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CASE STUDY EVALUATION OF THE BOSTON AREA CARPOOLING PROGRAM

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16. Abstract

This report is a case study evaluation of an areawide carpooling program in operation in the Boston, Massachusetts area from August, 1973 through August, 1974. The program, entitled the WBZ/ALA Commuter Computer Campaign, was the first program in the nation to promote and organize carpooling on a regional scale. It consisted of a free computer matching service for prospective carpoolers supported by an intensive multi-media promotional effort.

The central objective of the present evaluation was to assess the effectiveness of the WBZ/ALA effort in generating interest in carpooling and in encouraging carpool formation. The evaluation was structured around a two-pronged survey effort. The WBZ/ALA Follow-Up Survey was administered to a sample of program participants to determine participant demographic and travel characteristics; their reasons for wanting to carpool; the extent of carpool formation as a result of, or independent of, the WBZ/ALA program; and participant experiences and attitudes toward the program.

In order to understand the regional significance of the WBZ/ALA Program, a second survey, the Eastern Massachusetts Survey, was administered to a sample of auto commuters in the region. The second survey was specifically designed to measure the penetration of the WBZ/ALA Program as well as provide benchmark data on the level of carpooling in the region and the characteristics and attitudes of carpoolers, noncarpoolers, and potential carpoolers.

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PREFACE

This study was performed by the Applications Division, Transportation Systems Center (TSC). Initial phases of the study effort (survey design and execution, processing of the survey data) were sponsored by the Office of the Assistant Secretary for Systems Development and Technology, U.S. Department of Transportation, under the Urban Analysis PPA, OS-545. Data analysis and preparation of the final report were sponsored by the Office of the Assistant Secretary for Policy, Plans and International Affairs, under the Transportation Energy Policies Project PPA, OP-502 and OP-602.

The author wishes to acknowledge the cooperation and assistance of the two organizations which sponsored the Boston area carpool program, WBZ-Radio and TV and the Automobile Legal Association Auto and Travel Club. Special acknowledgement is given to Barbara Anthony, Nancy Cooney, and Michael Fusco of Raytheon Service Company for their extensive efforts in tabulating and analyzing survey results and to Mary Stearns and Larry Vance of TSC for their valuable review comments.

METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

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

Approximate Conversions from Metric Measures

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

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EXECUTIVE SUMMARY

PURPOSE

This report is a case study evaluation of an areawide carpooling program in operation in the Boston area from August, 1973 through August, 1974. The program, entitled the WBZ/ALA Commuter Computer Campaign, was the first program in the country to promote and organize carpooling on a regional scale. It consisted of a free computer matching service for prospective carpoolers accompanied by an intensive multi-media promotional effort.

The central objective of the evaluation was to assess the effectiveness of the WBZ/ALA effort in generating interest in carpooling and encouraging carpool formation. In particular, it was designed to examine the operational aspects of the carpooling program and to determine the motivations, characteristics, and experiences of persons who participated in the program. Beyond providing information on the program and its participants, the evaluation also provided a unique opportunity to examine more generalized aspects of carpooling, such as carpool characteristics, factors associated with the propensity to carpool, and the level of carpooling in the Boston area.

This study effort was not intended to assess the WBZ/ALA Program in a cost-benefit or cost-effectiveness framework. In the first place, the absence of accurate cost

records relative to planning and operating the program made such an analysis unfeasible. More important, it was felt even at the outset of the evaluation that such a perspective might be inappropriate for this first areawide program. On the grounds that the Commuter Computer Program was in essence a demonstration, there appeared to be far greater merit in examining it from an operational standpoint to obtain lessons for other programs than in judging its overall performance from the standpoint of costs incurred and benefits achieved such as congestion relief or fuel savings.

METHODOLOGY

The evaluation was structured around a two-pronged survey effort. The WBZ/ALA Follow-Up Survey was administered to a sample of program participants to determine their demographic and travel characteristics, their reasons for wanting to carpool, the extent of carpool formation as a result of or independent of the program, and their experiences and attitudes toward the program. In order to understand the regional significance of the WBZ/ALA Program -- that is, to view the program and its participants in the context of overall carpooling behavior and attitudes -- a second survey, the Eastern Massachusetts Survey, was administered to a sample of auto commuters in the region. This survey was specifically designed to measure the

penetration of the WBZ/ALA Program as well as provide benchmark data on the level of carpooling in the region and the characteristics and attitudes of carpoolers, noncarpoolers, and potential carpoolers.

The WBZ/ALA Survey was conducted among approximately 10,500 of the program's 13,500 participants, and completed usable questionnaires were received from 4,300 respondents (a 41% response rate). The Eastern Massachusetts Survey was conducted among a random sample of the area's 955,000 auto registrants; 2,900 of the 25,000 persons in the sample returned completed usable forms, yielding an 11% response rate. Bias check procedures revealed negligible differences between each survey's respondents and nonrespondents.

It should be noted that the national energy crisis, which began in the fall of 1973, complicated this case study evaluation by providing an exogenous inducement for carpooling. The overall study and the two surveys were designed to attempt to separate the energy crisis events from program-related factors.

FINDINGS

The case study evaluation examined the Commuter Computer Program from a sequential perspective -- starting with program participation, proceeding to the computer matching and carpool formation process, and ending with the experiences of carpoolers and noncarpoolers. Study

findings, based on an examination of program operations as well as responses to the two surveys, are presented below in this sequential order.

Program Participation:

By the end of the program period, the total number of participants had reached 13,500 persons -- representing less than 1% of the approximately 1.5 million workers in the Eastern Massachusetts Region and an overall response density of about six persons per square mile. Analysis of the combined survey results led to three possible explanations for the limited public response to the program: (1) program-related factors -- e.g., the lack of positive incentives for carpooling, the impersonality of an areawide computer-based program; (2) attitudinal factors -- e.g., perceived problems associated with carpooling and prevailing skepticism about the need for carpooling; and (3) competition from other carpool formation mechanisms -- i.e., employer-based programs or informal channels among co-workers, neighbors, and relatives. It was determined that the promotional aspect of the program could not be faulted for the low participation level, since the publicity campaign encompassed several media and reached three-quarters of commuters in the area.

Program participants (as represented by WBZ/ALA Survey respondents) were compared to area commuters (as reflected by Boston SMSA workers and Eastern Massachusetts Survey respondents) in order to understand which types of commuters were attracted to the program and how their demographic and travel characteristics resembled or differed from those of prototypical carpoolers. When compared to Boston SMSA workers or carpoolers in general, WBZ/ALA respondents were found to be of higher socioeconomic status, with the prevailing characteristics being male, between the ages of 26 and 35, earning $10,000-$25,000 annually, college graduates, and engaged in professional and managerial occupations. When compared to Boston SMSA workers and Eastern Massachusetts Survey respondents, WBZ/ALA respondents tended to have a predominantly radial inbound trip orientation, relatively longer travel times, and a high level of travel costs.

Overall, it was concluded that program participants represented a logical candidate carpooling group from the standpoint of locational and travel characteristics but an atypical group from the standpoint of certain demographic traits. The consistency between participants' travel-related characteristics and expected carpooler travel characteristics confirmed the notion that the desire to carpool stems from considerations relating to time, cost, convenience, and perceived availability of modal

alternatives. However, an explanation for the atypicality of participants' demographic characteristics became apparent only after a detailed examination of the various motivations for carpooling which existed during the program.

It was found that the temporal coincidence of the energy crisis with program operation was in large part responsible for this phenomenon. WBZ/ALA Survey findings showed that prospective carpoolers participating in the program in response to the energy crisis were significantly different in demographic terms (especially by virtue of their higher income level) from participants reporting prior (pre-program and pre-crisis) interest in carpooling. The Eastern Massachusetts Survey substantiated these findings by indicating similar types of distinctions between persons who began carpooling during the energy crisis and persons who started carpooling before or after the crisis. On the basis of available national data on rates of carpool formation around the period of the energy crisis, it was also concluded that the energy crisis caused the level of participation to be higher than it would have been under normal circumstances.

Computer Matching and Carpool Formation Process:

The computer matching rate achieved with 13,500 participants was 26%. An analysis of the matching process showed that the program's low matching rate was due to the

low level of program participation and the large number of carpool markets (that is, possible combinations of residential origin, work destination, and work arrival time). This latter factor reflected the regional nature of the program, with a "many-to-many" trip orientation, and in addition, the unrestricted set of specific origin and destination choices.

The percentage of WBZ/ALA Survey respondents carpooling at the time of the survey was 25%. This level of carpooling represented a net increase over the percentage of respondents carpooling before the program (8%). In addition, the percentage of carpoolers was higher among WBZ/ALA Survey respondents than among Eastern Massachusetts Survey respondents (18%), reflecting the fact that the former group was comprised of voluntary participants in a carpool matching program, who were presumably more interested in carpooling than the general population of auto commuters.

Despite these apparently positive implications regarding the program's impact, analysis of findings from the two surveys revealed that the Commuter Computer Program played a negligible role in areawide carpool formation during its year of operation. Only one of the 520 Eastern Massachusetts Survey carpoolers attributed carpool formation to the program's matching process, and awareness of the program among areawide commuters was found to be unrelated

to either carpool formation or interest in carpooling. Moreover, the program did not significantly affect the rate of carpool formation among participants. Only a portion of those WBZ/ALA Survey respondents matched by the program joined carpools, and the 25% of respondents carpooling indicated that carpool formation had primarily occurred independently of the program's matching process -- i.e., through informal channels or other programs. The program's limited effect on carpool formation among participants was found to be related to the low matching rate, limitations in the matching criteria, and limitations in the post-matching notification and follow-up process.

Experiences of Carpoolers:

An examination of the carpool characteristics of WBZ/ALA Survey carpoolers and Eastern Massachusetts Survey carpoolers revealed a variety of carpool types in terms of size, duration, and driving arrangement. The two groups were found to be similar with respect to prior mode distribution, with approximately 20% of carpoolers diverted from transit or from a combination of car and transit. Moreover, they reported similar motivations for carpooling, with cost savings and the energy crisis constituting the most important reasons.

The 25% of WBZ/ALA Survey respondents who were carpooling at the time of the survey were on the whole satisfied with carpooling. The most frequently cited perceived advantages of carpooling were cost savings, helping to alleviate environmental problems, and relief from driving. The most frequently cited negative features were reduced independence and mobility and schedule adherence difficulties. Overall, it was found that negative features were less frequently cited than positive features, confirming the finding of basic satisfaction among this group.

Experiences of Noncarpoolers:

The inability of WBZ/ALA noncarpoolers to form carpools was due to both program and individual factors. Program difficulties included the insufficient quantity and quality of computer-generated matches, the lack of an updating system to accommodate changes in participants' carpooling requirements, and the absence of a post-matching mechanism to facilitate carpool formation among matched participants. Individual factors included residential moves, job changes, and loss of interest in carpooling.

An investigation of noncarpoolers' reasons for stopping carpooling revealed that for both WBZ/ALA and Eastern Massachusetts Survey noncarpoolers, the major cause of carpool dissolution was normal attrition factors such as

residential and job changes, rather than operational problems or increased gasoline availability.

The majority of WBZ/ALA noncarpoolers (73%) were found to be still interested in carpooling. An analysis of noncarpoolers' continued interest by certain demographic characteristics suggested an attitude change toward increased acceptance of carpooling, especially among high income, auto-oriented commuters who have traditionally been most resistant to carpooling.

On the other hand, only 25% of Eastern Massachusetts noncarpoolers expressed interest in carpooling. In general, the reasons given by the former group for lack of interest related to the impracticality or inconvenience of carpooling -- e.g., unusual working hours, need for a car because of type of work. An examination of Eastern Massachusetts noncarpoolers' likelihood to carpool in response to various carpooling incentives revealed greatest receptivity toward economic incentives (viz., gas tax/income tax refund) and least receptivity toward highway incentives (special lanes and ramps).

Based on the data for Eastern Massachusetts noncarpoolers on interest in carpooling and receptivity toward incentives, rough projections were made as to the potential level of carpooling in the area. The maximum potential level was estimated to be 52% of all Eastern Massachusetts commuters, and a more conservative level was

estimated to be 26%. Though these estimates indicate considerable margin for increase over the actual level of carpooling among Eastern Massachusetts respondents (18%), their applicability for local planning purposes and their generalizability to other locales are limited by the coarseness of the methodology and the various assumptions used.

CONCLUSIONS AND RECOMMENDATIONS

The major conclusions of the case study evaluation of the Commuter Computer Program are as follows:

- The level of public participation in the program was low -- only 13,500 out of approximately 1.5 million workers in the area -- owing to program-related factors, attitudinal factors, and competition from other carpool formation mechanisms.
- Program participants exhibited typical travel-related characteristics but atypical demographic characteristics relative to expected carpooler traits.
- The national energy crisis, by expanding the ranks of participants to include persons traditionally resistant to carpooling, caused the participation level to be higher than it would have been under normal circumstances.
- The program's matching rate was low -- 25% -- on account of the low level of participation and the large area coverage.
- Though WBZ/ALA Survey results indicated 25% of participants carpooling, less than one-quarter of these carpoolers attributed carpool formation to the program's matching process. The program's limited effect on carpool formation among participants was due to the low matching rate and

shortcomings in the matching and post-matching process.

- The program had a negligible impact on carpool formation or interest in carpooling among Boston area commuters.
- Program participants indicated a greater predisposition and more favorable attitude toward carpooling than the auto commuter population at large.
- Based on the reported experiences and attitudes of carpoolers and noncarpoolers, the overall prognosis for carpooling as a mode of travel appears favorable.

Although the WBZ/ALA Program was of limited effectiveness in encouraging carpool formation in the Boston area, it played a very positive role as a stimulus to and learning ground for carpool programs in other cities throughout the country. Within the context of this case study evaluation, the examination of the program's operational elements and of participants' experiences and reactions to the program has led to a number of recommendations for future areawide programs. The key recommendations are listed below:

- There is a need for active employer and/or community support to "personalize" an areawide, computer-based program and thereby encourage participation by commuters.
- An areawide program should have limited outreach area (i.e., number of carpool markets) and flexible matching criteria variables to increase the matching rate and enhance the potential for carpool formation.

- An areawide program should include a computer file updating system to accommodate changes in participants' carpooling needs and matching data.
- An areawide program should incorporate a post-matching mechanism to facilitate carpool formation among matched participants.

In addition to these recommendations for areawide carpool programs, a brief comparison of areawide vs. employer-based and community-based carpool programs in terms of their effectiveness in attracting participants, matching prospective carpoolers, and encouraging carpool formation has resulted in some tentative recommendations as to universally desirable features of carpool programs.

The findings and recommendations of this case study evaluation are intended to have research as well as practical applications. It is expected that the information obtained will be useful in structuring future carpooling programs (including the recently implemented statewide program in Massachusetts) and will contribute to the growing body of knowledge regarding carpooling behavior, attitudes, and potential. Moreover, this early effort to evaluate an areawide program will hopefully serve as an impetus for evaluations, albeit on a smaller scale, of ongoing areawide and employer-based carpool programs.

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

In the past few years, carpooling has begun to receive unprecedented attention as a mode of travel in urban areas. The factors spurring this interest in carpooling are varied, and include air pollution, traffic congestion, limited parking availability, and, more recently, the national energy crisis. Reflecting the varied sources of interest in carpooling is the diversity of organizations involved--federal, state, and local government agencies as well as the private sector.

The primary focus for the Department of Transportation's efforts in the area of carpooling has been the nationwide carpool action plan initiated in early 1974, at the peak of the energy crisis. Under this plan, sponsored by the Urban Mass Transportation Administration and the Federal Highway Administration, financial and technical assistance was made available to metropolitan regions interested in establishing carpool programs. In conjunction with this assistance program, the Department has been conducting studies on such issues as the current and potential level of work-trip carpooling, factors affecting the level of carpooling, and techniques for encouraging and facilitating the formation of carpools. One of these, a case study evaluation of an areawide carpooling program in

Boston, is the subject of this report. The other studies are described in references 1, 3, and 4.

In August 1973, a few months prior to the energy crisis, the Boston Metropolitan area became the site of the first major program in the country to promote and organize carpooling on a urbanwide scale. This program, entitled the WBZ/ALA Commuter Computer Campaign, consisted of a free computer matching service for prospective carpoolers accompanied by an intensive mult-media promotion effort. The sponsors, WBZ-Radio and TV and the Automobile Legal Association (ALA) Auto and Travel Club, were under a one-year agreement to operate the program.

The Boston area program, although the first of its type, was by no means the only existing program to encourage carpooling. Formal programs were increasingly supplementing informal channels of carpool formation--i.e., neighbors, relatives, and co-workers making arrangements on an individual basis. These newer programs were widespread throughout the larger urban areas, and represented a wide variety of program types in terms of sponsorship, participant groups, and operational characteristics.[1]

In view of the increasing role of formal carpool promotion/matching programs and the general lack of a systematic evaluation of public response to and effectiveness of these programs, the Transportation Systems Center (TSC) became involved in a detailed case study

evaluation of the WBZ/ALA Commuter Computer Campaign. As is explained in the next section, this case study eventually developed into an opportunity for examining more generalized aspects of carpooling, such as carpool characteristics and factors associated with the propensity to carpool.

1.2 CARPOOL EVALUATION STUDY DESIGN

The central objective of TSC's case study evaluation was to assess the effectiveness of the WBZ/ALA effort in generating interest in carpooling and encouraging carpool formation. The program itself assumed no responsibility beyond providing people with a list of prospective carpoolers and thus contained no mechanism for self-evaluation--that is, no means of obtaining feedback from participants on the extent of carpool formation, attitudes toward the program, or experiences with carpooling. Accordingly, TSC decided to monitor the progress of the Commuter Computer Campaign and, in particular, to learn about participants' behavioral and attitudinal responses to the program in a detailed follow-up survey.

As plans for the WBZ/ALA Follow-Up Survey materialized, it became increasingly apparent that an evaluation which focused solely on program participants would be inadequate. In the first place, the program participants were recognized to constitute a unique population of potential carpoolers--that is, persons who voluntarily requested to be matched

with other prospective carpoolers in the absence of any compelling positive or negative incentives. Such a population could not form the basis of generalizations about areawide carpooling potential. Second, there was no information available on the overall level of carpooling in the Boston area,[2] and hence no benchmark against which to compare program results. Third and most important, the national energy crisis which began in the fall of 1973 further underscored the need for a "control," so that program participation and program-generated carpooling could be measured in relation to energy crisis effects on areawide carpool formation. Therefore, a decision was made to supplement the Follow-Up Survey of program participants with a random sample survey of commuters in the Eastern Massachusetts Region, an area roughly comparable to the program outreach area. The Eastern Massachusetts Survey would measure the penetration of the WBZ/ALA program as well as indicate the post-program and potential level of carpooling.

Once the basic study design of a two-pronged survey effort was established, some additional thought was given to the various types of information which could be obtained from each survey. Figure 1 summarizes the specific objectives of each survey, around which individual questions were structured. The questionnaires are presented in Appendices A and B.

WBZ/ALA Follow-Up Survey

- Determine demographic and travel characteristics of program participants.
- Ascertain the extent of carpool formation among participants, both directly as a result of and independently of the program.
- Obtain information on the experiences of carpoolers-i.e., operating characteristics of their carpools, reasons for wanting to carpool, perceptions regarding the pros and cons of carpooling.
- Obtain information on the experiences of noncarpoolers-i.e., reasons they did not form carpools, continued interest in carpooling.
- Obtain feedback on participants' attitudes toward the program.

Eastern Massachusetts Survey

- Measure penetration of WBZ/ALA Program among Eastern Massachusetts commuters.
- Estimate post-program and potential level of carpooling in the Eastern Massachusetts Region.
- Measure impact of the energy crisis on carpooling.
- Determine demographic and travel characteristics of carpoolers, noncarpoolers, and potential carpoolers.
- Obtain information on the experiences of carpoolers-i.e., reasons for wanting to carpool, mechanisms for carpool formation, operating characteristics of their carpools.
- Determine noncarpoolers' interest in carpooling and receptivity toward various carpooling incentives.

Figure 1 Specific Objectives of Carpool Surveys

The procedures for the two surveys are highlighted in Figure 2. Appendices A and B present a detailed description of the procedures for the WBZ/ALA Follow-Up Survey and Eastern Massachusetts Survey, respectively.

	WBZ/ALA FOLLOW-UP	EASTERN MASS
TYPE OF SURVEY	SELF-ADMINISTERED MAIL-BACK	SELF-ADMINISTERED MAIL-BACK
SURVEY PERIOD	JULY-AUGUST 1974	OCTOBER-NOVEMBER 1974
SURVEY UNIVERSE	PROGRAM PARTICIPANTS (13,000 BY AUGUST 1974)	COMMUTERS IN EASTERN MASS. REGION (~ 1.5 MILLION)
SAMPLING SOURCE	WBZ/ALA RECORDS OF PARTICIPANTS'NAMES AND ADDRESSES	AUTO REGISTRANTS IN EASTERN MASS. REGION (~ 1 MILLION)
SURVEY SAMPLE	ALL PARTICIPANTS AS OF MARCH 1974 (10,600)	RANDOM SAMPLE OF AUTO REGISTRANTS (25,000)
USABLE RESPONSES	4,300	2,900

Figure 2 Procedure for WBZ/ALA Follow-Up Survey and Eastern Massachusetts Survey

The two surveys differ with respect to the populations and geographic areas under analysis. The universe for the WBZ/ALA Survey included all participants who wrote into the carpooling program, in all some 13,500 area commuters. Because of the self-selecting nature of this group, random sampling techniques were not applicable. Instead, a time cut-off was used to select the survey sample; all participants as of March 1974 (six months after the inception of the program) were surveyed, resulting in a sample of 10,600 persons. The Eastern Massachusetts Survey

had as its universe the approximately 1.5 million commuters in the Eastern Massachusetts Region. The sampling source for this survey was 955,000 auto registrants living in an area slightly smaller than the Eastern Massachusetts Region. Auto registrants were the most feasible sampling source and were felt to represent fairly well the population of commuters that a regional carpool program would hope to attract. (Two groups of potential carpoolers which were known to be excluded from this sampling source are non-auto-owners with no transit available and dissatisfied transit users.) A systematic random sample was taken using every Kth individual from a list of registrants, yielding 25,000 potential respondents. Response rates for the two surveys were 41% and 11%, respectively, and bias check procedures revealed negligible differences between respondents and nonrespondents.

