things being equal.

Another interesting comparison in Table XXXVI is the significant difference in flight crew costs per block hour between those airlines which are unionized and those which are not. Omitting Airline B-4 (which does not separate flight crew costs), of the remaining ten airlines, the average flight crew cost of the unionized airlines are significantly higher than the average of the non-unionized airlines.

2. Indirect Operating Costs

A matrix summary was used to explore the ratio of indirect to direct operating cost (IOC/DOC). The ratio was not found to be a function of either region, market type, or airline size, but would vary with the type of aircraft and financial structure of the operator. For the Twin Otter, the average IOC/DOC ratio was .73, while for the B-99, it was .86. The distribution of the IOC/DOC ratio for 25 airlines is shown in the table below:

IOC/DOC Ratio & Interval	Number of Airlines
≤ .40	2
.41 to .60	7
.61 to .80	6
.81 to 1.00	8
> 1.00	2

As can been seen from these comparisons, the direct operating costs generally exceed the indirect operating costs of running a commuter airline.

3. Revenue Sources and Return on Investment

Passenger revenues account for the largest percentage of total revenues for commuter airlines, followed by cargo, charter, and other (mail, training, sightseeing, etc.). Only four out of the 28 airlines which reported on revenue sources had non-passenger revenues greater than 15%, and these were all small airlines carrying less than 100,000 passengers annually. Of the remaining 24 airlines, the average non-passenger revenue percentage was 8.5%. As discussed earlier in this section, return on investment data was not available from the survey, but comparison of estimated breakeven load factors with current load factors indicated that only two of all the airlines surveyed were operating at a loss.

4. Fuel Prices and Availability

The survey provided information on current fuel prices, and historical information on availability during the fuel crises in the winter of 1973 - 1974. In regard to the latter, most airlines did not have problems getting sufficient fuel, while the few who did were able to get priority allocations by applying to the FEA. Currently there are no allocation problems, and the average price based on the lowest prices paid by 28 airlines was $.48/gal. Table XXXVII summarizes the lowest fuel price by region with Figure 4 illustrating the variation by airline "size" in terms of passengers per year carried. Higher prices were generally charged when an airline required fuel at a non-home-based airport. Fuel prices were only slightly correlated with region and airline size, with the West and non-CONUS regions paying an average of $.50/gal. and $.52/gal. respectively, and the smaller airlines generally paying higher than average prices. The price spread ranged from $.33/gal. in the Midwest to $.71/gal. in New England.

TABLE XXXVII - AIRLINES SURVEYED BY MARKET TYPE

LOWEST GAS PRICE ($/GAL.)

REGION	HUB AND SPOKE	LINEAR	SHUTTLE	RECREATIONAL	AVERAGE
NEW ENGLAND	.34	--- .41 .35	.71		.45
MIDDLE ATLANTIC	.62 .45	.44	.43		.49
SOUTH	.59 .42 .38			.34	.43
MIDWEST	---	--- .40 .33			.37
WEST	.36 ---	.56 .46 .47 .53 .60 .43	.62	.50	.50
ALASKA, HAWAII AND TERRITORIAL	.45 .55	.56 .53		.49	.52
				TOTAL AVERAGE	.48