In terms of the area of analysis, both surveys drew their potential respondents primarily from the Eastern Massachusetts Region (see map in Chapter 3). For the WBZ/ALA Survey, the area of response included the 152 towns and cities in the Eastern Massachusetts Region plus communities from Rhode Island, New Hampshire, and other parts of Massachusetts. The Eastern Massachusetts Survey was more limited in scope, drawing its population from 126 cities and towns in the Eastern Massachusetts Region.

In sum, the case study evaluation examined the effectiveness of the Commuter Computer Program against a backdrop of areawide carpooling trends and the special environment created by the energy crisis. The two surveys, over and above providing the information needed to evaluate the Boston area program, permitted an examination of factors associated with carpool formation, carpool characteristics, and characteristics of carpoolers, non-carpoolers, and potential carpoolers.

This study effort was not intended or designed to assess the WBZ/ALA Program in a cost-benefit or cost-effectiveness framework. In the first place, the absence of accurate cost records relative to planning and operating the program made such an analysis unfeasible. More important, it was felt that such a perspective might be inappropriate for this program, the first of its type in the country. On the grounds that the program essentially constituted a demonstration, there appeared to be far greater merit in examining it from an operational standpoint to obtain lessons for other programs than in judging its overall performance from the standpoint of costs incurred and benefits achieved such as congestion relief or fuel savings.

Ultimately, the output of this study effort is envisioned to have research as well as practical applications. The information obtained will not only be useful in structuring future carpooling programs in Boston

and other locales but also will contribute to the growing body of knowledge regarding carpooling behavior, attitudes, and potential.

1.3 CONTENTS OF THE REPORT

The remainder of this report consists of a detailed description and evaluation of the Boston area carpooling program. Chapters 2 and 3 provide background information on the WBZ/ALA Commuter Computer Program and the program scenario, the Eastern Massachusetts Region. Chapter 4 describes demographic and travel characteristics of Eastern Massachusetts commuters. Chapter 5 evaluates the program in terms of participation: it traces the growth in the number of participants over the program period and examines participants' demographic and travel characteristics; the chapter then considers the participation level and participant mix in the context of various possible motivations for carpooling. In Chapter 6, the evaluation focuses on the Commuter Computer matching system and the carpool formation process among program participants. Chapters 7 and 8 evaluate program effectiveness from the perspective of the experiences of carpoolers and noncarpoolers, respectively. Chapter 9 presents overall case study conclusions and then applies the findings in a broader context to arrive at recommendations regarding generally desirable features of carpool programs.

[1] See the discussion of 77 carpool programs in the TSC report entitled Carpooling: Status and Potential (Reference 1).

[2] Census Journey to Work data for 1970 provide information on work trip occupancy, but do not provide a measure of regular ride-sharing arrangements.

CHAPTER 2

DESCRIPTION OF THE WBZ/ALA COMMUTER COMPUTER PROGRAM

This chapter provides background information on the WBZ/ALA Commuter Computer Program, which was in operation in the Boston area between August 1973 and August 1974.

2.1 PROGRAM HISTORY

The WBZ/ALA Commuter Computer Program developed out of a desire on the part of both sponsoring organizations to achieve publicity via a public service campaign. Rather than expending their advertising budgets directly on publicity measures encouraging people to listen to WBZ[1] or join ALA, they decided to apply funds to a public service effort which, hopefully, would be more effective in increasing listenership/membership. WBZ-Radio had conducted a number of public service campaigns in the past: two years before in 1971 the theme was drugs, and in 1972 the campaign focused on proper nutrition. Sensing in early 1973 the impending development of transportation into a major issue, the Creative Services Director at WBZ/Radio devised a five-part transportation campaign:

1. "Commuter Computer" -- carpool promotion and matching service.
2. "The BZ Rider" -- free shuttle buses in downtown

shopping area and at Logan Airport.

3. "Dial 103" -- free telephone number to dial for local travel information (routes, schedules).
4. "Rush Hour Rescue" -- expansion of existing free emergency towing service on Southeast Expressway (provided by WBZ in conjunction with ALA) to Route 128 and possibly other major highways.
5. Legislation -- on-air editorials, talk programming, and printed ads encouraging listeners to propose new state legislation related to transportation; the best listener suggestions would be drafted into a bill, which the station would then file on behalf of its listenership.

The "Commuter Computer" effort, the only portion of the campaign which materialized, forms the subject of this case study.

Figure 3 presents a historical record of the major events in the Boston carpooling program from the conception of the idea in January 1973, to the middle of October, when the promotional effort began to level off. From this schedule one can glean the comprehensiveness of the campaign: not only was the promotional effort (i.e., selling the concept of carpooling) carried out at near-saturation levels via many media, but also the dissemination of application forms was conducted in a very thorough

Mid-January 1973	Beginning of discussions between WBZ and ALA regarding possibility of car-pool campaign.
February thru April	Discussions with transportation experts from government (City, State, Federal), business and academia.
May	WBZ and ALA make firm commitment to campaign.
June	Meeting with Mass. Transportation Secretary Altshuler to discuss campaign.
July	Preparation of advertising, questionnaires, decals, etc.
August 2	Beginning of campaign on WBZ radio and TV (at least 2 spots per hour on radio).
August 15 - September 15	Billboards posted throughout metropolitan Boston.
August 21 - 29	Ads on Channels 7, 38, and 56 (about 10-20 spots per week).
August 22	Kick-off press conference.
Late August	Altshuler sets up task force to assist campaign - consisting of DPW, Police, Registry of Motor Vehicles, MBTA, Mystic River Bridge, Sumner-Callahan Tunnels.
September 1	Ad in Boston Magazine (monthly).
September 4 - 11	Ads on Channels 7, 38, and 56 (about 10-20 spots per week).

Figure 3 Commuter Computer Program Schedule

September 5	Ads in Boston Globe, Boston Herald American.
September 7	"Great Race" (race downtown by several carpools consisting of WBZ personalities and state officials). "Impact" TV show (90-minute special program).
Early September	Meeting with Greater Boston Chamber of Commerce, Associated Industries of Massachusetts. Tunnel distribution of 20,000 questionnaires. Questionnaire printed in nine suburban newspapers (100,000 circulation).
Early September to Present	Staggered distribution of questionnaires at stores, restaurants, shopping malls, banks, hotels, Mass. Pike, Logan Airport, Boston and Cambridge Chambers of Commerce.
September 10	Ad in Ad East (monthly), Phoenix.
September 13	Ad in Transcript Papers.
September 16	Ad in Herald American.
September 17	Ad in Time Magazine.
September 19	Article in Wall Street Journal. EPA distributes 10,000 questionnaires to Federal employees.
September 22	Ad in Boston Globe.
September 24	Ad in Phoenix.
October 1 - 18	Free station wagon contest.
October 5	Article in Christian Science Monitor.
October 10	CBS feature - Walter Cronkite.

Figure 3 Commuter Computer Program Schedule (cont.)

fashion (newspaper and magazine ads, employers, public places, and major transportation centers). In addition to the events shown in Figure 3, the campaign encompassed numerous TV and radio editorials presenting status reports on participation level and matching rates, citing cooperating companies, and appealing for more participants. Furthermore, recognizing that grass roots support was essential to the success of the program, the staff had meetings with a variety of community groups, business organizations, and state agencies to elicit their active participation and cooperation in the program.

A noticeable gap in the program's coverage was the absence of positive incentives toward carpooling. Although large employers and public agencies voiced considerable support of the program and participated in the distribution of questionnaires, they were rather reluctant to provide assistance in the form of positive incentives toward carpooling -- for example, free or priority parking at company lots or transit park-and-ride lots, reduced tolls, and exclusive lanes on highways and at toll plazas.

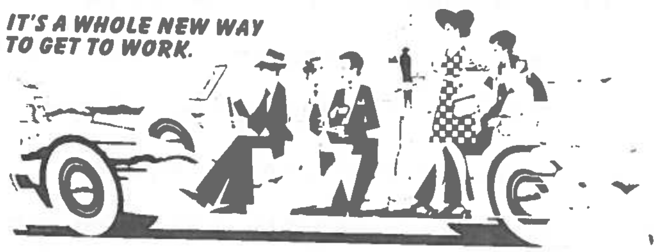
It should be noted, however, that the absence of positive incentives was to some extent compensated for by certain exogenous factors which served as negative incentives to solo driving. Events associated with the national energy crisis (rising gas prices, gas shortages, statewide gas rationing plan, 55 mph speed limit), impending

EPA regulations on employee parking, and the collapse of the Mystic River Bridge, a major route into downtown Boston from the northeast,[2] undoubtedly combined to create a rather favorable environment toward carpooling (at least in the short term).

The Commuter Computer Program was terminated upon expiration of the one-year contract between WBZ and ALA. According to the persons in charge of the program, the decision not to renew the open-ended agreement between the two sponsoring organizations was based on two factors: the lower-than-anticipated response from prospective carpoolers and limited cooperation from public and private organizations, and their understanding that the Massachusetts Department of Public Works would initate a statewide carpool program in the fall of 1974. As it turned out, the State program, entitled MASSPOOL,[3] did not get underway until September 1975, resulting in a one-year transitional period in which there was no areawide program for carpool matching and promotion.

2.2 PROGRAM OPERATION

The mechanics of the program's carpool matching process were as follows. An individual obtained a matching request application (shown in Figure 4) from one of the sources mentioned above or directly from ALA, answered the questions, and then mailed back the completed form with 10¢



WBZ RADIO's COMMUTER COMPUTER CLUBCAR

QUESTIONNAIRE

☐ MS
☐ MR
ADDRESS
CITY ZIP (DO NOT OMIT ZIP CODE)
PHONE

1. CHECK THE ONE POINT IN THE FOLLOWING LIST CLOSEST TO YOUR COMMUTING DESTINATION

1. ☐ Government Center/City Hall
2. ☐ P O Square/Financial Dist
3. ☐ State House/Beacon Hill
4. ☐ Wash St /Shopping District
5. ☐ Pru Center/Copley Square
6. ☐ Park Square
7. ☐ North Station
8. ☐ South Station
9. ☐ B U /Kenmore Square
10. ☐ Northeastern U /Fenway
11. ☐ City Square/Charlestown
12. ☐ South End/City Hospital
13. ☐ Faneuil Hall/North End
14. ☐ Charles Circ /Mass General
15. ☐ Columbia Pt /Boston Globe
16. ☐ Army Base/Fargo Building
17. ☐ Logan Airport
18. ☐ M I T (Cambridge)
19. ☐ Harvard (Cambridge)
20. ☐ Gillette Plant/South Boston
21. ☐ Boston Herald American
22. ☐ Lechmere Square (Cambridge)
23. ☐ Dedham/128 Industrial Parks
24. ☐ Needham/128 Industrial Parks
25. ☐ South Shore Plaza
26. ☐ Waltham Industrial Park/128
27. ☐ Polaroid/128
28. ☐ Burlington Mall
29. ☐ Intersection 128/93, Woburn
30. ☐ Other (On or within Route 128, Major Street or Landmark)

MBTA DRIVE / RIDE LOCATIONS

31. ☐ Riverside Station
32. ☐ Quincy Center Station
33. ☐ Wonderland Station
34. ☐ Everett Station
35. ☐ No. Quincy Station
36. ☐ Dedham/128 Railroad Station

2. CHECK THE TIME AT WHICH YOU MUST BE AT YOUR MORNING DESTINATION

1 ☐ 6 30AM
2 ☐ 7 00AM
3 ☐ 7 30AM
4 ☐ 8 00AM
5 ☐ 8 30AM
6 ☐ 9 00AM
7 ☐ 9 30AM
8 ☐ Other

3. AT WHAT TIME DO YOU LEAVE IN THE AFTERNOON

1 ☐ 3 00PM
2 ☐ 3 30PM
3 ☐ 4 00PM
4 ☐ 4 30PM
5 ☐ 5 00PM
6 ☐ 5 30PM
7 ☐ 6 00PM
8 ☐ Other

4. CHECK HERE IF YOU NEED THE NAMES OF PEOPLE WHO LEAVE FOR HOME ONE HOUR AFTER YOU NORMALLY DO

5. CHECK YOUR CLUBCAR PREFERENCE

☐ Drive only
☐ Ride only
☐ Alternate driving
☐ All male
☐ All female
☐ No preference

6. CHECK ANY OF THESE SPORTING EVENTS WHICH YOU REGULARLY ATTEND IF YOU WOULD LIKE TO RIDE THE CLUBCAR TO THEM

1 ☐ Patriots Games at Schaefer
2 ☐ Bruins Games at Boston Garden
3 ☐ Celtics Games at Boston Garden
4 ☐ B C Football at Alumni Stadium
5 ☐ Whalers at Boston Garden
6 ☐ Red Sox Games at Fenway Park
7 ☐ Braves at Boston Garden

IMPORTANT—It should be understood by all persons using the Commuter Computer service that its sole function is to match on the basis of information provided but without investigation of driving records and other relevant information prospective drivers with prospective riders THE UNDERSIGNED HEREBY AGREES THAT WBZ AND ALA WILL NOT BE LIABLE FOR ANY ACTION TAKEN OR OMITTED IN GOOD FAITH BY WBZ OR ALA AND THEIR AGENTS AND EMPLOYEES IN CONNECTION WITH THE "COMMUTER COMPUTER" SERVICE THE UNDERSIGNED AGREES TO ASSUME ALL RESPONSIBILITY FOR CONTACTING INVESTIGATING AND DRIVING OR COMMUTING WITH THE PERSONS WHOSE NAMES ARE FURNISHED BY WBZ OR ALA AND THE UNDERSIGNED AUTHORIZES WBZ AND ALA TO RELEASE THE NAME AND TELEPHONE NUMBER OF THE UNDERSIGNED TO ANY POTENTIAL DRIVER OR RIDER SELECTED BY ALA

Signature

IF YOU DRIVE TO WORK ALONE — CUT IT OUT.

Cut out the questionnaire Answer all questions Then mail to Commuter Computer Clubcar, Box 103, Boston, MA 02134

Questionnaires must be accompanied by a dime or 10¢ in stamps for return postage and handling, or they cannot be processed

Along with your Commuter Computer printout, you will also receive a Clubcar "Clubcard," side and rear window decals, a what-to-do-in-case-of-accident reference card, and a special "Visor Advisor" with alternate route maps, emergency phone numbers and downtown parking information, designed to fit on your sun visor, out of sight until you need it.

The Commuter Computer Clubcar is a service of WBZ Radio and WBZ Television, created in cooperation with the ALA Auto and Travel Club

WBZ RADIO 103
WBZ-TV 4
ALA Auto & Travel Club

Figure 4 WBZ/ALA Commuter Questionnaire

in cash or stamps. The questionnaire was then coded, keypunched, and put into a master file containing information on all program participants. Periodically, the participants in the master file were processed through a matching system utilizing an IBM 360/20 computer.

The matching system was basically a sorting program which matched individuals on the basis of origin (zip code), destination, and arrival time. The computer made two passes through the data, first to edit and group the requests, and then to match and print the response letters. Although other key data were not used as matching criteria (i.e., drive/ride, male/female preference, etc.), the system printed out these commuter carpool preferences with each match that it generated.

Within approximately one month, participants in the program received one of the three types of computer print-outs (shown in Figure 5) indicating: (1) that his or her questionnaire could not be processed due to insufficient or incorrectly supplied information (this print-out was accompanied by the original questionnaire with problem area(s) circled in red); (2) that the computer was unable to match the person with someone else having compatible carpooling needs, but would continue to process his/her application[4] (this "sorry" letter was accompanied by a blank questionnaire which the person was encouraged to give to a neighbor); or (3) that the computer had located at least one

1

WBZ/ALA COMMUTER COMPUTER PRINTOUT

COMMUTER COMPUTER IS UNABLE TO DETERMINE YOUR COMMUTING NEEDS BECAUSE OF INSUFFICIENT DATA SUBMITTED.

YOU MAY COMPLETE AND RESUBMIT THE ENCLOSED QUESTIONNAIRE.

2

DEAR COMMUTER

9/24/73

COMMUTER COMPUTER HAS NOT YET BEEN ABLE TO MATCH YOUR CARPOOLING REQUIREMENTS WITH THOSE OF OTHER COMMUTERS. HOWEVER, WE WILL CONTINUE TO PROCESS YOUR APPLICATION AND WILL CONTACT YOU WHEN WE HAVE MATCHES FOR YOU.

P.S. - PLEASE GIVE THE ENCLOSED QUESTIONNAIRE TO A FRIEND TO HELP MAKE COMMUTER COMPUTER WORK IN YOUR AREA.

John Doe
64 WARFIELD AVE
HULL MA 02045

WBZ/ALA COMMUTER COMPUTER

3

WBZ/ALA COMMUTER COMPUTER PRINTOUT

John Doe
40 BERKELEY RD
FRAMINGHAM MA 01701

10/09/73

PEOPLE MATCHING YOUR COMMUTER CARPOOL REQUIREMENTS.

Mr.	X	28 LAVERDURE	FRAMINGHAM MA	877-7316	DRIVE
Ms.	Y	15 QUEENS WY A6	FRAMINGHAM MA	877-2372	ALT
Mr.	Z	7 MONTGOMARY DR	FRAMINGHAM MA	877-1855	ALT

Figure 5 Sample Commuter Computer Printouts

other person with similar carpooling needs (the print-out included the name, address, telephone number, and drive/ride preference of each person). Included with the third type of print-out was a WBZ/ALA "Visor Advisor" -- a sticker containing information on alternate routes to downtown Boston and the location of downtown parking facilities; a glove compartment card with tips on carpooling and an accident check list; two Commuter Computer decals; and a Commuter Computer Clubcard (see Figure 6).

The division of labor between WBZ and ALA was relatively well-defined in a contract which was binding from August 1973 until August 1974. WBZ was responsible for all the publicity aspects of the campaign--that is, the design through implementation phases of any radio or TV ads, editorials, or special programs. ALA, on the other hand, bore the responsibility for all activities related to the matching of carpoolers--including editing and processing returned questionnaires as well as mailing out blank questionnaires and computer print-outs of matched carpoolers. Regarding the division of expenses, ALA was responsible for all computer mailing expenses plus a portion of the advertising and promotion expense.

There is no way of accurately estimating the total cost of the Commuter Computer Program, since WBZ and ALA could "bury" certain activities within their normal operations. However, the following list gives an indication of the major

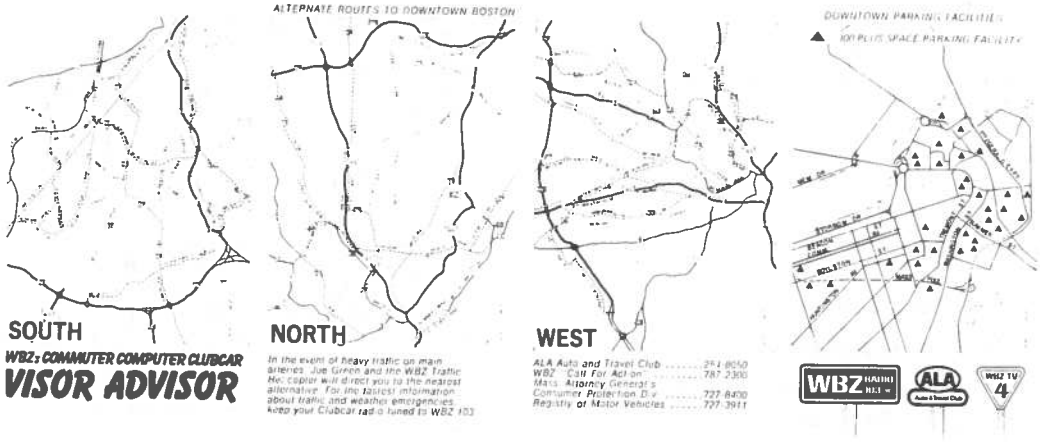


Figure 6 Commuter Computer Mailing Kit

PERSONAL ACCIDENT CHECK LIST

(Keep in glove compartment)

Date of Accident: _____

Time of Day: _____

Road and Weather Conditions: _____

Location of Accident: _____

City _____

Street or Reference Point _____

Name, Address and Phone # of Other Driver:

_____

_____

_____

Driver's License Number: _____

License Plate Number: _____

To Whom is Car Registered? _____

Names and Seating Positions of Additional Occupants of Other Car: _____

_____

_____

Police Authority at Scene (State, MDC, Local)

_____

Name of Officer in Charge: _____

_____

The WBZ Commuter Computer Clubcar. It's a whole new way to get to work. And it could be the first step toward preventing a major traffic crisis in Boston.

Besides, it makes sense for you.

You save money: on gas, tolls and parking.

You get to work faster. Fewer cars on the road can put the rush back into rush-hour.

You help the environment. Fewer cars mean less pollution.

You conserve fuel. And that helps lessen the energy crisis.

The enclosed printout contains the names and telephone numbers of a few people who live near you and work near you. Some of them may call you. But why wait? Call them as soon as possible and arrange your own Clubcar schedule.

We know you're interested in solving traffic problems. But face it, there may be some inconveniences to car-pooling. You can overcome these few problems by using common courtesy and by planning ahead.