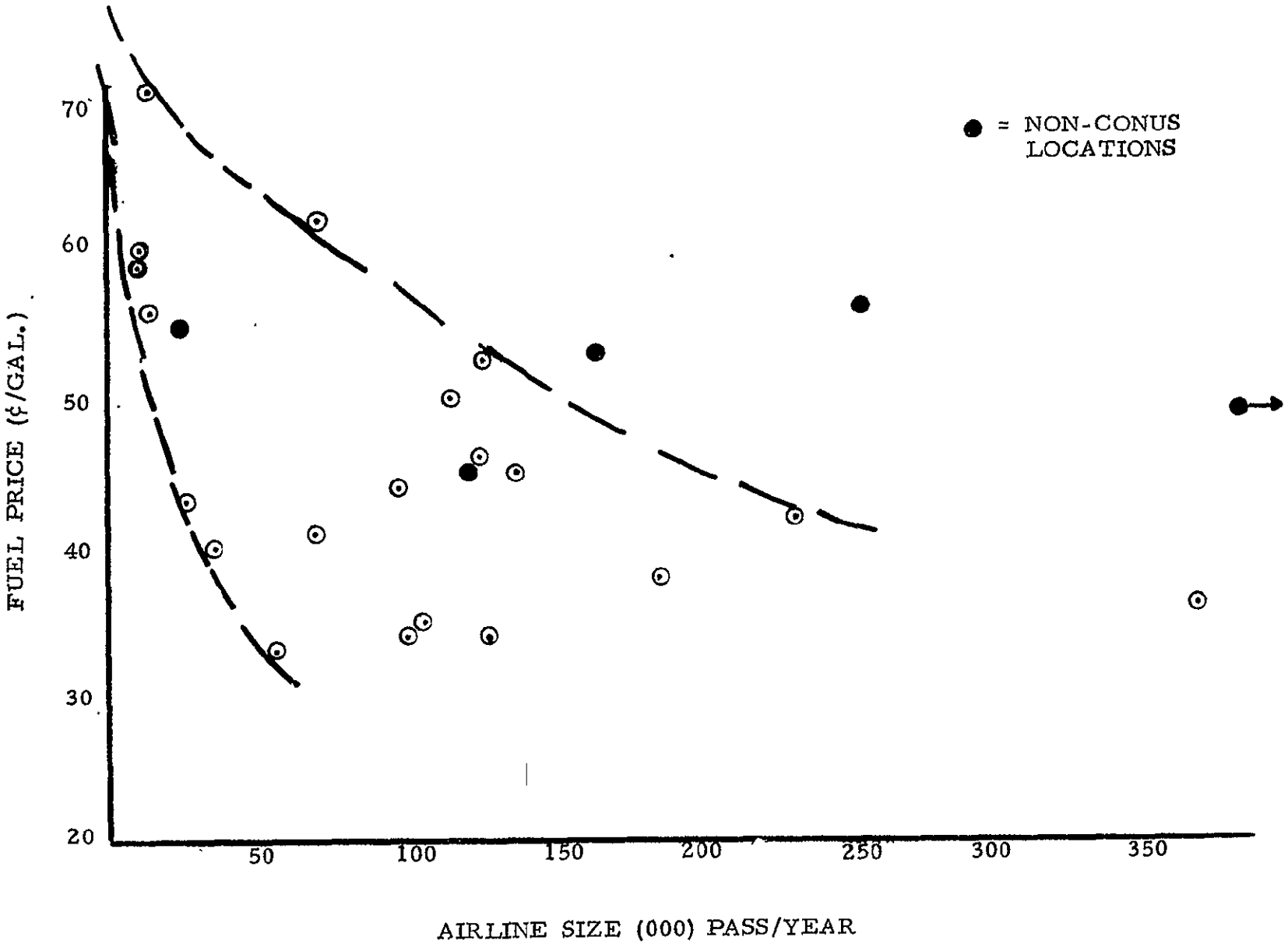

FIGURE 4 - LOWEST FUEL PRICE VS. AIRLINE SIZE

X. INSTITUTIONAL ISSUES

A. General

A number of institutional issues currently face the commuter industry. These include considerations of the benefits and disadvantages of certification by the CAB, including the related issues of subsidy eligibility, eligibility for loan guarantees, and equal treatment regarding joint fare programs. Additionally, many commuters are concerned about increasing state regulation which limits their flexibility to enter and exit intrastate markets and readily adjust fares. They are further concerned that their interstate operations could conceivably be regulated in differing manners between states.