Be on time in the morning and after work.

Call someone if you're ill or need to use your own car one day.

Leave early enough so everyone gets to work on time.

Set up cost sharing in the beginning so everyone knows what to expect.*

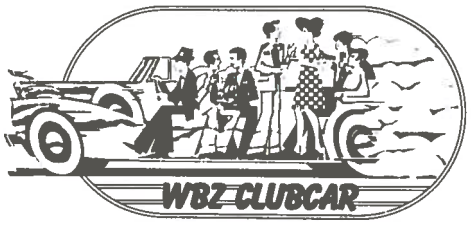
Listen to WBZ Radio for tips from other Clubcar riders.

Use MBTA Drive/Ride locations wherever possible.

The Commuter Computer Clubcar is created in cooperation with the ALA Auto and Travel Club.

* Please consult your insurance agent concerning any questions you may have about car pooling coverage.

Keep this card in wallet for future benefits



WBZ's COMMUTER COMPUTER CLUBCARD

This is to certify that

NAME _____

Is a member in good standing of the WBZ Commuter Computer Clubcar Carclub, and should be extended all courtesies and privileges associated with said membership.

DATE _____

SIGNATURE _____

Figure 6 Commuter Computer Mailing Kit (cont.)

categories of manpower, computer, and advertising needs which comprised the total cost of the urbanwide carpooling program.

1. Initial planning of campaign, continual liason with local transportation agencies and major employers, etc. (no time or manpower estimate available).
2. TV and radio advertising (at least two spots per hour on radio plus many special shows, editorials, etc.).
3. Large ads containing questionnaire form in several major local newspapers and a national news magazine.
4. Printing of loose questionnaires (500,000-750,000).
5. Initial development and debugging of matching program (approximately one week of programmer time).
6. Manual editing and coding of returned questionnaires, count of daily and weekly receipts, manual matching of people with non-standard entries, etc. (about 3-4 hours per day of clerical person's time, assuming 100 questionnaire receipts per day).
7. Keypunching and verifying (about 100 questionnaires per day).
8. Computer processing (each run required about 9 hours of computer operator time for edit pass, match pass, and sort of letters, plus an unknown amount of computer time).

9. Slush found to cover special publicity features (e.g., free car contest) and miscellaneous mailing costs (over and above those covered by the 10¢ remittance per respondent).

2.3 INFLUENCE ON OTHER CARPOOLING PROGRAMS

During the year of program operation, WBZ and ALA received numerous requests from other cities throughout the country, and even abroad, regarding the Commuter Computer Program. More importantly, the program appears to have served as a model for a number of areawide carpool programs established in response to the energy crisis--for instance, in Los Angeles, San Francisco, Baltimore, Philadelphia, Pittsburgh, New York City, Tulsa, Dallas, and Fort Worth. Regardless of the effectiveness of the WBZ/ALA Program in promoting carpooling in Boston, the program's pioneering role as a stimulus to and learning ground for the successor program, MASSPOOL, and for other programs was considerable.

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[1] According to the April-May 1973 American Research Bureau ratings, WBZ-Radio has the largest listenership of all stations in the Boston area: about 43% of all males over 18 years old and 35% of all females over 18 listen to this station during the course of a week.

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[2] Shortly after the Bridge collapse, a southbound section of I-93 leading into Boston was opened to buses and carpools with three or more passengers. According to the Massachusetts Department of Public Works, the level of carpooling on I-93 subsequently increased from 3% to 10% of total traffic.

[3] Appendix E contains a fact sheet on the MASSPOOL Program.

[4] Although the person's name and travel data remained on file for continual reprocessing, he would not receive a listing of names in the future unless he sent in another request. Presumably he would otherwise be contacted by the person(s) receiving a listing with his name on it.

CHAPTER 3

DESCRIPTION OF THE EASTERN MASSACHUSETTS REGION

In order to understand the dynamics of the WBZ/ALA regional carpool program and to evaluate commuters' response to the program, it is appropriate to examine the demographic and transportation characteristics of the area in which the program operated. Of particular relevance to evaluating the carpool program are the area's population distribution, employment distribution, and work trip modal split.

Although the program attracted commuters from as far away as New Hampshire, Rhode Island, and western Massachusetts, its principal outreach was the suburban communities surrounding downtown Boston. The Eastern Massachusetts Region (EMR), the specifically designated A-95 planning area, closely approximates this program outreach area and thus serves as a suitable geographical reference for the carpool program. However, owing to the lack of readily available aggregated data for the EMR, the quantitative information presented in this section is 1970 Census data for the Boston Standard Metropolitan Statistical Area (SMSA), an area which lies within the EMR (see Figure 7). Since this information provides descriptive background for the reader and is not used analytically, discrepancies between the actual program outreach area, the EMR, and the Boston SMSA are considered insignificant.

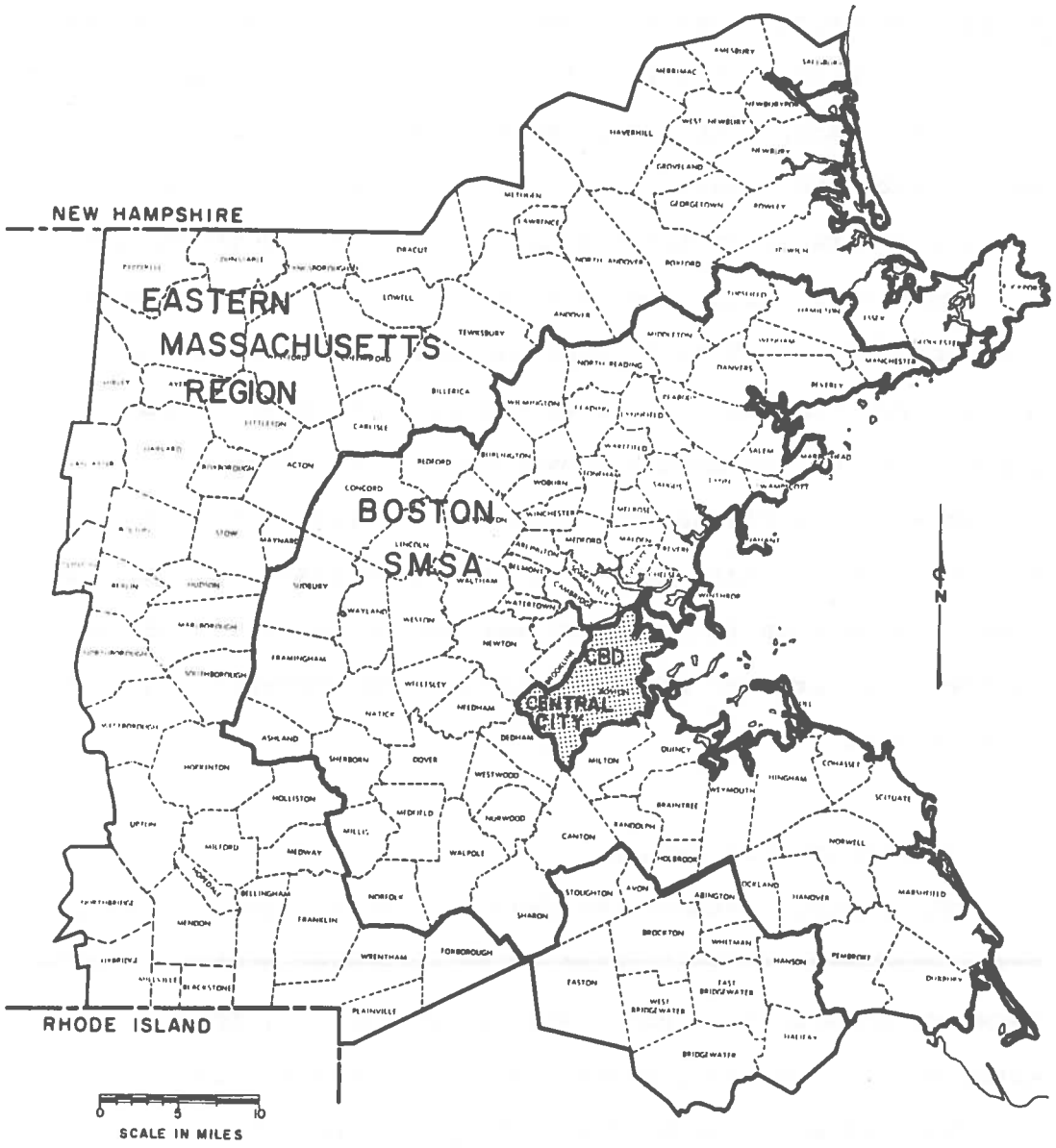

Figure 7 Map of Eastern Massachusetts Region

3.1 POPULATION AND EMPLOYMENT

The Eastern Massachusetts Region consists of 152 towns and cities covering a 2,400 square mile area. The population of the region is about 3.5 million, of which half is located within 20 miles of the central city of Boston. The Boston SMSA, which includes 79 towns and cities of the EMR, covers 990 square miles, contains over 2.5 million people, and ranks as the eighth largest SMSA in the nation.

Despite a decline of 8% in the central city population between 1960 and 1970, to approximately 600,000, the area as a whole has continued to grow, experiencing most of its population and employment growth outside of Route 128 -- a circumferential highway belt located 14 miles from Boston. Although recent years have seen this area along and outside Route 128 develop into a major employment center, employment in the core city has remained viable when compared to other large cities.

3.2 TRANSPORTATION NETWORK

The linkage between residence and workplace for Boston area residents is facilitated by an extensive highway network, as well as rapid transit, commuter railroad, express and local bus, subway, and streetcar service.

The highway system of the region is characterized by a series of radial highways, with Routes I-95, I-93, and Route 3 from the North; Routes 2 and 90 (a toll road) in the

western portion; and Routes I-95, 24, and 3 (the Southeast Expressway) from the South (see Figure 8). These are linked by two major circumferential belts, Route 128 and Interstate 495, located 14 and 35 miles outside of the Boston Central Business District (CBD), respectively.

Transit service extends approximately 20 miles from the CBD, with the Massachusetts Bay Transit Authority (MBTA) serving 79 towns and cities in the Eastern Massachusetts Region.[1] Rapid transit facilities (see Figure 9) are generally no more than 9 miles from the CBD. Of those cities served by rapid transit, all have densities in excess of 4,800 people per square mile, with few points within these cities more than one-half mile from the nearest transit station.

The rapid transit system is well supplemented by a feeder bus system, express bus service on three of the regions's radial highways, and two commuter railroads serving the extreme outlying suburbs. In addition, there are a number of park-and-ride and kiss-and-ride lots at transit and commuter rail facilities throughout the area.

Continued suburbanization of both population and employment has resulted in increasing reliance on use of the automobile for the journey to work. Despite the extent of the transit system, especially within the Route 128 area, transit patronage has been on the decline.[2] Nevertheless, auto ownership in the Boston area is still somewhat lower

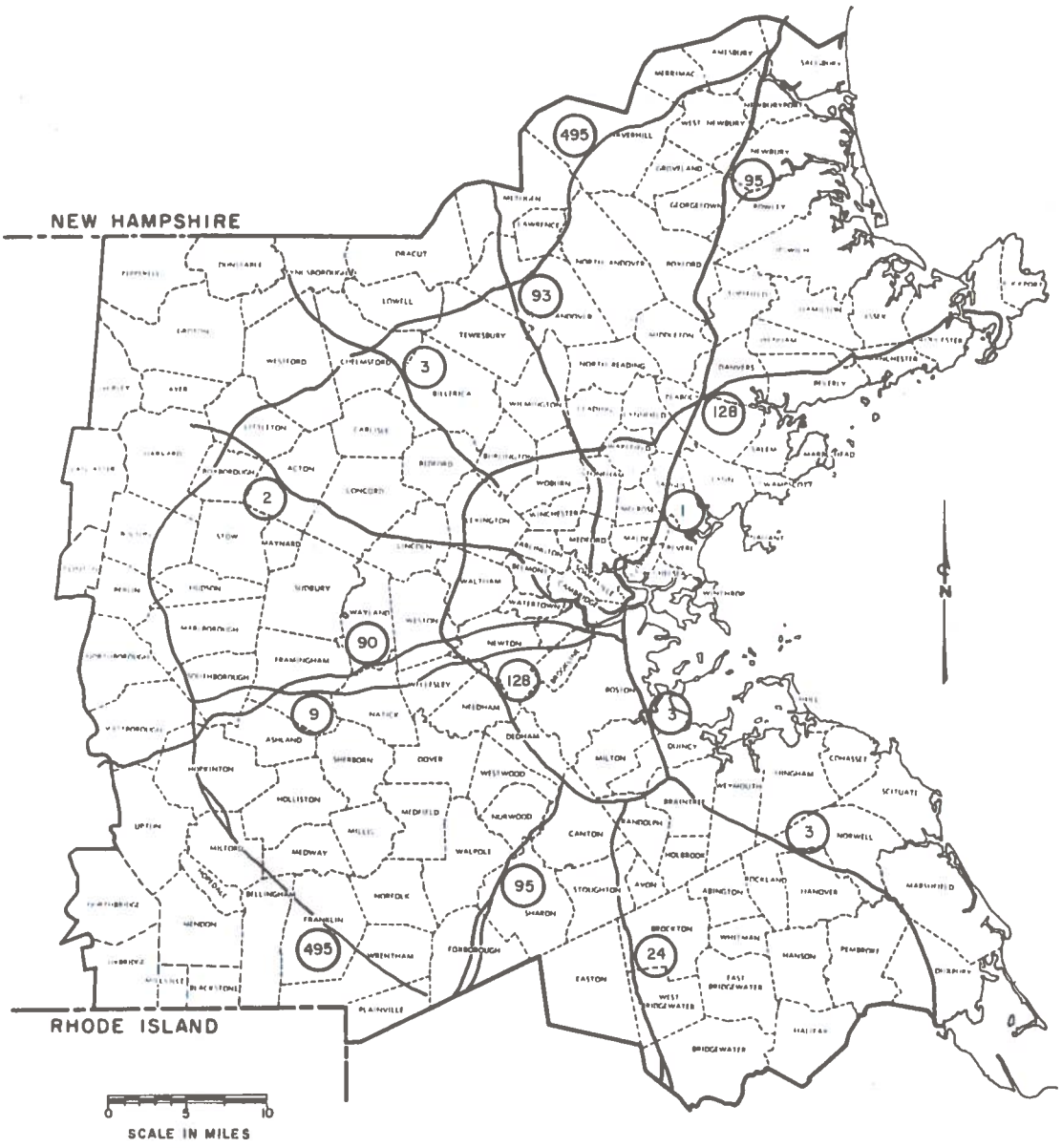

Figure 8 Map of Eastern Massachusetts Region Highway Network

MBTA Rapid Transit Lines

Commuter Rail Lines

Figure 9 Map of Eastern Massachusetts Region Rapid Transit and Commuter Rail System

than the national average for SMSA's, with 76% of households owning one or more autos vs. 81% nationally.

3.3 CHARACTERISTICS OF BOSTON SMSA WORKERS

At the time of the 1970 Census, the Boston SMSA contained over 1.1 million workers 16 years of age and older. A concise picture of their demographic characteristics, i.e. income, occupation, education, age, sex, etc., is presented in Figure 10.[3] Overall, Boston SMSA workers tend to be between the ages of 16 and 44, high school graduates, engaged in white collar occupations,[4] and earning less than $10,000 a year.

The majority of Boston SMSA workers live outside of the central city and are traveling to work destinations other than the CBD or other areas in the central city. As can be seen from Table 1, over 75% of SMSA workers live outside the central city with the percentage for females below that for males (39% vs. 61%, respectively). Moreover, Table 1 reveals that only 33% of workers are headed toward central city worksites, and only 7% travel into the CBD. In contrast, 55% of workers travel to areas outside the central city, and another 12% travel outside the SMSA of residence.

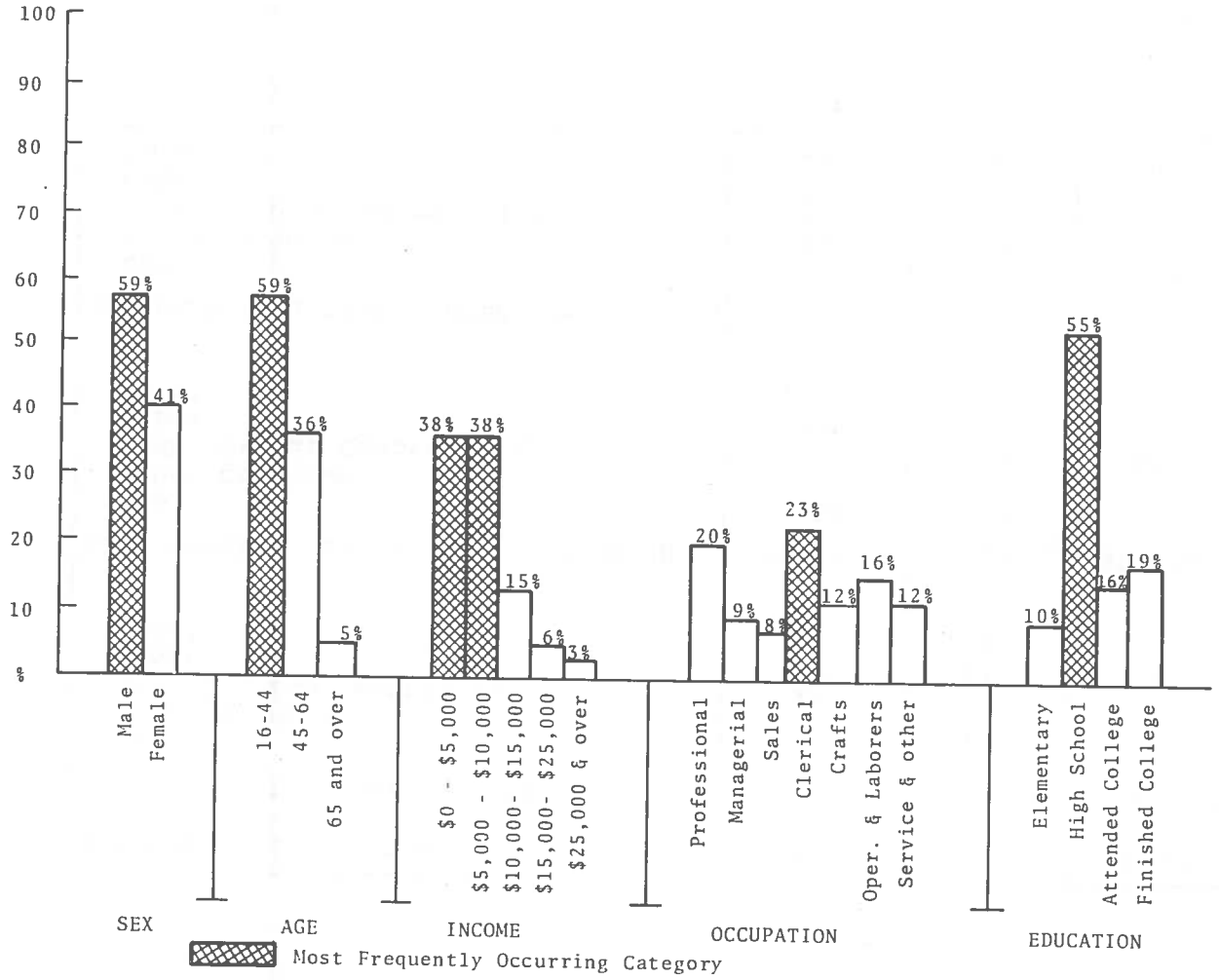

Figure 10 Demographic Characteristics of Boston SMSA Workers

TABLE 1. BOSTON SMSA WORKERS' RESIDENCE BY DESTINATION BY SEX

RESIDENCE/DESTINATION	MALE	FEMALE	TOTAL
LIVE IN CENTRAL CITY - WORK IN:	140,167	117,836	258,003
CBD	9%	16%	12%
Other Downtown	54	59	56
SMSA Outside Central City	23	14	19
Other	14	11	13
Total	100	100	100
LIVE OUTSIDE CENTRAL CITY - WORK IN:	518,818	333,885	852,703
CBD	5%	6%	6%
Other Downtown	19	15	17
SMSA Outside Central City	64	68	65
Other	12	11	12
Total	100	100	100
ALL SMSA RESIDENTS - WORK IN:	658,985	451,721	1,110,706
CBD	6%	9%	7%
Other Downtown	26	26	26
SMSA Outside Central City	55	54	55
Other	13	11	12
Total	100	100	100

Boston SMSA workers tend to live and work in the same area. Of those living in the central city, for instance, 68% are traveling to central city worksites. Likewise, of workers living outside of the central city, 65% travel to worksites in the SMSA outside of the central city. Regardless of residence, however, it is noteworthy that females travel to central city worksites, in particular the CBD, in greater proportion than their male counterparts. This is especially the case for female workers living in the central city, 74% of whom work there, as compared to only 63% of male workers. The data suggest, then, that Boston SMSA workers, especially females, locate their residences in order to shorten their journey to work.

Travel mode to work is reflective of the existing transportation infrastructure and the distribution of residences and workplaces. As expected, the majority of SMSA workers (67%) rely on the auto for their journey to work (with 11% of these being auto passengers),[5] 20% using transit, and another 13% using other modes (walk to work, bicycle, work at home, etc.) A comparison of modes reveals a higher mean income for auto drivers ($8,814), when compared to that of auto passengers ($5,473), transit users ($5,541) or other modes ($4,869). The majority of auto drivers are male, whereas females constitute the majority of auto passengers, transit patrons, and users of other modes.[6]

Data from the 1970 Census were aggregated in order to examine work-trip flows by mode (see Table 2). Results indicate that although the automobile is the predominant mode areawide, workers living in the central city rely more heavily on public transportation than do workers living outside the central city. This is only the case for workers traveling radially to central city worksites, however, as workers engaged in "reverse commutes" (i.e. central city to suburb) rely more heavily on the single passenger auto for their journey to work. In general, public transit usage is expectedly greater for those working in CBD, regardless of residence.

A further analysis of work-trip flows by mode shows that the percentage of auto drivers is greatest for workers living outside the central city or the Boston SMSA. In addition, regardless of residence or workplace, the percentage of auto passengers is disproportionately low --- although slightly greater for workers living outside of the central city or for workers living inside the central city and commuting to areas outside the central city.

3.4 SUMMARY

In sum, the Eastern Massachusetts Region can be characterized as a diverse, economically viable region. Its workers (i.e. Boston SMSA workers) tend to be in white collar occupations, earning less than $10,000 a year,

TABLE 2. BOSTON SMSA WORKERS' RESIDENCE BY DESTINATION BY TRAVEL MODE

	Auto Driver		Auto Passenger		Public Transit		Other*		Total	
Live in Central City, Work in:										
CBD	4,705	15%	1,504	5%	21,616	68%	3,746	12%	31,571	100%
Other C.C.	47,013	32	11,186	8	54,797	38	31,862	22	144,794	100%
SMSA	28,103	57	5,711	11	13,263	27	2,441	5	49,518	100%
Other	11,846	37	2,774	9	11,882	37	5,554	17	32,056	100%
All	91,667	36	21,175	8	101,558	39	43,602	17	258,003	100%
Live Outside Central City, Work in:										
CBD	16,567	35%	4,374	10%	26,458	54%	390	1%	47,879	100%
Other C.C.	86,737	59	15,555	11	42,012	28	3,490	2	147,794	100%
SMSA	366,493	66	67,054	12	42,042	8	81,234	14	556,803	100%
Other	67,106	67	10,875	11	10,842	11	11,404	11	100,227	100%
All	536,903	63	97,838	12	121,444	14	96,518	11	852,703	100%
Total - SMSA, Work in:										
CBD	21,272	27%	5,878	7%	48,164	61%	4,136	5%	79,450	100%
Other C.C.	133,750	46	26,741	9	96,809	33	35,352	12	292,652	100%
SMSA	394,596	65	72,745	12	53,305	9	83,675	14	606,321	100%
Other	78,592	60	13,649	10	22,724	17	16,958	13	132,283	100%
All	628,570	56	119,013	11	223,002	20	140,121	13	1,110,706	100%

*Includes walk to work, work at home etc.

commuting by auto, and for the most part working outside the central city. Although 50% of the region's population resides within 20 miles of the Boston central city, population and employment have grown fastest in the outlying (beyond 20 miles) suburban areas -- areas characterized by heavy reliance on the automobile for the journey to work.

[1] The MBTA serves all 79 towns and cities in the Boston SMSA.

[2] Ridership decreased by 8.2% from 1968 to 1969. The decrease from 1969 to 1973 was 13.1%. Despite the decline, the percentage of Boston SMSA workers using public transit (20%) is relatively high when compared with the national average for all 243 SMSA's (12%).

[3] The data on SMSA workers were obtained from (1) U.S. Bureau of the Census, Characteristics of the Population for Massachusetts, Vol. 1, Part 23 and (2) Journey to Work: 1970 Census of Population.

[4] White collar, as defined in the 1970 Census, includes professional, managerial, sales, and clerical workers.

[5] On the basis of the 11% auto passenger figure from the 1970 Census, the percentage of workers carpooling can be estimated as falling between 11% and 22% (assuming a range in carpool size of ∞ to 2). The calculation of a precise level of carpooling requires some knowledge of auto occupancy rates, either a frequency distribution or mean. It should be noted that the census data on auto passengers are probably a better indication of shared riding (which includes impromptu arrangements) than of carpooling per se (which consists of more regular, formalized arrangements).

[6] Overall, female workers in the Boston SMSA earn $4,121 a year as compared to a mean income of $9,481 for male workers.

CHAPTER 4

CHARACTERISTICS OF THE EASTERN MASSACHUSETTS SURVEY RESPONDENTS

The preceding chapter described the Eastern Massachusetts Region in rather general terms, providing some basic information on population and employment, the transportation network, and Boston SMSA worker characteristics as reported in the 1970 Census. This chapter will amplify the description of the scenario in which the WBZ/ALA Program operated by presenting Eastern Massachusetts Survey findings on areawide commuter characteristics. Where appropriate, comparisons will be made between survey respondents and SMSA workers to shed light on the representativeness of the survey date base. Moreover, survey findings on carpooler vs. noncarpooler characteristics will be discussed and compared to other recent empirical studies on this topic.

As described briefly in Chapter 1 and in more detail in Appendix B, the Eastern Massachusetts Survey was administered to 25,000 auto registrants. Completed forms were received from 3,864 persons (a 15% response rate). of these, 1,008 were inapplicable respondents (retired, etc.), leaving 2,856 usable responses (a net usable response rate of 11%). In order to determine if the 2,856 survey respondents differed significantly from the 21,136 nonrespondents, a brief telephone survey was conducted among

600 of the 25,000 auto registrants who had been sent mail surveys. The 318 nonrespondents identified through the phone survey were compared to the 2,856 respondents; no significant differences were found except in terms of educational level and percent carpooling (both higher for respondents).

4.1 DEMOGRAPHIC AND TRAVEL CHARACTERISTICS

Table 3 presents the demographic characteristics of the Eastern Massachusetts Survey respondents and Boston SMSA workers.[1] Overall it is apparent that the 2,856 respondents to the Eastern Massachusetts Survey tend to be of higher socioeconomic status than Boston SMSA workers. In addition, the respondent base has a lower percentage of females and young persons (under 25) than the SMSA worker population. These differences can be attributed in part to the slight bias of respondents in favor of higher educational levels and, more importantly, to two aspects of the Eastern Massachusetts Survey procedure: (1) the use of auto registrants as the sampling source (in general, there is a correlation between auto ownership and variables such as age, income, sex, and occupation); and (2) the fact that the geographic area encompassed by the survey is larger and contains more suburban towns than the Boston SMSA (thereby diminishing the representation of poorer inner-city dwellers). Although a survey of auto registrants can

TABLE 3. COMPARISON OF DEMOGRAPHIC CHARACTERISTICS OF BOSTON SMSA WORKERS AND EASTERN MASSACHUSETTS SURVEY RESPONDENTS

CHARACTERISTIC	Boston SMSA Workers	Eastern Mass Respondents
SEX		
Male	59%	79%
Female	41	21
AGE		
25 or under	22%	7%
26-35	19	27
36-45	19	26
46-55	20	24
56-65	15	14
66 or over	5	2
INCOME		
<$5,000	38%	4%
$5-10,000	38	17
$10-15,000	15	33
$15-25,000	6	31
>$25,000	3	15
EDUCATION		
High school or less	65%	31%
Attended college	16	23
College graduate	19	46
OCCUPATION		
Professional	20%	37%
Managerial	9	23
Sales & clerical	31	19
Blue collar	39	21
Other	1	--
NUMBER OF AUTOS		
0	24%	--
1	49	36%
2	23	49
3 or more	4	15

provide a good indication of the actual and potential incidence of carpooling among a logical target group for a carpool program, it is a rather inadequate means of obtaining a representative picture of commuting behavior and modal choices among the population at large. However, it should be kept in mind that decisions regarding the survey sampling source and geographic area were dictated primarily by the desire for comparability with the WBZ/ALA Program target group and outreach area, rather than by the desire for accurate portrayal of areawide travel behavior.[2]

Table 4 shows travel-related characteristics of the Eastern Massachusetts Survey respondents and Boston SMSA workers.[3] The two groups are distributed similarly in terms of residence (origin), workplace (destination), and trip flow patterns, with a predominantly non-central city orientation. However, again on account of the sampling source, auto registrants, the survey respondents show greater dependency on the automobile for the trip to work. For example, a comparison of auto usage by trip flow indicates that for three out of four commuting patterns, Eastern Massachusetts Survey respondents exhibit a higher percentage of work travel by auto than SMSA workers. The one exception is for commuting from the suburbs into the central city. Here, the availability of good transit service and the difficulty of auto travel due to congestion seem to outweigh the inherent tendency toward auto usage.

TABLE 4. COMPARISON OF TRAVEL-RELATED CHARACTERISTICS OF BOSTON SMSA WORKERS AND EASTERN MASSACHUSETTS SURVEY RESPONDENTS

CHARACTERISTIC	Boston SMSA Workers	Eastern Mass Respondents
ORIGIN (RESIDENCE) DISTRIBUTION		
Boston Central City (CC)	20%	8%
0-5 mi. from core (excl. CC)	80	6
5-10 mi. from core		19
10-20 mi. from core		36
Over 20 mi. from core		31
DESTINATION (WORKPLACE) DISTRIBUTION		
Boston Central City	33%	28%
0-10 mi. from core (excl. CC)	67	22
Over 10 mi. from core		50
TRIP FLOW DISTRIBUTION		
Suburbs to Central City		
Outer suburbs to Boston	18%	8%
Inner suburbs to Boston		15
Within suburbs		
Outer suburbs to inner suburbs	59	14
Within inner suburbs		23
Within outer suburbs		25
Inner suburbs to outer suburbs		7
Boston to outside Boston	7	3
Within Boston	16	5
MODE SPLIT		
Auto	67%	86%
Transit	20	11
Other	13	3
% AUTO USAGE BY TRIP FLOW		
Suburbs to Central City		
Outer suburbs to Boston	63%	74%
Inner suburbs to Boston		58
Within suburbs		
Outer suburbs to inner suburbs	78	98
Within inner suburbs		90
Within outer suburbs		96
Inner suburbs to outer suburbs		100
Boston to outside Boston	59	93
Within Boston	36	60

In sum, the Eastern Massachusetts Survey respondents are similar to the Boston SMSA worker population in terms of their residential and workplace distributions and their trip flow orientation. However, they differ from SMSA workers by virtue of their higher socioeconomic status, higher auto ownership, and higher auto usage. Since these differences are primarily attributable to the survey procedure employed, they indicate that the Eastern Massachusetts Survey respondents are not entirely representative of commuting behavior of the general population.

4.2 CARPOOLING BEHAVIOR

Recent studies on carpooling[4] have arrived at the following general distinctions between carpoolers and noncarpoolers:

- Carpoolers tend to have slightly lower average family incomes
- Carpoolers tend to have fewer cars per family member
- Carpoolers tend to work in higher density activity centers
- Carpoolers are slightly younger
- Carpoolers have slightly longer commuting distances

It is interesting to examine Eastern Massachusetts Survey findings in the context of these earlier empirical findings.

Of the 2,856 Eastern Massachusetts Survey respondents, 520 (18%) were carpooling at the time of the survey, November 1974. This 18% figure is consistent with the estimated 11 to 22% of SMSA workers carpooling in 1970 (based on the percentage of Boston SMSA workers who are auto passengers). However, the accuracy of this figure as an areawide carpooling rate in 1974 should be qualified in two respects. On the one hand, the discrepency between the percent of carpoolers among survey respondents vs. nonrespondents (18% vs. 13%) suggests that the true percentage of carpoolers among the 25,000 auto registrants surveyed is somewhat lower than 18%. On the other hand, if it is indeed true that there is a greater incidence of carpooling among persons of lower socieconomic status, then the underrepresentation of such persons in the survey sample would suggest that the 18% figure is too low.

Regardless of the accuracy of the survey findings on percentage of carpoolers, the survey respondent base can be validly employed to compare the demographic and travel characteristics of carpoolers vs. noncarpoolers. Tables 5 and 6 show the results of two types of intergroup comparisons in terms of demographic and travel attributes, respectively:

(1) the Chi-Square (X^2) Test, a statistical procedure which tests the null hypothesis that there is no significant difference between two groups (the

TABLE 5. PERCENT OF EASTERN MASSACHUSETTS SURVEY RESPONDENTS IN CARPOOLS BY DEMOGRAPHIC CHARACTERISTICS

		% in Carpools*	x^2 Test
SEX:	Male	18	Not significant at .05 level
	Female	19	
AGE:	25 or under	16	Not significant at .05 level
	26-35	17	
	36-45	17	
	46-55	20	
	56-65	21	
	66 or over	14	
INCOME:	<$5,000	15	Significant at .05 level
	$5-10,000	19	
	$10-15,000	17	
	$15-25,000	21	
	>$25,000	15	
EDUCATION:	Attended grade school	19	Not significant at .05 level
	Finished grade school	21	
	Finished high school	18	
	Attended college	17	
	Finished college	18	
OCCUPATION:	Professional	20	Significant at .001 level
	Managerial	17	
	Sales	10	
	Clerical	22	
	Craftsmen	21	
	Operatives	13	
	Laborers	18	
	Service Workers	8	
NO. AUTOS:	0	9**	Not significant at .05 level
	1	20	
	2	17	
	3 or more	18	

*Denotes percent of respondents in each category who carpool.

**Denotes cell with fewer than 15 respondents.

TABLE 6. PERCENT OF EASTERN MASSACHUSETTS SURVEY RESPONDENTS IN CARPOOLS BY TRAVEL-RELATED CHARACTERISTICS

		% in Carpools*	x^2 Test
ORIGIN:	Boston	11	Significant at .001 level
	0-5 mi.	6	
	5-10 mi.	14	
	10-20 mi.	20	
	Over 20 mi.	22	
DESTINATION:	Boston	21	Significant at .001 level
	0-10 mi.	16	
	Over 10 mi.	18	
TRIP FLOW:	Outer suburbs to Boston	25	Significant at .001 level
	Inner suburbs to Boston	22	
	Outer suburbs to inner suburbs	28	
	Within inner suburbs	12	
	Within outer suburbs	19	
	Inner suburbs to outer suburbs	16	
	Boston to outside Boston	8	
	Within Boston	14	
TRIP TIME:	0-9 min.	6	Significant at .001 level
	10-19 min.	11	
	20-29 min.	20	
	30-39 min.	23	
	40-59 min.	27	
	60 or more min.	20	
TRIP LENGTH:	0-4 mi.	8	Significant at .001 level
	5-9 mi.	16	
	10-14 mi.	20	
	15-19 mi.	24	
	20-29 mi.	26	
	30-39 mi.	30	
	40 or more mi.	19	

*Denotes percent of respondents in each category who carpool.

resulting probability describes the chance of rejecting the null hypothesis when it is in fact true);

(2) an examination of the percentage of carpoolers within each category of age, sex, etc. to identify differences of practical, as opposed to statistical, significance.

As can be seen from Table 5, carpoolers do not differ substantially from noncarpoolers with respect to demographic characteristics. The only exception is occupation: the Chi-Square Test indicates a significant difference at the .001 level, with the percentage of carpoolers highest among professionals, clerical workers, and craftsmen. These findings are in marked contrast to previous empirical study results, which have found age, income, and car ownership differences between carpoolers and noncarpoolers. The absence of intergroup differences is partly due to the underrepresentation of lower income persons who have typically been found more likely to carpool, and partly due to the influence of the energy crisis. As is explained in greater detail in Chapter 5, the energy crisis tended to draw into carpooling a higher socioeconomic group than had hitherto been carpooling; the presence of these "atypical" persons may have diluted the visibility of the traditionally prototypical carpooler of lower socioeconomic status.

Table 6, on the other hand, shows that carpoolers and noncarpoolers differ substantially with respect to travel characteristics, in accordance with prior study results. In terms of trip origin, persons living 10 miles or more from Boston are more likely to carpool than persons living closer in (21% vs. 12% carpooling). With regard to trip destination, persons traveling to Boston are more likely to be carpooling than persons with other destinations (21% vs. 18%). It is interesting to note that the percentage of carpoolers is lowest among persons living within 5 miles of Boston and persons working within 10 miles of Boston. In keeping with the findings relative to origin and destination, and examination of trip flows shows that the percentage of persons carpooling is higher among those making radial inbound trips (25%) than those with other commuting patterns (16%). Moreover, the percentage of carpoolers appears to be positively related to trip time and trip length: the percentage of carpoolers increases for each successive interval of trip time and trip length except for the longest (60 or more minutes, 40 or more miles).

It would seem, based on the above findings from the Eastern Massachusetts Survey, that carpooling behavior is more strongly related to travel characteristics than to demographic attributes. Factors such as the energy crisis appear to have weakened the traditional relationship between socioeconomic status variables and the propensity to

carpool. However, knowledge acquired from previous empirical studies about the interrelationship between carpooling behavior and locational, time, and distance variables still appears to be valid. In fact, it is possible that the energy crisis, by affecting the cost and availability of gasoline, intensified the relationships by making carpooling an attractive alternative for shorter trips as well.

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[1] See Appendix D for the tabulation of responses to questions 20, 23-27 on which this exhibit is based.

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[2] It should also be noted that if Census-type data had been readily available for the Eastern Massachusetts Region, the differences described here would be smaller and would be due almost entirely to the sampling source, auto registrants.

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[3] See Appendix D for the tabulation of responses to questions 1, 18, and 19 on which this exhibit is based.

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[4] Kendall, Donald, Carpooling: Status and Potential, Report No. DOT-TSC-OST-75-23, Cambridge MA, June 1975, pp. 35-45. (Based on National Opinion Research Center Continuous National Survey, November 1973 to February 1974.)

Shapiro, S. and Aldrich B., "Social Factors Affecting the Decision to Participate in a Carpool," New Concepts in Urban Transportation, Vol. 2, No. 8, University of Minnesota, October 1972.

Voorhees, Alan M. and Associates, Inc., Transportation Pooling, prepared for UMTA, Washington, DC, January 1974.

Voorhees, Alan M. and Associates, Inc., and Behavior Science Corporation, A Study of Techniques to Increase Commuter Vehicle Occupancy on the Hollywood Freeway, prepared for California Department of Transportation, November 5, 1973, pp. 53-56, 68-70.

CHAPTER 5

PARTICIPATION IN THE WBZ/ALA COMMUTER COMPUTER PROGRAM

5.1 PARTICIPATION LEVEL

Boston area commuters were given the opportunity to participate in the WBZ/ALA regional carpool program for a one-year period beginning in August 1973 and ending in August 1974. Along with promoting the concept of carpooling, the major challenge of the program was to attract and otherwise encourage Boston area commuters to participate in the Commuter Computer aspect of the program. A high level of participation was especially needed in order to make operational the computer aided matching service and to maximize the number of potential carpool matches. Participation in the program was encouraged by an extensive multi-media campaign, a free car contest, and mass dissemination of application forms at public places, toll booths, and employment sites. However, as noted previously, the program lacked tangible incentives for carpooling--e.g., reduced tolls and preferential parking.

The effectiveness of the Commuter Computer Campaign in attracting prospective carpoolers can best be assessed by examining the number of participants who sent applications into WBZ/ALA requesting matching. Figure 11 shows the weekly questionnaire receipts during the early months of the program as a function of various promotional activities

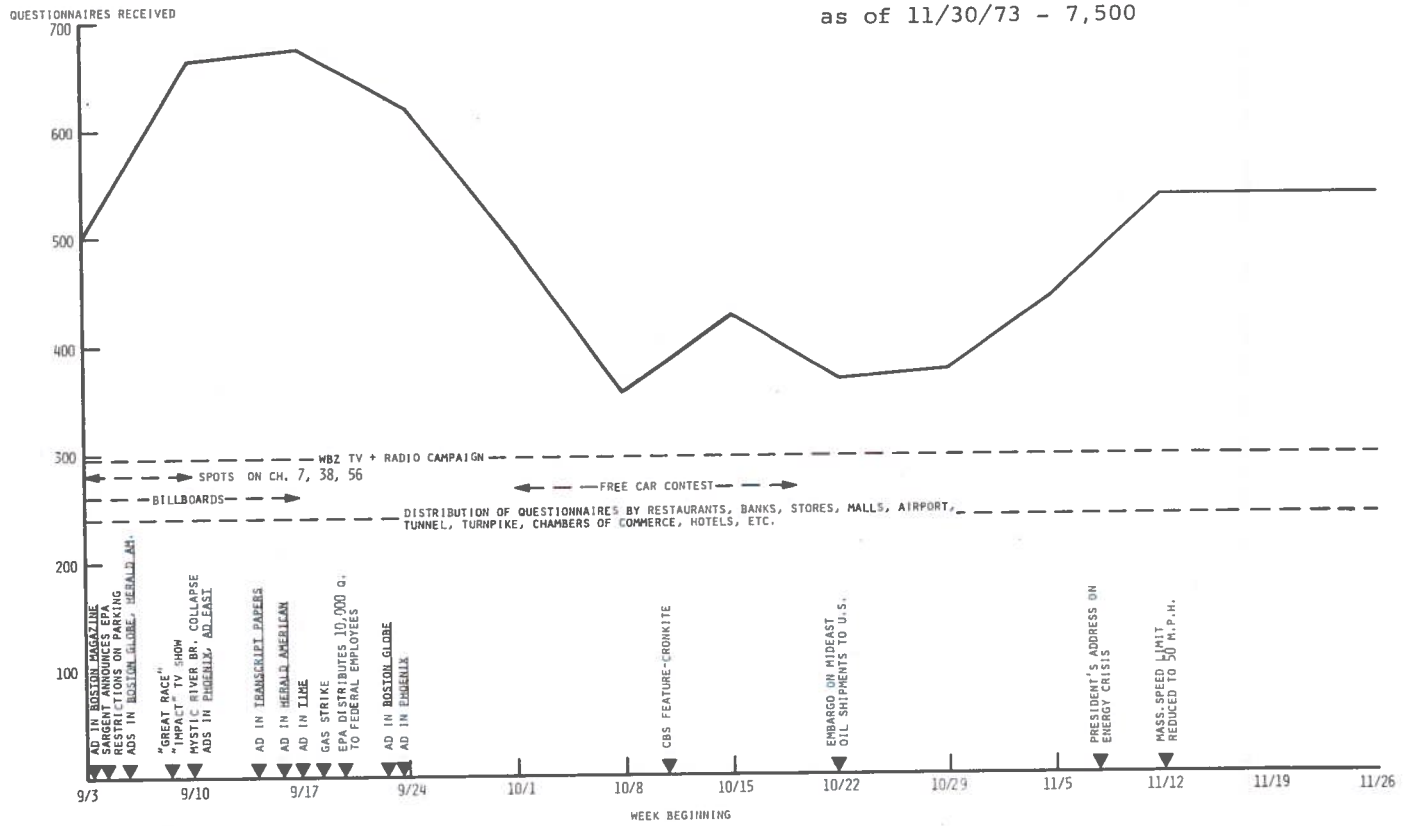


Figure 11 WBZ/ALA Commuter Computer Program Weekly Questionnaire Receipts

undertaken by WBZ/ALA and news events considered to have an effect on carpooling (e.g., proposed EPA restrictions on parking, the announcement of the Mideast embargo on fuel exports to the U.S.). It can be seen that weekly questionnaire receipts reached a peak of almost 700 in mid-September 1973, during the intensive phase of the publicity campaign, and then declined over the next few weeks to a rate of about 350 per week. This rate prevailed throughout most of October, except for a slight increase which appears to be related to the free car contest. From the middle of October on, promotional activities tended to level off; nevertheless, the rate of receipts began to climb sharply in November, reaching a level of about 550 per week. By the end of November 1973, 7,500 persons had sent matching request applications to WBZ/ALA. Possible explanations for the initial level of public response include: (1) the mounting energy crisis; (2) saturation of the public through the intensive publicity efforts through mid-October; and (3) the increasing role of large employers in distributing questionnaires.