The most predominant issue currently facing, and being debated by, the commuter industry is CAB certification. Such certification would automatically make the commuter eligible for subsidy and equipment loan guarantees, route protection, equal treatment in joint fare programs, and, in many areas, increased community acceptance. On the other hand, such certification includes substantial financial and traffic reporting requirements, requires CAB approval for all fare changes and market entry/exit, and forces mandatory airport certification (including security screening) at all airports served by the commuter. It further would require operation under FAA FAR Part 121 if aircraft larger than 12,500 lbs. are used. Some commuters estimate that the cost of certification which normally requires extensive CAB hearings, is in the neighborhood of $50,000. Additionally, commuters have estimated that in the more stringent Part 121, costs can, for example, cost over $500,000 to change from Part 135 to Part 121 with a fleet of four planes, plus an additional several hundred thousand dollars annually. The latter Part 121 costs can conceivably be avoided should the carrier continue to operate smaller aircraft and obtain CAB approval to operate under Part 135 requirements. In spite of the disadvantages, some operators feel that the only way they can become a fully accepted member of the national air transportation system is through

certification. Operators in need of subsidy have also either applied for certification or favor such action. The commuter industry, in an attempt to avoid many of the above mentioned disadvantages of certification, is exploring alternative means of attaining many of the benefits of certification without being burdened by requirements they consider more applicable to the larger certificated carriers. This is particularly true in view of the current regulatory reform proposals that most observers agree will open many new markets for the commuter as the larger certificated carriers pull out of their smaller, uneconomical markets. Alternative certification forms suggested to date vary from a "low bid" system proposed by the CAB to licensing proposals that are more favored by the commuter industry. Many commuter operators not in immediate need of the benefits of certification, oppose any form whatsoever. They feel that their success is largely due to the lack of significant CAB regulation and their flexibility in being able to readily vary service in the marketplace. As such, the industry is somewhat split on the certification issue.

Another issue currently facing the industry is current union organization activity that is resulting in more and more commuter pilots and mechanics being organized by various unions. This, many operators feel, will create additional economic pressure on their already thinly balanced cash flow situation.

B. Regional Survey Results

Tables XXXVIII and XXXIX address a summary of the interview results by major institutional issue, region, and market type. Table XXXIX also addresses the issues as a function of commuter size. As can be seen from the tables, some trends are noticeable by region, others are quite mixed in regard to their position. In regard to carrier size (as measured by the number of annual passengers carried per year), only six surveyed carriers were for full certification, with three of those in the larger airline category. The vast majority of the smaller carriers

TABLE XXXVIII - SUMMARY OF INSTITUTIONAL ISSUES

ISSUE	RESULTS		
	BY REGION	BY MARKET TYPE	TOTAL SURVEY
CERTIFICATION	o MOST AREAS EVENLY SPLIT o WEST LARGELY IN FAVOR OF FULL OR PARTIAL CERTIFICATION o NON-CONUS AREAS AGAINST CERTIFICATION	NO DEFINITE TRENDS	FULL: 6 LIMITED: 10 NONE: 13
SUBSIDY	o NEW ENGLAND GENERALLY FAVORS SUBSIDY o OTHER AREAS SPLIT, OR AGAINST SUBSIDY	o HUB AND SPOKE STRONGLY AGAINST o LINEAR MARKETS SLIGHTLY IN FAVOR	FOR: 11 AGAINST: 18
LOAN GUARANTEES	o ALL AREAS GENERALLY WELCOME ASSISTANCE o NON-CONUS AREA UNANIMOUSLY IN FAVOR	o ALL TYPES FAVOR ASSISTANCE o RECREATIONAL MARKET ALL IN FAVOR	FULL: 21 LIMITED: 2 NONE: 5
UNIONIZATION STATUS	o MIDWEST AND WEST ARE ALL UNIONIZED o OTHER AREAS GENERALLY NOT	o RECREATIONAL TYPES UNIONIZED o SHUTTLE TYPES NOT o OTHERS MIXED	UNIONIZED: 13 NON-UNIONIZED: 16
ROUTE PROTECTION	NOT AN ISSUE	NOT AN ISSUE	NOT AN ISSUE

TABLE XXXIX - INSTITUTIONAL ISSUES VS. COMMUTER SIZE

Category of Airline Size (Pass/Yr)	Number of Airlines	Issues			
		Certification	Subsidy	Loan Guarantees	Pilots Unionized
> 300,000	3	2 For 1 Against	1 For 2 Against	2 For	3 Yes
200,000 to 300,000	3	1 For 1 Limited 1 Against	2 For 1 Against	2 For 1 Limited	2 Yes 1 No
100,000 to 200,000	10	0 For 4 Limited 6 Against	2 For 8 Against	7 For 1 Limited 2 Against	5 Yes 5 No
< 100,000	12	3 For 5 Limited 4 Against	6 For 6 Against	10 For 2 Against	2 Yes 10 No

were either against any certification or were for a limited form of some kind. Whereas most carriers were for eligibility to obtain equipment loan guarantees in all size categories, the majority of those for subsidy were the smaller carriers. More carriers were, in fact, opposed to subsidy than were for such financial assistance.