As is apparent from Figure 12, however, the number of participants did not continue to grow at November levels. With the exception of a slight surge during January, coinciding with the implementation of the Oregon (alternate day) plan of gasoline rationing, the rate of participation slowed down after November. This slowdown in the

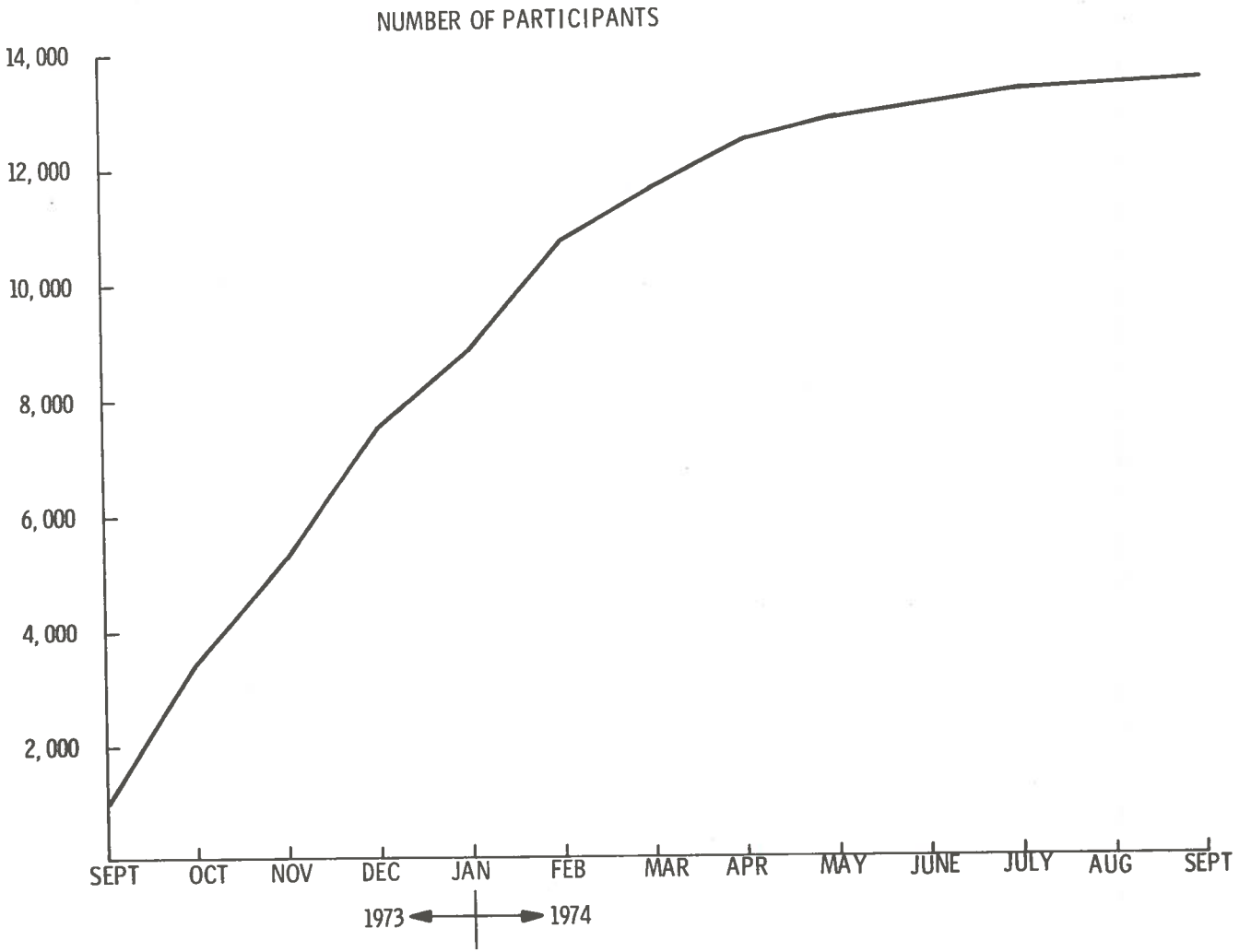


Figure 12 WBZ/ALA Program Participation Over Time

participation rate is not surprising, given the curtailment of the publicity program to occasional radio announcements and the absence of any new exogenous factors to spur interest in carpooling. By the end of the program period, the total number of participants had reached 13,500, a disappointing level on several counts: the 13,500 persons represented less than 25% of the program target of 55,000[1]; less than 1% of the approximately 1.5 million Eastern Massachusetts Region workers; and an overall response density of about six persons per square mile.

Before exploring possible reasons for this low level of participation and examining the effect of this low level on the program's matching/carpool formation process, it is appropriate to examine characteristics of the program participants against the backdrop of areawide commuter characteristics. Knowledge of participant attributes will be informative as to the type(s) of person(s) who can be expected to participate in a program of this nature.

5.2 PARTICIPANT CHARACTERISTICS

In this section, the demographic and travel characteristics of WBZ/ALA program participants will be examined and, where appropriate, compared to the characteristics of Boston SMSA workers and Eastern Massachusetts Survey respondents. Although the subject of this section is participant characteristics, it should be

pointed out that all of the data are based on the 4,293 respondents to the WBZ/ALA Follow-Up Survey. As explained in Appendix A, this survey was administered to 10,581 of the 13,500 program participants. Completed, usable forms were received from 4,293 persons (a response rate of 41%). In order to determine the existence of any nonresponse bias, the 4,293 respondents and the 6,288 nonrespondents were compared in terms of five characteristics available from the original matching request applications sent to WBZ/ALA. On the basis of the bias check results, it is reasonable to assume that the characteristics of the program's 13,500 participants are accurately portrayed by the survey respondents.

5.2.1 DEMOGRAPHIC CHARACTERISTICS

Data from the survey (depicted in Table 7[2]) indicate that participants in the WBZ/ALA Commuter Computer Program tended to be male, between the ages of 26-35, earning $10,000-$25,000 a year, college graduates, and engaged in professional occupations. Ninety-six percent of survey respondents were also licensed drivers, with 60% coming from households with 2 or more cars. When compared to either Boston SMSA workers or carpoolers in general (statistics from the National Opinion Research Center Continuous National Survey), respondents tend to have a higher income, higher auto ownership level, be more highly educated, and be

TABLE 7. COMPARISON OF DEMOGRAPHIC CHARACTERISTICS OF BOSTON SMSA WORKERS, WBZ/ALA SURVEY RESPONDENTS, AND EASTERN MASSACHUSETTS SURVEY RESPONDENTS

CHARACTERISTIC	Boston SMSA Workers	WBZ/ALA Respondents	Eastern Mass Respondents
SEX			
Male	59%	66%	79%
Female	41	34	21
AGE			
25 or under	22%	17%	7%
26-35	19	45	27
36-45	19	19	26
46-55	20	12	24
56-65	15	7	14
66 or over	5	--	2
INCOME			
<$5,000	38%	4%	4%
$5-10,000	38	23	17
$10-15,000	15	33	33
$15-25,000	6	32	31
>$25,000	3	8	15
EDUCATION			
High school or less	65%	16%	31%
Attended college	16	22	23
College graduate	19	62	46
OCCUPATION			
Professional	20%	51%	37%
Managerial	9	17	23
Sales & clerical	31	14	19
Blue collar	39	7	21
Other	1	11	--
NUMBER OF AUTOS			
0	24%	3%	--
1	49	38	36%
2	23	48	49
3 or more	4	11	15

disproportionately drawn from white collar occupations. However, when compared to Eastern Massachusetts Survey respondents -- who, it must be remembered, were sampled from a source and geographic area approximating the WBZ/ALA Program target group and outreach area -- some interesting findings emerge. On the one hand, WBZ/ALA Survey respondents tend to be more predominanatly female, from younger age groups, and of a lower income bracket than Eastern Massachusetts Survey respondents, indicating that the program's relative appeal was consistent with prior data on carpooler characteristics. On the other hand, the greater preponderance of college graduates and professionals in the WBZ/ALA respondent base is in contrast with prior study findings and merits some explanation.[3] Overall, the WBZ/ALA Survey respondents are more similar in terms of demographic characteristics to the Eastern Massachusetts Survey respondents than to Boston SMSA workers.

5.2.2 TRAVEL CHARACTERISTICS

Table 8 presents patterns of origin/destination distribution and travel-related characteristics for WBZ/ALA Survey respondents as compared to areawide commuters (Boston SMSA workers and Eastern Massachusetts Survey respondents).[4]

With respect to trip origin, the WBZ/ALA Survey respondents show far more suburban orientation than either the Eastern Massachusetts Survey respondents or Boston SMSA

TABLE 8. COMPARISON OF TRAVEL-RELATED CHARACTERISTICS OF BOSTON SMSA WORKERS, WBZ/ALA SURVEY RESPONDENTS, AND EASTERN MASSACHUSETTS SURVEY RESPONDENTS

CHARACTERISTIC	Boston SMSA Workers	WBZ/ALA Respondents	Eastern Mass Respondents	
ORIGIN (RESIDENCE) DISTRIBUTION				
Boston Central City (CC)	20%	1%	8%	
0-5 mi. from core (excl. CC)	80	12	6	
5-10 mi. from core		19	19	
10-20 mi. from core		34	36	
Over 20 mi. from core		34	31	
DESTINATION (WORKPLACE) DISTRIBUTION				
Boston Central City	33%	60%	28%	
0-10 mi. from core (excl. CC)	67	35	22	
Over 10 mi. from core		5	50	
TRIP FLOW DISTRIBUTION				
Suburbs to Central City				
Outer suburbs to Boston	18%	31%	8%	
Inner suburbs to Boston		29	15	
Within suburbs				
Outer suburbs to inner suburbs	59	20	14	
Within inner suburbs		14	23	
Within outer suburbs		2	25	
Inner suburbs to outer suburbs		3	7	
Boston to outside Boston	7	1	3	
Within Boston	16	--	5	
MODE SPLIT		(Pre-Program)	(Post-Program)	(Carpoolers' Prior)
Auto				
Solo Driver	67%	66%	68%	75%
Carpool		9	18	--
Transit				
Transit only	20	12	6	11
Combination auto and transit		12	5	8
Other	13	1	3	6
% AUTO USAGE BY TRIP FLOW				
Suburbs to Central City				
Outer suburbs to Boston	63%	69%	74%	
Inner suburbs to Boston		59	58	
Within suburbs				
Outer suburbs to inner suburbs	78	96	98	
Within inner suburbs		91	90	
Within outer suburbs		97	96	
Inner suburbs to outer suburbs		92	100	
Boston to outside Boston	59	86	93	
Within Boston	36	42*	60	
AVERAGE TRAVEL TIME	NA	46 min.	30 min.	

*Denotes cell with fewer than 15 respondents.

workers. In general, public response to the Commuter Computer Program was minimal from the inner portions of the Eastern Massachusetts Region (within 5 miles of downtown): only 1% of respondents live in the Boston Central City, vs. 20% of SMSA workers. This is not surprising in light of the fact that it is an area well served by transit, where commuters for the most part are engaged in shorter radial trips to central city worksites. As can be seen from Table C-2 in Appendix C, the majority of respondents reside in a band 5 to 30 miles from downtown, which constitutes a populous, auto-oriented area. However, some participants (8% of all respondents) live as far away as New Hampshire, Rhode Island, and western portions of Massachusetts more than 40 miles from Boston.

The vast majority of WBZ/ALA Survey respondents have work destinations within Route 128, the circumferential highway located approximately 10 miles from the core. Sixty percent of the respondents work downtown in the Boston Central City, vs. only around 30% of areawide commuters. This finding is consistent with the orientation of the Commuter Computer Program to matching people with downtown work destinations.

A more complete picture of the relationship between residence and workplace can be seen by examining data on work trip flows. As in the case of destination data, the WBZ/ALA Survey respondents are engaged in different types of

trip flow patterns from areawide commuters. For example, 60% of WBZ/ALA Survey respondents make radial inbound trips to the Boston Central City, vs. 23% of Eastern Massachusetts Survey respondents and 18% of Boston SMSA workers. Moreover, WBZ/ALA Survey respondents travel relatively less within the suburbs than the other two groups. Again, these differences reflect the downtown orientation of the program. The relatively high proportion of Boston SMSA workers engaged in reverse commutes out of Boston and travel within Boston can be attributed to the greater representation within this group of lower income, auto-less persons who depend on transit for the journey to work.

In order to determine the pre-program modal split, the WBZ/ALA Follow-Up Survey contained the question, "How did you usually travel to work before hearing about the Commuter Computer Program?" The responses on pre-program mode can be compared with responses to the question on current mode to calculate the net increase in carpooling (see Section 6.3 below). In addition, a comparison of the pre-program mode distribution of WBZ/ALA Survey respondents with mode split data for Boston SMSA workers and with the prior mode distribution of Eastern Massachusetts Survey respondent carpoolers[5] reveals a higher percentage of former solo drivers among the two survey groups (66% and 75%, respectively) than the estimated percentage range of solo drivers among SMSA workers (45-56%). This is consistent

with what would be expected of prospective carpoolers in the case of the WBZ/ALA Survey respondents and actual carpoolers in the case of the Eastern Massachusetts Survey respondents -- that they would be drawn disproportionately from the solo driver mode rather than from transit. However, it may also reflect the higher income/auto ownership status of the two groups. The 9% of WBZ/ALA Survey respondents already in carpools before the program can be assumed to have participated so as to increase the size of their carpools or to change carpools.[6]

In terms of modal breakdown by trip flow, the WBZ/ALA Survey respondents are similar to the Eastern Massachusetts Survey respondents. Both groups show far greater auto usage than Boston SMSA workers, particularly for travel within the suburbs. Again, this finding reflects the higher levels of income and auto ownership for these groups compared to SMSA workers, which in turn is related to the difference in geographic area represented.

Regardless of mode, arrival and departure times of WBZ/ALA Survey respondents were found to closely approximate normal peak work hours with the majority arriving between 7:30 and 8:30 a.m. and departing between 4:30 and 5:00p.m. (see Figure 13). In general, the WBZ/ALA Program did not accommodate commuters working night shifts, half days, or irregular hours.[7]

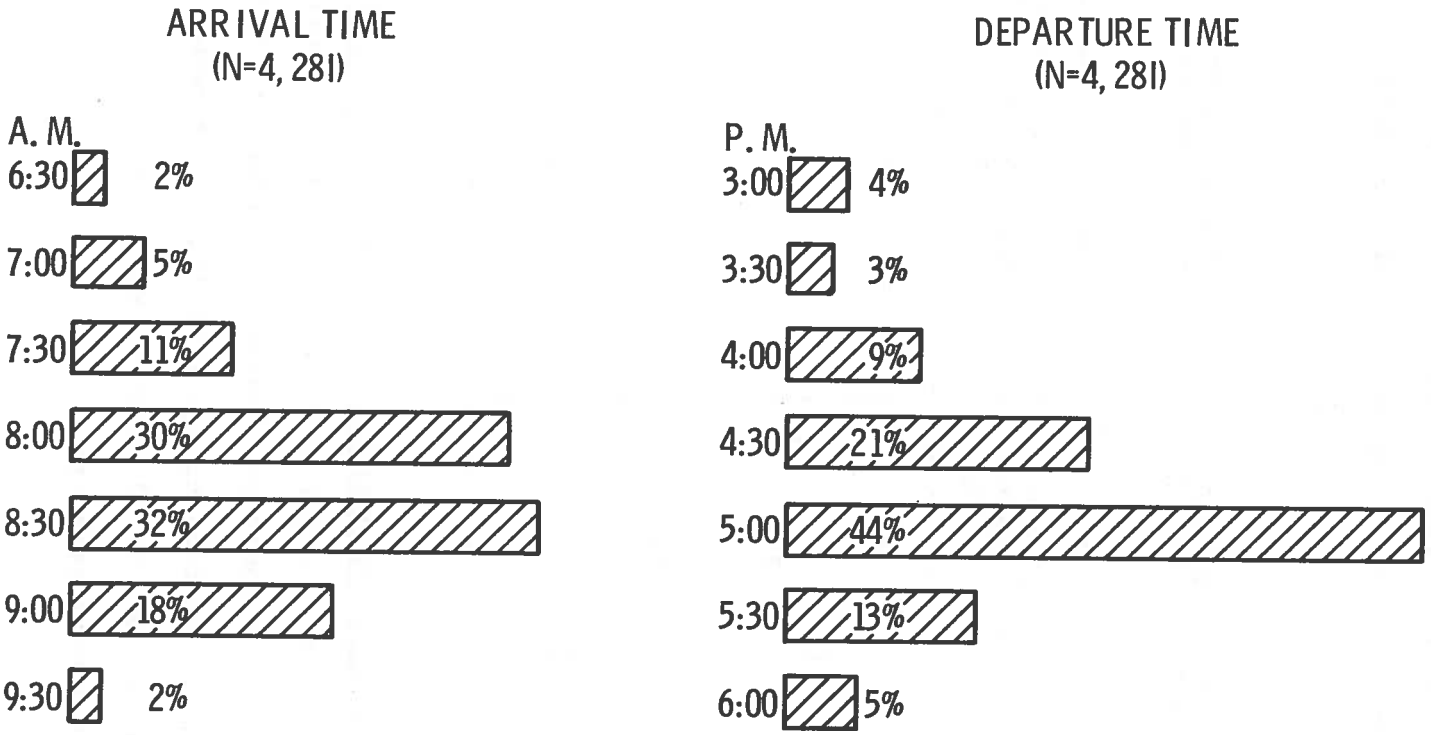


Figure 13 Arrival and Departure Times of WBZ/ALA Survey Respondents

Table 9 presents travel time distributions for WBZ/ALA Survey respondents and Eastern Massachusetts Survey respondents (comparable data are unavailable for Boston SMSA workers).

TABLE 9. TRAVEL TIME DISTRIBUTIONS OF WBZ/ALA AND EASTERN MASSACHUSETTS SURVEY RESPONDENTS

Travel Time	WBZ/ALA Respondents (N=4,244)	Eastern Massachusetts Respondents (N=2,784)
0- 9 minutes	9%	8%
10-19 minutes		25
20-29 minutes	34	21
30-39 minutes		19
40-59 minutes	42	20
60 or more minutes	15	7
	100%	100%

For the former group, the average commuting time via their prior travel mode is 46 minutes one way, with 42% traveling 40 to 59 minutes. In contrast, Eastern Massachusetts Survey respondents have an average travel time (via their mode at the time of the survey) of 30 minutes, with only 20% falling in the 40 to 59 minute category.

If the Eastern Massachusetts Survey distributions are regarded as typical of areawide travel time characteristics, then apparently the WBZ/ALA Program for the most part attracted persons with longer than average trip times. This finding is consistent with prior empirical findings that carpoolers have longer commuting distances (and presumably times) than noncarpoolers. Moreover, the relatively high travel times of WBZ/ALA Survey respondents is easily explained by the higher proportion (12%, vs. 5% of Eastern Massachusetts Survey respondents) making multi-modal trips, which tend to be not only lengthy but also inconvenient. In this regard, 84% of all users of the auto-transit combination reported traveling more than 40 minutes one way, while only 45% of those driving alone reported taking that long.

WBZ/ALA Survey respondents were also questioned about daily travel cost via their prior travel mode, although no information was requested with regard to total operating costs for auto drivers (i.e. insurance, gas, maintainence, etc.) Table 10 shows the percentage of respondents incurring parking costs, tolls, and transit fares along with the average cost for those paying each type of fee.

TABLE 10. PRIOR MODE TRAVEL COST OF WBZ/ALA SURVEY RESPONDENTS

Type of Fee	Percent Paying Fee (N=3,731)	Average Cost
Daily parking fee at place of employment or transit station	23%	$1.19
Tolls per car	21	.43
Transit fare (one way)	26	.85

Although the incidence of any one type of fee is only about 23%, 58% of all respondents were found to be paying one or more types of fees. The fact that the combined incidence of the three types of fees is greater than the percentage of respondents incurring costs reflects that some respondents pay more than one type of fee (e.g., tolls and parking).

Stratification of the travel cost data by prior mode shows that the 9% of WBZ/ALA Survey respondents already carpooling before the program not only had a higher incidence of fees than solo drivers (60% vs. 43%), but also a higher average cost per car ($1.25 vs. $.94). One can hypothesize that the high per car cost was a prime factor motivating carpoolers to have joined carpools. For transit users, the incidence of fees was much higher than for solo drivers or carpoolers, as would be expected; however, the average cost was comparable to that for solo drivers ($.90, with users of transit/auto paying about $1.00, and users of transit alone paying about $.80).

5.2.3 SUMMARY OF WBZ/ALA PARTICIPANT CHARACTERISTICS

In sum, survey data on demographic and travel characteristics reveal that participants in the WBZ/ALA carpool program are significantly different from Boston SMSA workers and somewhat different from Eastern Massachusetts Survey respondents. The patterns of origin/destination distribution and travel-related characteristics for the WBZ/ALA Survey respondents are consistent with what one would expect for potential carpoolers and can be interpreted as indicating that the desire to carpool stems from considerations relating to time, cost, convenience, and modal alternatives. However, the demographic profile compiled from survey respondents (in particular, income, occupation, and education distributions) is not only different from that of Boston SMSA workers but also different from that of the "typical" carpooler. The explanation for this discrepancy between actual vs. predicted (typical) carpooler characteristics of program participants becomes clearer upon delving into the various motivations for carpooling which existed during the program.

5.3 MOTIVATIONS FOR CARPOOLING

Of prime importance to understanding the Commuter Computer Program participation level and the participant mix is an examination of the various factors motivating people to carpool and/or to write into the program requesting

matching.[8] A significant motivating factor was the intensive WBZ/ALA promotional campaign. However, as discussed in Chapter 2, independent of but coinciding with the WBZ/ALA promotional effort, a series of local and national events precipitated by the energy crisis combined to advance further the concept of carpooling as a viable worktrip alternative. Consequently, Eastern Massachusetts commuters experienced almost simultaneously the intensive promotion of a regional carpooling program, increasing gas prices, and a gasoline shortage. The interaction between the energy crisis and promotional effort makes it difficult to isolate each factor's effect on participation.[9]

Still another complication is the fact that the role of the promotional effort (and hence, presumably, participants' reaction to the campaign) varied. Data from the WBZ/ALA Follow-Up Survey indicate that carpooling was not a novel concept or experience to most participants. Thirty-seven percent of respondents had been in a carpool at some time in the past (prior to the program). Moreover, 62% of all respondents indicated that they were in fact interested in carpooling before the program (and thus before the energy crisis). For this group, the function of the promotional campaign was to inform people about how they could participate in the Commuter Computer Program and to help bring together prospective carpoolers. For the remainder of the respondents (those without prior interest), the function

of the promotional campaign was to change people's attitudes about carpooling (i.e., stimulate interest in carpooling) as well as provide information and facilitate carpool matching. It should be noted that the difficulty of separating promotional campaign vs. energy crisis effects is especially pronounced with respect to measuring changes in attitudes.

Notwithstanding the above difficulties, the balance of this section examines two other motivating factors--latent interest and the energy crisis--and attempts to shed some light on their relative effects.

5.3.1 PRIOR INTEREST AND THE ENERGY CRISIS

The WBZ/ALA Follow-Up Survey attempted to ascertain the motivational impact of the energy crisis by asking respondents whether or not gasoline cost or availability caused them to look into carpooling. Although carpooling interest was generally high before the program, results showed that the energy shortage was one catalyst in generating interest into action. Two-thirds of all respondents answered affirmatively that gas cost or availability had caused them to look into carpooling. Interestingly, there was no apparent relation between prior interest in carpooling and whether or not a respondent took action to form a carpool on account of the energy crisis. The same proportion (two-thirds) of those with prior

interest and without prior interest looked into carpooling as a result of the energy crisis.

Although the overall percentage of WBZ/ALA Survey respondents with prior interest was practically the same as the percentage influenced by gas cost/availability (62% and 67%, respectively),[10] a disaggregate examination of these two motivating factors in relation to various demographic and travel characteristics is enlightening.

In general, the percentage of survey respondents with prior interest in carpooling was highest among females, lower income commuters, and the young (under 25) and old (over 64)--groups traditionally considered prime candidates for carpooling. On the other hand, the percentage of respondents who looked into carpooling as a result of gas cost/availability was highest among males, higher income commuters, and those between the age of 25 and 55. Figure 14 illustrates the striking difference between prior interest and energy crisis impact, by income.

Figure 15-a shows the differential impact of the energy crisis vs. prior interest, by residence. It can be seen that the percentage of respondents influenced by gas cost/availability is far more sensitive to residential location than the percentage with prior interest. Beyond Route 128, the proportion of respondents affected by gas cost/availability widely outstrips the proportion interested before the crisis events. Presumably, those living 10 miles

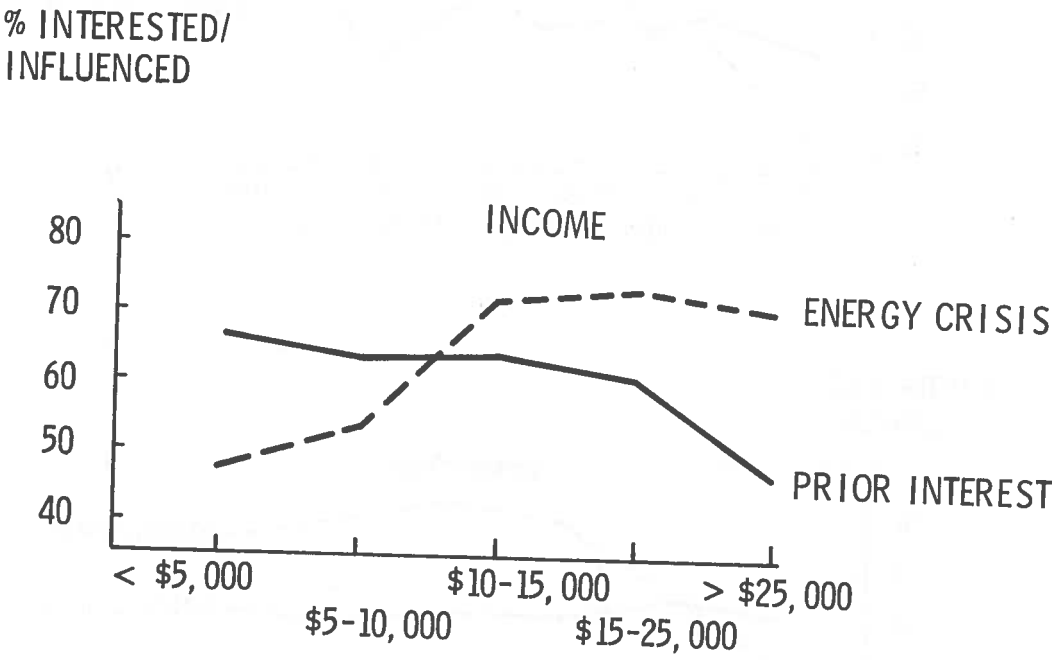
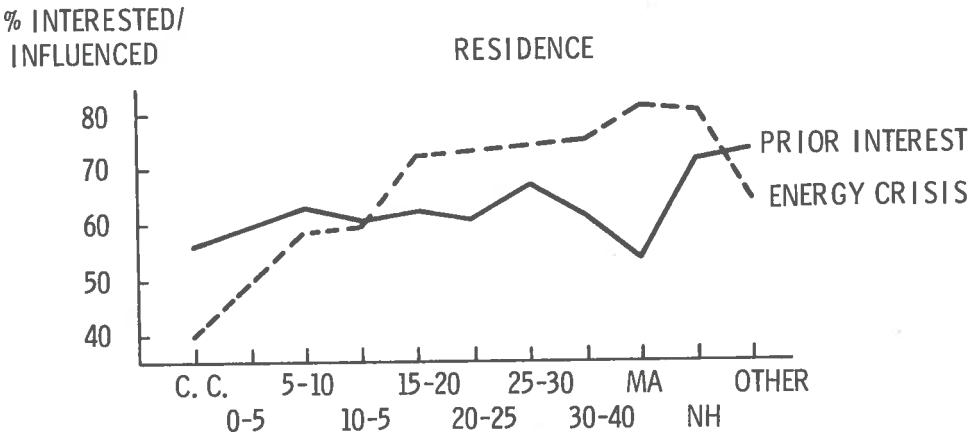


Figure 14 Prior Interest vs. Energy Crisis Effect on WBZ/ALA Survey Respondents by Income



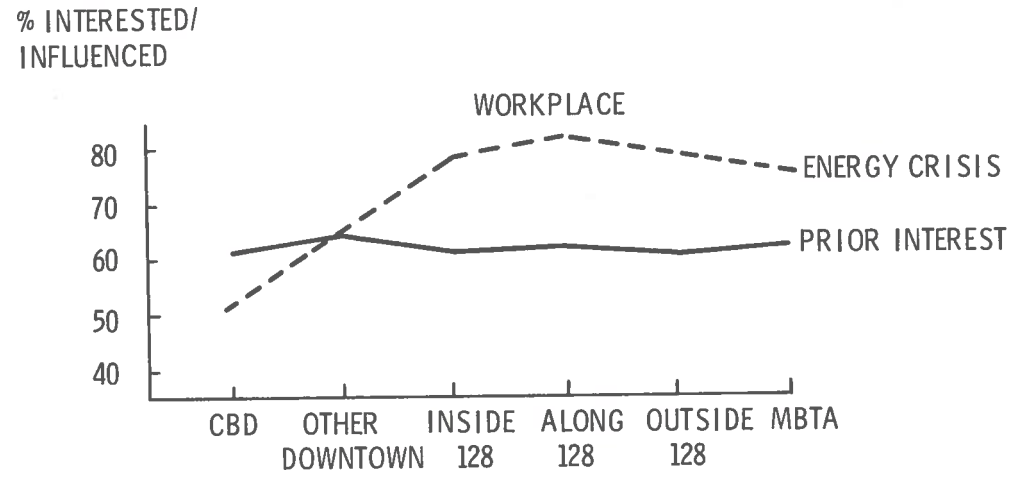


Figure 15 Prior Interest vs. Energy Crisis Effect on WBZ/ALA Survey Respondents by Residence and Workplace

or more from the downtown are more dependent on the automobile for their journey to work (because of the absence of mass transit and viable bus service to the workplace).

Figure 15-b presents prior interest vs. energy crisis impact by workplace. Whereas the percentage of respondents with prior interest is the same for all work locations, the percentage influenced by gas cost/availability is least among those working in the CBD or other downtown sites. Again, much of this difference can be attributed to the fact that those working downtown live closer to their jobs and are accessible to public transit.

As is suggested by the above data on residence and workplace, there is a significant difference in prior interest vs. energy crisis impact by travel mode (see Figure 16). The percentage of respondents with prior interest is highest among transit users, reflecting in part the relatively long travel times of those using transit or transit/ auto compared to those driving alone or carpooling. In contrast, the percentage of respondents influenced by the energy crisis is directly related to the degree of dependency on the auto, with solo drivers showing the highest percent influenced.

The preceding comparisons between prior interest and energy crisis impact clearly indicate that the energy crisis directly affected the mix of participants in the WBZ/ALA Program, by bringing into the program commuters who were

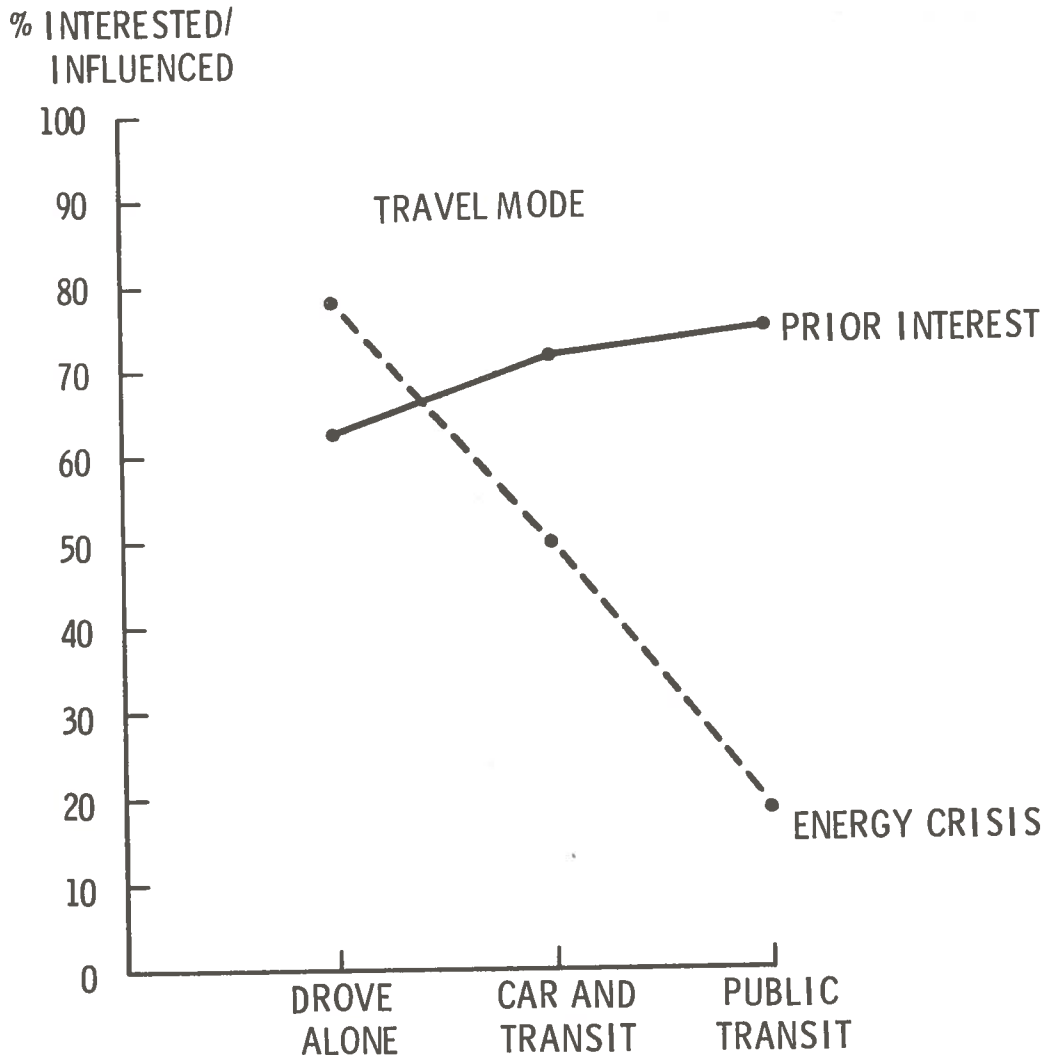


Figure 16 Prior Interest vs. Energy Crisis Effect on WBZ/ALA Survey Respondents by Travel Mode

strikingly different in demographic and travel characteristics from the "typical" carpooler. Moreover, the energy crisis was at least partially responsible for expanding the number of participants beyond the 62% interested in carpooling before hearing about the program. As mentioned earlier, there is no way to separate the effect of the promotional campaign and the energy crisis[11] on creating interest in carpooling, and thus the relative contribution of each factor on program participation level cannot be ascertained.

5.3.2 REGIONAL IMPACT OF THE ENERGY CRISIS

The Eastern Massachusetts Survey provides insight into the effect of the energy crisis on areawide carpooling behavior. Overall, the findings from this survey tend to corroborate data from the WBZ/ALA Follow-Up Survey regarding energy crisis effects on the mix of program participants.

The impact of the energy crisis can be evaluated by stratifying the Eastern Massachusetts Survey respondent carpoolers according to the time of carpool formation (before, during, and after the energy crisis[12]) and comparing the three groups in terms of demographic and travel characteristics. The 442 carpoolers for whom precise information on carpool duration is available are distributed as shown in Table 11.

TABLE 11. EASTERN MASSACHUSETTS CARPOOLERS' TIME OF CARPOOL FORMATION

Time of Carpool Formation	Number	Percent
Before energy crisis (over one year ago)	194	44%
During energy crisis (six months to one year ago)	135	30
After energy crisis (in the last six months)	113	26
Total	442	100%

Comparisons between before- and during-energy crisis carpoolers can indicate any changes in carpooler characteristics due to the crisis, and comparisons between during- and after-crisis carpoolers can reveal whether such changes were temporary or permanent.

Table 12 compares the three groups of carpoolers with respect to sex, age, income, education, and auto ownership. It can be seen that carpoolers who formed or joined carpools during the energy crisis tend to have a higher percentage in the male, younger (26-35), $25,000 or more, college graduate, and two-car categories than before- or after-crisis carpoolers. This finding is in accord with the analysis of the WBZ/ALA Survey data on prior interest vs. energy crisis impact. Nonetheless, an examination of after-energy crisis carpooler characteristics reveals that for the

TABLE 12. COMPARISON OF DEMOGRAPHIC CHARACTERISTICS OF PRE-ENERGY CRISIS, ENERGY CRISIS, AND POST-ENERGY CRISIS CARPOOLERS

CHARACTERISTIC	Pre-Energy Crisis Carpoolers (n=194)	Energy Crisis Carpoolers (n=135)	Post-Energy Crisis Carpoolers (n=113)
SEX			
Male	76%	83%	80%
Female	24	17	20
AGE			
25 or under	2%	7%	15%
26-35	24	32	26
36-45	25	26	23
46-55	27	23	25
56-65	20	11	11
66 or over	2	1	--
INCOME			
<$5,000	3%	1%	7%
$5-10,000	17	13	18
$10-15,000	31	27	33
$15-25,000	39	40	33
>$25,000	10	19	9
EDUCATION			
High school or less	31%	26%	31%
Attended college	27	15	20
College graduate	42	59	49
NUMBER OF AUTOS			
0	--	--	--
1	43%	27%	44%
2	44	57	37
3 or more	13	16	19

most part, these changes were only temporary. Patterns of age and auto ownership distribution reverted to pre-crisis patterns, and the percentages of upper-income persons and college graduates reverted to levels comparable to or lower than the pre-crisis levels.

In terms of travel-related characteristics (see Table 13), the energy crisis appears to have drawn relatively more commuters from farther out residential locations and relatively fewer from Boston Central City workplaces than was the case either before or after the crisis. This finding is consistent with WBZ/ALA Survey findings. Energy crisis carpoolers include a slightly higher proportion of commuters making shorter trips (5-9 miles, 10-29 minutes) than before-crisis carpoolers. Here it would seem that the gas cost and availability situation prevailing during the crisis made carpooling an attractive alternative <u>even</u> for relatively shorter work trips.

As was found in the WBZ/ALA Survey, the Eastern Massachusetts Survey indicates that the energy crisis had a more significant impact on auto users than transit users. A higher proportion of energy crisis carpoolers are former auto drivers (90%) than is the case for before- or after-crisis carpoolers (63% and 71%, respectively); correspondingly, a lower proportion of energy crisis carpoolers are former transit riders. The gasoline shortage and higher gas prices during the crisis period apparently

TABLE 13. COMPARISON OF TRAVEL-RELATED CHARACTERISTICS OF PRE-ENERGY CRISIS, ENERGY CRISIS, AND POST-ENERGY CRISIS CARPOOLERS

CHARACTERISTIC	Pre-Energy Crisis Carpoolers (n=194)	Energy Crisis Carpoolers (n=135)	Post-Energy Crisis Carpoolers (n=113)
ORIGIN			
Boston	4%	4%	6%
0-5 mi.	2	--	2
6-10 mi.	13	14	17
11-15 mi.	26	14	24
16-20 mi.	18	17	15
21-25 mi.	17	29	15
26-30 mi.	17	18	16
31-40 mi.	3	4	5
DESTINATION			
Boston	39%	19%	30%
0-5 mi.	10	7	5
6-10 mi.	9	16	11
11-15 mi.	15	20	22
16-20 mi.	8	16	14
21-25 mi.	12	14	8
26-30 mi.	2	4	6
31-40 mi.	1	2	2
All other Mass. towns	4	2	2
DISTANCE TO WORK			
0-4 mi.	10%	6%	13%
5-9 mi.	16	20	22
10-14 mi.	22	18	16
15-19 mi.	18	17	13
20-29 mi.	24	24	20
30-39 mi.	7	10	15
40-200 mi.	3	5	1
TIME TO WORK			
0-9 mins.	1%	--	6%
10-19 mins.	14	16%	13
20-29 mins.	21	26	23
30-39 mins.	21	21	28
40-49 mins.	27	26	18
50-59 mins.	6	4	5
60 mins. or more	10	7	7
PRIOR MODE			
Car	64%	90%	74%
Transit	17	3	10
Car and transit	9	5	6
Other mode	10	2	10

motivated auto drivers to carpool in greater numbers than at other times and had a relatively inhibiting effect on switches to carpooling by transit users. It is interesting to note that after the energy crisis, the relatively high level of diversion from the solo driver mode continued. The after-energy crisis distribution of prior mode reverted only partially to pre-crisis patterns.

To summarize, the WBZ/ALA Survey findings indicate that prospective carpoolers participating in the program in response to the energy crisis were significantly different in terms of demographic and travel-related attributes from program participants reporting prior (pre-crisis and pre-program) interest in carpooling. The Eastern Massachusetts Survey substantiates these findings by indicating similar types of distinctions between persons who began carpooling during the energy crisis and persons who started carpooling before or after the crisis. Of key significance is the observation that the energy crisis appears to have permanently altered patterns of modal diversion to carpooling.