Tables XL through XLVI identify the individual carrier survey results related to the major institutional issues by region.

TABLE XL - NEW ENGLAND REGION INSTITUTIONAL ISSUES

	A	B	C	D
Route Type	Hub & Spoke	Linear	Linear	Shuttle
Passengers/Yr (000)	125-150	50-75	100-125	0-25
CAB Certification	Limited	No	No	No
Subsidy	No	No	No	Yes
Equipment Loan Guarantees	No	Yes	Limited	Yes
Route Protection	No	No	No	No
Unionized	Yes	No	No	No

TABLE XLI - MID-ATLANTIC REGION INSTITUTIONAL ISSUES

	A	B	C	D
Route Type	Hub & Spoke	Hub & Spoke	Linear	Shuttle
Passengers/Yr (000)	50-75	125-150	75-100	0-25
CAB Certification	Limited	No	Limited	No
Subsidy	No	No	Yes	No
Equipment Loan Guarantees	Yes	Yes	Yes	No
Route Protection	No	No	No	No
Unionized	No	Yes	No	No

TABLE XLII - MIDWEST REGION INSTITUTIONAL ISSUES

	A	B	C
Route Type	Linear	Linear	Linear
Passengers/Yr (000)	200-225	25-50	50-75
CAB Certification	Yes	Yes	No
Subsidy	No	Yes	No
Equipment Loan Guarantees	Yes	Yes	No
Route Protection	No	No	No
Unionized	Yes	Yes	Yes

TABLE XLIII - WESTERN REGION INSTITUTIONAL ISSUES

	A	B	C	D
Route Type	Hub & Spoke	Hub & Spoke	Linear	Linear
Passengers/Yr (000)	350-375	25-50	0-25	0-25
CAB Certification	Yes	Limited	Limited	Limited
Subsidy	No	Yes	Yes	Yes
Equipment Loan Guarantees	---	Yes	Yes	Yes
Route Protection	No	No	No	No
Unionized	Yes	No	No	No

TABLE XLIV - WESTERN REGION INSTITUTIONAL ISSUES (CONT'D)

	E	F	G	H	I
Route Type	Linear	Linear	Linear	Shuttle	Recr.
Passengers/Yr (000)	125-150	125-150	25-50	50-75	100-125
CAB Certification	Limited	Limited	Yes	Yes	No
Subsidy	Yes	No	Yes	No	No
Equipment Loan Guarantees	Yes	No	Yes	Yes	Yes
Route Protection	No	No	No	No	No
Unionized	Yes	No	No	No	Yes

TABLE XLV - SOUTHERN REGION INSTITUTIONAL ISSUES

	A	B	C	D
Route Type	Hub & Spoke	Hub & Spoke	Hub & Spoke	Hub & Spoke
Passengers/Yr (000)	0-25	225-250	175-200	100-125
CAB Certification	No	Limited	No	Limited
Subsidy	No	Yes	No	Yes
Equipment Loan Guarantees	Yes	Limited	No	Yes
Route Protection	No	No	No	No
Unionized	No	Yes	No	Yes

TABLE XLVI - NON-CONUS AND CARIBBEAN REGION INSTITUTIONAL ISSUES

	A	B	C	D	E
Route Type	Hub & Spoke	Hub & Spoke	Linear	Linear	Recre.
Passengers/Yr (000)	100-125	0-25	150-175	250-275	800-825
CAB Certification	No	Yes	No	No	No
Subsidy	No	No	No	Yes	No
Equipment Loan Guarantees	Yes	Yes	Yes	Yes	Yes
Route Protection	No	No	No	No	No
Unionized	No	No	No	No	Yes

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