Unfortunately, neither survey permits a quantitative assessment of the net increase in carpooling due to the energy crisis. In the case of the WBZ/ALA Survey, there is no way to separate the effect of the promotional campaign vs. the energy crisis in stimulating interest in carpooling, nor is it possible to isolate the impact of the energy

crisis on modal shifts to carpooling. In the case of the Eastern Massachussetts Survey, the absence of data on former carpoolers (i.e., persons who were not carpooling at the time of the survey but had done so in the past) prevents computation of a time series of carpool formation rates, which would be needed in order to determine if energy crisis rates were higher than rates at other times.[13]

Data from the NORC Survey indicate that the rate of carpool formation approximately doubled between the early fall of 1973 and January 1974.[14] Based on these national findings, it is probably safe to assume that the energy crisis caused some increase in the rate of carpool formation in the Boston area. Thus, the WBZ/ALA Program participation level (13,500 persons) and the percentage of Eastern Massachusetts Survey respondents in carpools (18%) probably reflect an increase over and above pre-energy crisis conditions.

5.4 CONCLUSIONS REGARDING WBZ/ALA PROGRAM PARTICIPATION

The comparison of WBZ/ALA Survey respondent characteristics and areawide commuter characteristics revealed that program participants represented a logical candidate carpooling group from the standpoint of locational and travel characteristics but an atypical group from the standpoint of certain demographic traits. It was then shown that the energy crisis was largely responsible for the

atypicality of program participants in that it drew into carpooling persons who were very different from those whose interest predated the program and the energy crisis (i.e., who resembled typical carpoolers). The additional finding that the energy crisis was a boosting factor vis-a-vis the program participation level suggests that in the absence of such an exogenous event, overall participation would have been even lower than the 13,500 persons obtained.

The central question that remains, then, is why the Commuter Computer Program elicited such a limited public response. Four possible explanations merit examination: (1) insufficient exposure of the Boston area population to the program; (2) shortcomings in the program: (3) prevailing negative attitudes toward carpooling: and (4) competition from other carpool formation mechanisms. Each of these hypotheses will be discussed in turn.

5.4.1 EXPOSURE OF THE EASTERN MASSACHUSETTS REGION POPULATION TO THE PROGRAM

The Eastern Massachusetts Survey allows investigation of the penetration of the WBZ/ALA Program among the areawide commuting population. It appears that the program's promotional effort was quite effective in reaching people, in that 76% of the survey respondents had heard of the program. Interestingly, the Commuter Computer Program publicity campaign seems to have selectively reached certain segments of the population -- in particular, it tended to

reach, or be recalled by, individuals of higher socioeconomic status. Eighty-three percent of college graduates had heard of the program, compared to only 53% of grade school graduates. Likewise, males and persons of higher income and occupational status were more likely to have heard of the program than females and persons of lower income and occupational status. On the other hand, awareness of the program did not vary according to travel characteristics such as origin, destination, and trip length.

There is no ready explanation for why exposure to the program was higher among some groups than others. However, the fact that persons of higher socioeconomic status were more apt to hear about or recall hearing about the program than persons of lower socieconomic status is consistent with the demographic composition of the WBZ/ALA participants.

Based on the above findings, the explanation for the low participation level does not lie with the promotional aspect of the program. Publicity encompassed several media (perhaps over and above what was needed), and the saturation level campaign appears to have been adequate in length and timing to reach a large percentage of the population.

5.4.2 NATURE OF THE PROGRAM

Although the Commuter Computer Program was more than adequate from the standpoint of publicity coverage, its failure to attract large numbers of participants may be due to other aspects of the program.

First of all, the program did not involve positive incentives for carpooling, such as monetary, travel-time, or convenience-related incentives. Data from other carpooling programs[15] indicate that special incentives are an important factor in program success. It should be noted that the sponsors, WBZ and ALA, did attempt to obtain the support of public and private organizations in promoting the concept of carpooling and providing incentives, but these efforts were largely frustrated.

Second, there is evidence from the WBZ/ALA Follow-Up Survey indicating that the generic nature of the more visible sponsor -- a large commercial broadcasting station-- may have affected the credibility ascribed to the program by the general public. Indeed, a number of survey respondents questioned the sincerity of the sponsors, commenting that carpooling had become a "fad" and that the Commuter Computer Program was little more than a public relations gimmick for the station. These perceptions may have been caused by the fact that the energy crisis surfaced and then subsided over the course of the program.

A third possible factor related to the program was the impersonality of an areawide effort involving mass media publicity and a computer. The prospect of offering up one's name, address, and other personal data to a central computer may have been unappealing to persons concerned about invasion of privacy and dealing with strangers. The fact that the highest level of participation came from Framingham, a community which supported the Commuter Computer Program through editorials in a local newspaper, suggests that localization of a carpool program can boost participation. A program can be regional in scope but implementation can take place on a more personal, micro level, i.e. through employers or community groups or institutions. Here again, it should be noted that the sponsoring organizations recognized the need for and attempted to elicit grass roots support, but to no avail.

Finally, the downtown orientation of the program may have been partly responsible for the low participation level. Although some participants took the liberty of writing in destinations other than the ones listed on the matching application request form, there were probably countless other persons who were discouraged from participating by the rather restricted list of options.

5.4.3 PREVAILING ATTITUDES TOWARD CARPOOLING

It should be recognized that any carpool program like the WBZ/ALA effort (voluntary, lacking tangible incentives) is bound to attract those persons who are least resistant to the concept of carpooling. That this was indeed the case for the Boston area program is substantiated by the fact that the majority of participants were interested in carpooling before the program, and these persons had travel characteristics typical of carpoolers nationally. As noted earlier, the energy crisis served to expand the rank of participants to include persons generally considered to be more resistant to carpooling -- i.e., higher income, more educated commuters in professional/managerial occupations.

The fact that the combination of least resistant plus energy-crisis motivated persons only amounted to 13,500 program participants suggests, among other things, an overall resistance to carpooling among the general public. As discussed below in Chapter 8, the Eastern Massachusetts Survey findings corroborate this hypothesis of limited public receptivity toward carpooling. Of the 2,336 noncarpooler respondents to that survey, only 25% indicated an interest in carpooling. Among those not very or not at all interested, the major reasons cited were unusual working hours, need for a car because of type of work, short commuting distance, and reduced mobility. Although the Eastern Massachusetts Survey did not attempt to uncover

reasons for lack of interest other than logistical and personal problems, it is possible that the following additional attitudinal factors may have also deterred interest in carpooling: (1) people's skepticism about their "matchability"; (2) a "wait and see" attitude vis-a-vis the EPA parking regulations (would they materialize?) and the energy crisis (how long would it last?); and (3) the attitude that "others can do the carpooling -- whether or not I carpool can't make a difference."

5.4.4 COMPETITION FROM OTHER CARPOOL FORMATION MECHANISMS

The final possible reason for the low level of participation in the Commuter Computer Program is the availability of alternative means of carpool formation. The WBZ/ALA Program was not the only formal carpool promotion/matching program in existence during the 1973-74 period (although it was the only areawide program). A number of large employers in the greater Boston area, for example, Prudential Insurance, John Hancock, and Lynn General Electric, had their own carpool programs, begun either in response to over-demand for parking spaces, anticipation of EPA reductions of parking spaces, or the energy crisis.

It is reasonable to assume that employees of a company providing carpool matching services would have utilized these services before resorting to the WBZ/ALA Program,

since the former option would presumbaly maximize the opportunity for finding a carpool partner with identical work location and schedule who was not a total stranger.

In addition to formal employer-sponsored carpool programs, there was also the possibility of informal arrangements among co-workers, family members, and neighbors. Here again, these options would have the advantages of prior familiarity of carpool members as well as compatible origins, destinations, and/or work schedules.

The Eastern Massachusetts Survey indicates that these alternative mechanisms were indeed the prevailing ones among the general population. For the 520 respondents to the survey who were in carpools,[16] 61% reported that their carpools were formed at work. [17] These workplace carpools were divided into 57% begun informally among co-workers and 4% begun through employer programs. The 39% of carpools not formed at work were divided into 18% formed among family members, 17% formed among neighbors, and 4% formed by various other means. Only one person of the 520 carpoolers attributed carpool formation to the WBZ/ALA Program.

Considering the above findings, the market for the Commuter Computer Program may have been limited to commuters who had exhausted other means of carpool formation or who, because of atypical commuting patterns, had no other means of forming a carpool. To the extent that the latter

situation was true, it would be reasonable to expect a low matching rate, which was indeed the case (see next chapter).

[1] Initial calculations performed by ALA indicated that about 55,000 travelers would have to join carpools to raise the average work trip auto occupancy from the then prevailing level of 1.1 (for cars commuting to Boston) to a target level of 1.5. Presumably the number of participants would have had to be far greater than 55,000 to account for the fact that not every participant would actually form or join a carpool.

[2] See Appendix C, Table C-1 and questions 27-31 and Appendix D, questions 20, 23, 24-27 for the tabulation of responses to the questions on which this exhibit is based.

[3] It is possible that persons from higher educational and occupational categories were more likely to respond to the WBA/ALA Follow-Up Survey than persons from lower level categories, as was the case in the Eastern Massachusetts Survey. On the other hand, the tendency for higher response rates to the Eastern Massachusetts Survey among more highly educated persons may be indicative of a higher level of interest in the survey subject matter, carpooling, which interest is reflected in relatively high participation rates by this group in the Commuter Computer Program.
It is also possible that persons who formed carpools were more likely to respond to the WBZ/ALA Survey than noncarpoolers, as was found in the Eastern Massachusetts Survey. This would also be due to a higher level of interest in the survey subject.

[4] See Appendix C, Tables C-2 and C-3 and question 1 and Appendix D, questions 1, 18, and 19 for the tabulation of responses to the questions on which this exhibit is based.

[5] For purposes of comparison with WBZ/ALA Survey data, the prior mode distribution of Eastern Massachusetts Survey carpoolers was felt to be more appropriate than the current mode distribution of all Eastern Massachusetts Survey respondents, which could potentially reflect increased carpooling between the inception of the program (August 1973) and the time of that survey (November 1974).

[6] The percentage of WBZ/ALA respondents who were solo drivers before the program (66%) is probably less than the percentage who had ever been solo drivers beforehand, owing to the inclusion of persons already in carpools who participated in the program. If the 9% of respondents already carpooling are assumed to be drawn disproportionately from the solo driver auto mode, then the WBZ/ALA Survey respondents approach the Eastern Massachusetts Survey figure of 75% former solo drivers.

[7] About 200 participants in the program had nonstandard arrival/departure times. These persons' applications were hand-sorted for potential carpool matches, and were not included in the Follow-Up Survey universe.

[8] Since it was anticipated that a program of this type might evoke curiosity, the Follow-Up Survey asked participants their main reason for sending a matching request form to WBZ/ALA. Six percent of the respondents indicated that curiosity was the major reason, and another 2% responded that the free car contest had motivated them to participate. Since these less legitimate motives did not necessarily preclude a genuine interest in carpooling, these 8% of respondents were included in the data base.

[9] Although the overall impact of the promotional campaign cannot be quantified, the WBZ/ALA Survey does provide indications of the relative effectiveness of the various types of publicity used (see Appendix F).

[10] It should be noted that respondents may have indicated both a prior interest in carpooling and interest in carpooling because of gas cost and availability (i.e. the energy crisis). Although these two categories of interest are not mutually exclusive, an examination of the demographic and travel characteristics of respondents in each category indicates strong differences between the two groups. Thus a further refinement of the data (i.e. separating out the overlap of respondents in both categories) was not warranted as it would only serve to heighten the already strong differences which existed.

[11] Nor is it possible to separate out some other exogenous factor, such as the general economic situation.

[12] The survey was conducted during November of 1974, approximately one year after the inception of the energy crisis. It was assumed for the purposes of this analysis that the energy crisis lasted from November 1973 through April 1974.

[13] Although it is possible to determine yearly rates of carpool formation for those carpools in existence at the time of the survey, these rates fail to include carpools formed and disbanded prior to the survey. Since there are more such cases as time progresses, carpool formation rates based only on currently existing carpools increasingly understate the actual rate as they extend back in time.

[14] Kendall, op. cit., p. 19.

[15] For example, the report by Kendall, op. cit.

[16] Given the reported methods of carpool formation, it is safe to assume that each of the Eastern Massachusetts Survey carpoolers was in a distinct carpool. Therefore, the 520 carpoolers can be assumed to represent 520 carpools.

[17] This percentage is identical to the NORC Survey percentage, but higher than the Hollywood Freeway Study figure of 43%. It should be noted that the proportion of Eastern Massachusetts carpools formed among co-workers increased, relative to other types, during the energy crisis.

CHAPTER 6

THE MATCHING AND CARPOOL FORMATION PROCESS

The preceding chapter evaluated the Commuter Computer Program in terms of participation in the program, looking at the number of participants as well as the participant mix. This chapter turns to another phase of the program, namely the matching and carpool formation process. The program's effect on carpool formation is evaluated by examining (1) the matching rate obtained, (2) practical and theoretical factors associated with the matching rate, and (3) carpool formation among program participants.

6.1 PROGRAM MATCHING RATE

The mechanics of the program's carpool matching process have already been described in Chapter 2, Section 2.2. Overall there were eight computer matching runs made over the program's one year of operation. Figure 17 shows the matching rate, or percentage of participants matched with at least one other participant, as a function of the number of applications processed.[1]

Initially it was felt that a minimum participant pool (critical mass) was needed before a reasonable matching rate would be obtained. The rationale for this was simply that the larger base would predictably produce more commonality among the participants' matching attributes (i.e., arrival

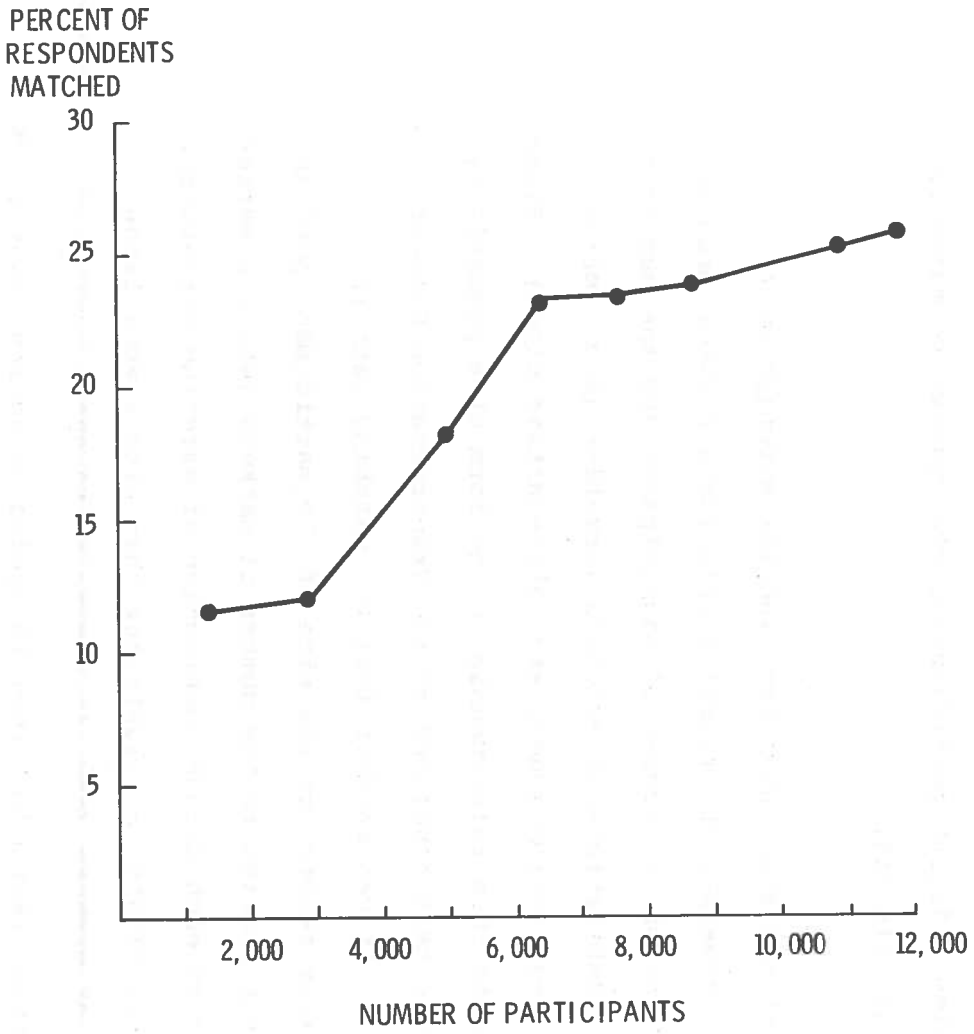


Figure 17 WBZ/ALA Matching Rate by Number of Participants

times, origins, and destinations). As can be seen in Figure 17, the concept of a critical mass was empirically borne out: although the percentage of matches produced was low in the first two runs, by the third and fourth runs (6,000 participants) the percentage had begun to rise sharply. However, the matching rate did not continue to increase as the participant pool expanded; after the final computer run, with almost 12,000 participants, the cumulative matching rate was only 26%.

6.2 FACTORS ASSOCIATED WITH PROGRAM MATCHING RATE

In general, the matching rate for a carpool program is a function of the number of participants and the number of unique combinations of matching variables (e.g., origin zones, destination zones, arrival/departure times). Figure 18 depicts this relationship in the form of a probability model recently developed at the Transportation Systems Center.[2] It can be seen that the matching rate is positively related to the size of the participant pool and inversely related to the number of markets (where a market represents each unique combination of matching variables). Moreover, Figure 18 illustrates that with a very large number of markets (say, in excess of 50,000), a very substantial respondent pool is needed to achieve even a 50% matching rate. It should be noted that this model

corraborates the concept of a critical mass by virtue of its S-shaped curves.

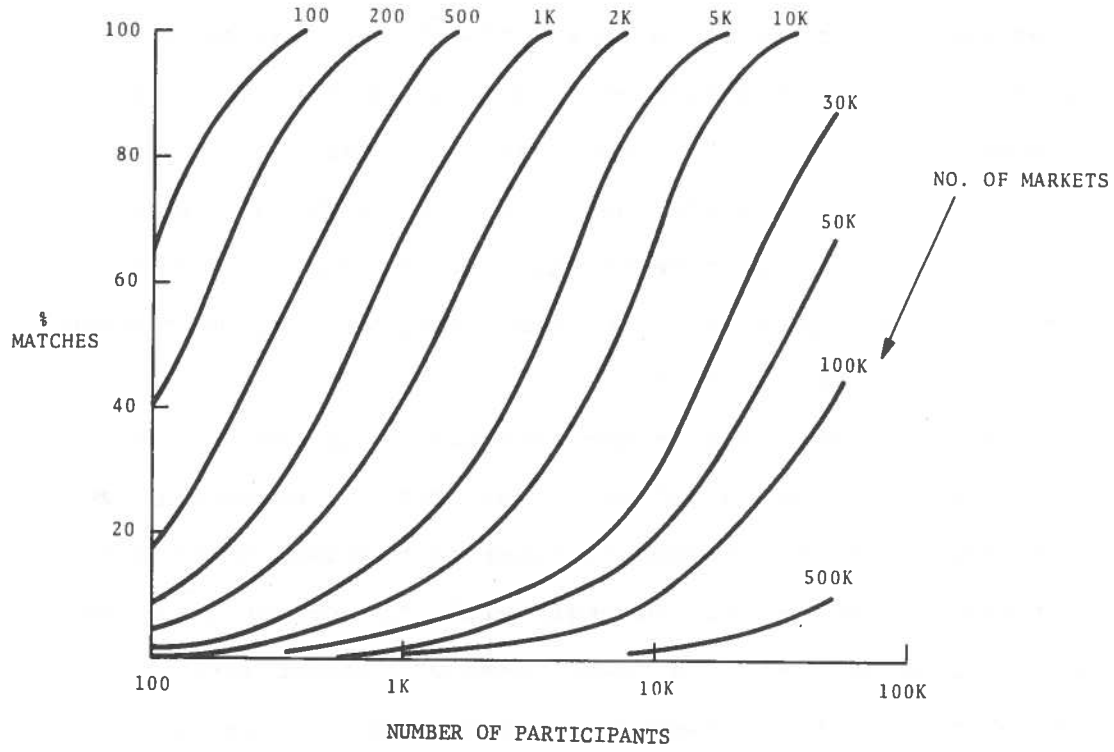


Figure 18 Matching Probability vs. Number of Participants

Although the specific assumptions of this model preclude its direct use to predict the matching rate for the Boston area program, it does provide a helpful theoretical framework for understanding why the WBZ/ALA matching rate was so low.

As discussed in the previous chapter, the level of participation in the program (13,500) was low compared to

the size of the commuter market in the Eastern Massachusetts Region (approximately 1.5 million persons). However, this factor in itself does not necessarily imply a low matching rate; rather, the explanation for the low matching rate involves the number of markets. The WBZ/ALA matching process used three variables -- origin, destination, and arrival time at work.[3] These variables constitute the minimum set of variables that a carpool matching program could use; more elaborate matching criteria might include drive/ride preferences, male/female preferences, smoker/non-smoker preferences, etc.[4]

Although the program was restrictive in terms of the number of matching variables, it was totally unrestrictive with respect to the number of discrete "values" which each variable could assume. To begin with, the regional nature of the program give it a "many-to-many" geographical orientation. This situation was compounded by having a continually expandable set of origins, destinations and time bands, rather than a rigid set of precoded choices. In the case of origins, participants simply wrote their home zip code on the matching request application, meaning that the number and geographic extent of the discrete origins was limited only by the maximum outreach of the publicity media. Destinations and arrival/departure times were more restricted, since information was obtained through checklists; however, the inclusion of "other" categories

with a space to write in an alternate destination or time served to increase the number of possible choices considerably.[5]

For the 10,581 participants as of March 1974 (who constituted the sample for the Follow-Up Survey), there were a total of 486 origin zip codes, 74 destinations, and 6 time bands, yielding approximately 215,000 possible combinations of the three matching variables. As Figure 19 shows, there was relatively little clustering of these 10,581 participants: only 73 out of 486 zones contained more than 50 participants, and only 33 out of 74 destinations contained that many.

Participants were highly dispersed with respect to origin; over half of the origins contained 5 or fewer participants, and only 4% had more than 100 participants. The 21 origins with over 100 participants were mostly located 5 to 20 miles from downtown. The slight clustering of these origins in the area northeast of Boston was possibly due to the collapse of the Mystic River Bridge and the subsequent opening of an inbound section of I-93 to buses and carpools. The one origin with over 200 participants was Framingham, Massachusetts, a town located approximately 25 to 30 miles from Boston. Although some of the high level of response may be attributed to the more intensive local publicity efforts (editorials in a local, widely read newspaper), it is noteworthy that the

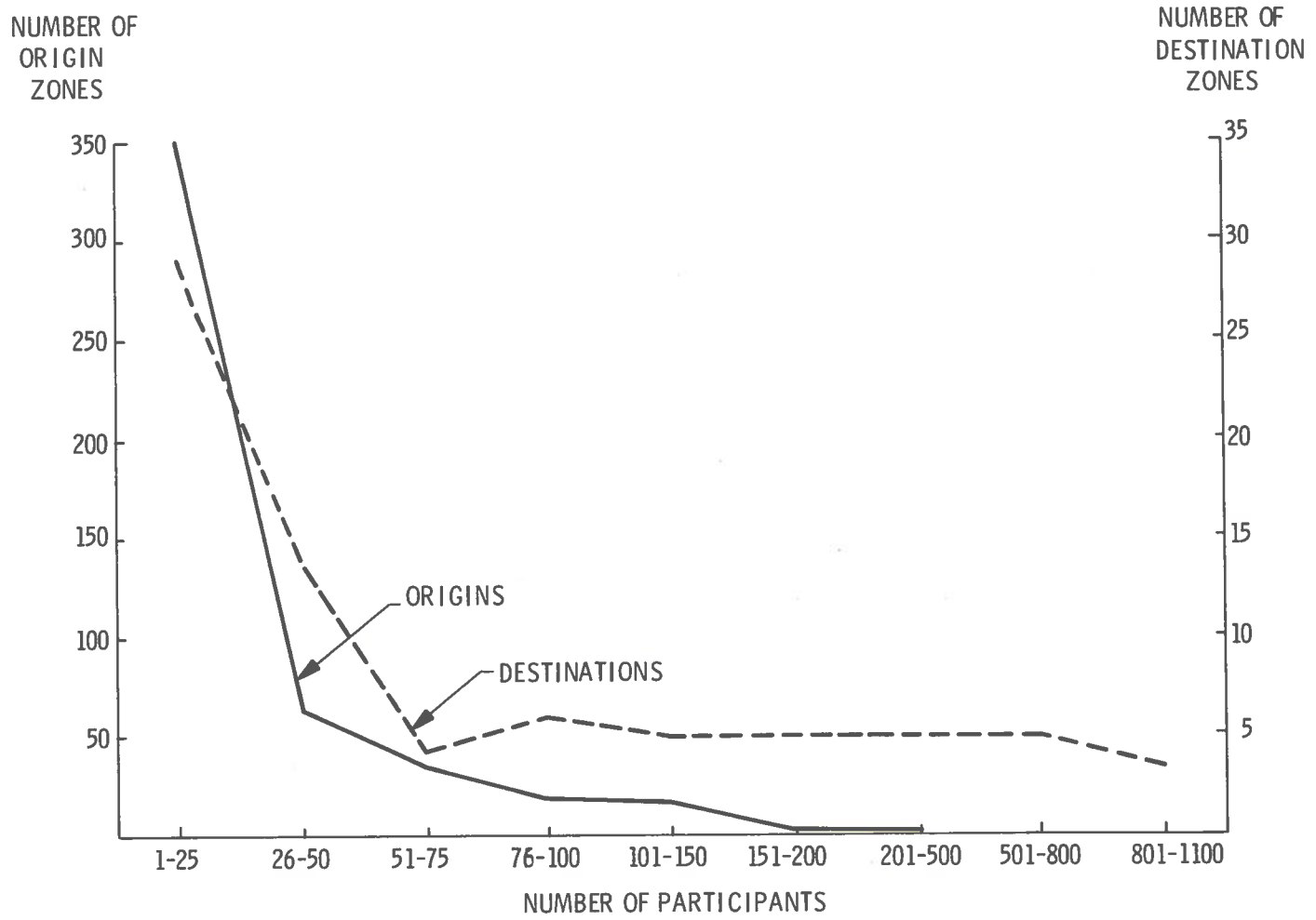


Figure 19 Distribution of Origins and Destinations by Number of Participants

Massachusetts Turnpike, a toll road, traverses the town and may have attracted commuters with higher than normal commuting costs.

The comparatively greater clustering of participants by destination can be explained by the use of a precoded (though expandable) list of destinations reflecting a downtown program orientation. In keeping with this intended orientation, the eight destinations with over 500 participants were mostly located downtown.

Given a program with regional scope and an expandable set of origins, destinations, and time bands, a low matching rate is not surprising. According to the probability model depicted above in Figure 16, for a given number of markets the matching rate should increase rapidly with growth in the participant pool after a critical mass of participants is reached. However the WBZ/ALA Program showed a different pattern of matching rates; as will be remembered from Figure 17, the program experienced a relatively small increase in the matching rate beyond the apparent critical mass point of 6,000 participants, suggesting that the number of markets must have expanded at almost the same rate as the number of participants. In terms of the probability model, this can be visualized as an outward movement from one S-shaped curve to another, rather than movement along a particular curve.

A reasonable question to pose at this point is how the program could have been structured or modified to increase

the matching rate. It would appear that the number of carpool markets is more readily manipulative than the size of the participant pool. First of all, the number of markets can be limited at the start of a program by using a specified list of origins, destinations, and times. As already discussed, the potential number of origins and destinations for a regional carpool program is large to begin with, and the matching request application essentially permitted an ever-expandable number. Second, the number of markets can be reduced at any point during the program by aggregating origins, destinations, and/or time bands into larger zones or intervals. WBZ/ALA personnel did aggregate downtown destinations after seeing the results of the initial computer runs; however, they did not attempt to aggregate origin zip codes or time bands even though, in the case of time bands, program participants indicated that they could adjust their arrival and departure times to accommodate potential carpool partners. A third possible approach to manipulating the number of carpool markets is to permit matching of participants along home-to-work routes. This technique has been applied in other carpool programs; however, since it requires more sophisticated computer software and processing capabilities, it was never comsidered for the Boston area program.

In general then, a regional carpool program such as the Commuter Computer Program can exercise some control over the

matching rate by the options, limitations, or other attributes that characterize the matching process. It is important to realize, however, that the matching rate is not the only criterion of program effectiveness. A far more important measure of the impact of a carpool program is the number of participants who form or join carpools as a result of the program.

6.3 LEVEL OF CARPOOLING

The WBZ/ALA Follow-Up Survey provides imformation on the level of carpooling among program participants. In response to the question "Are you currently a member of a carpool?" 1084 or 25% of all respondents answered affirmatively.[6] Table 14 chronicles the level of carpool activity including carpool membership prior to the program and up to the date of the Follow-Up Survey. It can be seen that the 25% figure includes respondents who were carpooling prior to the program as well as respondents who began carpooling during the time interval from the beginning of the program to the date of the survey (July 1974). However, the 1,084 current carpoolers do not include 119 respondents who were in carpools at some time during the program period but who had stopped carpooling by the time of the survey.

The level of carpooling as of the survey date (1,084 persons, 25% of all respondents) represents a net increase over the number and percentage of respondents carpooling

TABLE 14. CARPOOL MEMBERSHIP BEFORE AND DURING THE COMMUTER COMPUTER PROGRAM

Time Began Carpooling	Number of Carpoolers (Before Program)	Carpool Activity August '73 - July '74		Current Carpoolers (at survey date)
		Started Carpooling	Stopped Carpooling	
Before Program	359	N/A	58	301
During Program	N/A	844	61	783
Total Carpoolers	359	844	119	1084

before the program (359 persons, 8% of all respondents). Moreover, the level of carpooling among WBZ/ALA respondents (25%) is considerably higher than the level among Eastern Massachussets repondents (18%). Both of these findings would seem to indicate that the Commuter Computer Program had a positive impact on the level of carpooling in the Boston area. However, any change in a participant's carpooling status (from noncarpooler to carpooler) could be attributable to the program matching rate, the post-matching process (a matched person's willingness to contact other people on the computer listing, the ability of matched persons to make satisfactory arrangements, etc.), or to factors totally unrelated to the program (matching via other programs or informal mechanisms).

In order to ascertain the program's effect on carpool formation, carpoolers were asked: "How, if at all, did the Commuter Computer Program affect the size of membership of your carpool?" Results are presented in Table 15.

TABLE 15. EFFECT OF COMMUTER COMPUTER PROGRAM ON CARPOOLING

Response	Percent of WBZ/ALA Carpoolers (n=1,084)
1 - No effect	69%
2 - I joined a carpool which formed as a result of the program	8
3 - I joined a carpool which had existed before the program	10
4 - New member(s) joined my carpool, which had existed before the program	5
5 - Other I joined a carpool as a result of interest generated by the program (2%)	6
6 - No response	2
Total	100%

The above data can be used to estimate the direct effect of the program's matching process on carpool formation. Clearly, the 8% of carpooler respondents comprising category 2 represent a minimum measure of direct effect. To this 8% can be added some unknown fraction of the respondents in categories 3 and 4,[7] yielding a range of 8% to 23% of carpooler respondents carpooling as a result of the matches generated by the program.

The majority of respondents indicated that the program had no effect, which presumably means that they were still in the same carpool as before the program, or that they had

formed carpools on their own, through informal channels or through other programs. In the previous chapter, competition from other carpool formation mechanisms -- e.g., employer-based programs and informal arrangements -- was suggested as one of the reasons for the low participation level in the Commuter Computer Program. It is reasonable to assume that for many of the participants in the program, these other mechanisms actually took on a complementary rather than competitive role. In other words, participants ultimately relied on their own contacts to form carpools, regardless of whether or not they had received matching lists from WBZ/ALA. Although only 2% of respondents specifically indicated they had joined carpools as a result of interest generated by the program, it can be assumed that some portion of the 69% who responded "no effect" were also encouraged to seek carpool partners through the program's publicity.

Further evidence of the WBZ/ALA Program's limited effect on carpool formation can be gleaned from the Eastern Massachusetts Survey. It was already pointed out in the previous chapter that only one of the 520 carpooler respondents to that survey attributed carpool formation to the program, while the majority cited informal arrangements as their means of carpool formation. An additional finding is that awareness of the program (i.e., exposure to some form of publicity) does not appear to be correlated with

areawide carpool formation: the percentage of carpoolers is no different among those who heard about the program and those unaware of it. Finally, it appears that the program's effect on carpooling attitudes was equally minimal: if the 2,336 noncarpooler respondents are divided into two groups, those aware of and those unaware of the program, the percentage of persons indicating an interest in carpooling is slightly lower among the former group (24%) than the latter (29%).

Nevertheless, despite evidence from the Eastern Massachusetts Survey that the Commuter Computer Program played a negligible role in areawide carpool formation during the 1973-74 period, and despite the absence of any correlation between awareness of the program and either carpool formation or interest in carpooling, it is conceivable that the program's promotional campaign --in particular, the informational aspects citing the benefits of carpooling -- did have an indirect effect on carpooling behavior and attitudes. However, this indirect effect cannot be factored out owing to the simultaneous occurrence of a strong exogenous factor, the energy crisis.

The upper range of percentage of WBZ/ALA respondents who formed carpools directly as a result of the WBZ/ALA matching process corresponds closely to the program's matching rate (26%). However, this similarity is purely coincidental, since (1) many of the program-generated

matches were inadequate to effect carpools (reasons are discussed in Chapter 8), and (2) the majority of carpoolers did not attribute their carpooling status to the program. In general, then, a carpool program's matching rate is an inappropriate predictor of the ultimate percentage of program participants who join carpools: it is always an overestimate of program-induced carpooling, and bears little relationship to the extent of carpooling which occurs outside of the program.

To add further insight into the matching process, the 1,084 carpoolers and the 3,197 noncarpoolers[8] were compared with respect to matching variables (i.e. origin, destination, arrival and departure times).[9] Indeed, regardless of whether or not carpools were formed as a result of the program or through informal means, matching had to take place on these aforementioned variables. Figure 20 shows the distribution of these two subgroups on all four variables.

The most noteworthy difference between the two groups surfaces in the distribution of origins. Here it is seen that carpoolers are drawn more heavily from origin zones 4 to 7, or outside of the Route 128 area. In comparison, noncarpoolers show a much higher concentration within Route 128, or approximately 0 to 15 miles outside of the Boston central city. This finding is particularly significant in light of the fact that response density per origin was

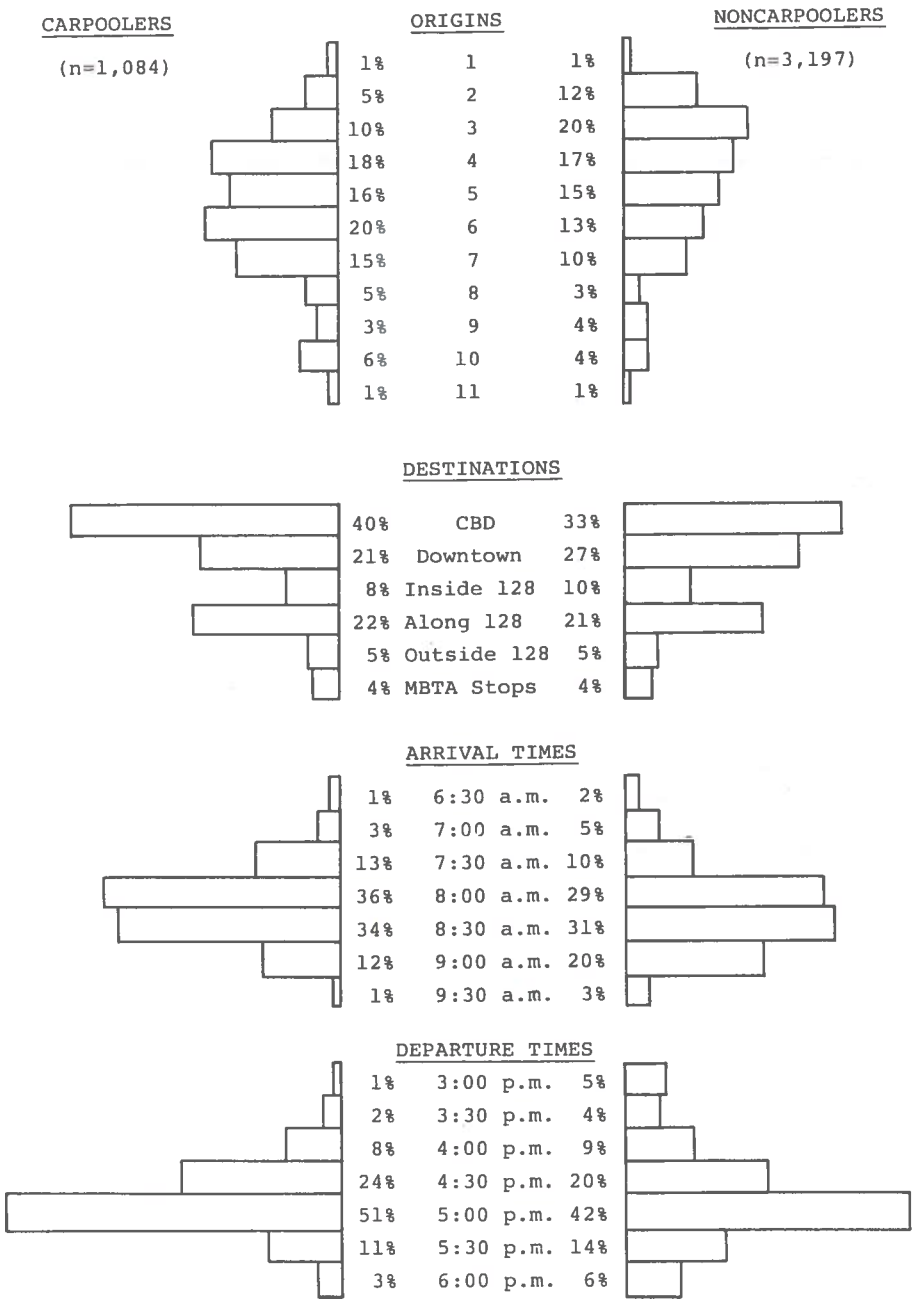


Figure 20 Distribution of Origins, Destinations, Arrival Times and Departure Times for WBZ/ALA Carpoolers vs. Noncarpoolers

higher within Route 128, and thus a higher rate of carpool formation would be expected.

An examination of other variables reveals small but noteworthy differences between carpoolers and noncarpoolers. Although departure times are roughly similar for these two groups, noncarpoolers noticeably exhibit less peaked arrival times and a lower proportion traveling into the CBD. The latter finding may be particularly important in light of the fact that non-CBD destinations had a lower response density and therefore a potentially lower matching rate. Overall, however, the distinctions between carpoolers and noncarpoolers do not reveal any systematic differences which would overwhelmingly affect their chances of being matched by the program.

6.4 SUMMARY

The level of carpooling among WBZ/ALA Survey respondents was found to be 1,084 persons, or 25% of all respondents. This level represents an increase over the level of carpooling among these respondents before the Commuter Computer Program commenced. In addition, the percentage of carpoolers is higher among WBZ/ALA Survey respondents than among Eastern Massachusetts Survey respondents, reflecting the fact that the former group was comprised of voluntary participants in a carpool matching

program, who were presumably more interested in carpooling than the general population of auto commuters.

Despite these apparently positive indications regarding the program's impact, analysis of findings from the two surveys revealed that the Commuter Computer Program did not significantly affect the rate of carpool formation among participants and that it played a negligible role in areawide carpool formation during its year of operation.

The preceding chapter explored reasons for the low level of participation in the program, which in turn explains the program's insignificant role in areawide carpool formation. The remainder of this section attempts to provide some insight into the program's limited effect on carpool formation among participants. Three possible reasons are discussed: (1) the low matching rate; (2) limitations in the matching criteria; and (3) limitations in the post-matching notification and follow-up process.

6.4.1 MATCHING RATE

For any carpool program, the percentage of participants forming carpools on the basis of program-generated matches can be expected to fall short of the matching rate, since many of the "paper" matches do not materialize into carpools. With an ultimate matching rate of only 26%, it is not surprising that the Commuter Computer Program exerted a minimal influence on carpool formation.

As discussed in section 4.1, the program's low matching rate is due to two factors: the low level of program participation and the large number of carpool markets. The total participation level of 13,500 persons was too small to yield sufficient commonality of origins, destinations, and work schedules. The problem of low participant density was especially pronounced with respect to origin zones.

The regional nature of the program, coupled with the lack of restrictions on the number or geographic outreach of origin zones and destination zones, resulted in too many carpool markets. The excessive number of origin-destination-time combinations alone would have tended to preclude high matching rates; however, in concert with the low overall participation level, it caused the low matching rate of 26%.

6.4.2 MATCHING CRITERIA

Limitations in the matching criteria (variables) may have also reduced the program's chances of effecting carpool formation. As mentioned above, the origin geocoding of respondents was based on zip codes. For the most part, there was a 1:1 correspondence between zip codes and towns, but in general, this made for large and irregular zones. On the average, most origins (towns) were five miles in area as compared to the one square mile grid areas used by more sophisticated matching programs. Although the use of these

relatively large zones was helpful for the standpoint of the matching rate, it may have been detrimental to the ultimate formation and/or successful operation of carpools. This is because the larger zones are more apt to produce matches which require a greater degree of route deviation, a compromise which some participants might not have been willing to make.

Still another limitation with respect to matching criteria was the exclusion of personal preference factors such as drive/ride, male/female, and smoker/nonsmoker. Although the use of these factors in the actual computer matching process would have been impractical because of a concomitant decrease in the matching rate, the program publicity and the matching request application did suggest that the first two of these factors would be taken into account in the matching process. This promise never materialized due to the lower than anticipated number of participants. It is possible that carpool formation among matched participants was hindered by incompatibilities in these areas for which preferences had been voiced.

6.4.3 MATCHING PROCESS

Finally, the mechanics of the matching process may have significantly undercut the effect of the program. As discussed in Chapter 2, a participant in the program received only one response from the computer, following the

first matching run in which his application was processed. If he was not matched, the response consisted of a "sorry" letter; if matched, he received a listing of prospective carpooler(s). Any matches among persons with different program entry dates (and different first run dates) had to rely on a one-way communication flow from the more recent participant (who received the listing) to the persons on the listing (who had at some time in the past received "sorry" letters). This limitation in the post-matching notification and follow-up process may have caused a number of participants to seek out alternative methods for forming a carpool (i.e., friends, neighbors, etc.).

6.5 RECOMMENDATIONS

This evaluation of the Commuter Computer matching process and its effect on the rate of carpool formation clearly points to a need for coordinated decisions relative to the program outreach area and matching process. A number of recommendations for areawide programs follow:

- Future programs will most likely have to limit the outreach area in order to constrain the number of carpool markets. A limited number of carpool markets may allow a more intensive publicity effort in "target areas" which will hopefully lead to a high level of participation. The program outreach area should be identified by its carpool potential, taking into account such factors as its population density, the proportion of single passenger autos, and the work trip flows of its residents.

- The use of zip codes as origin zones does not seem to adequately reflect the potential of population clusters which may be inclined to carpool. Other possibilities may be use of a grid system, or matching along major routes, park-and-ride lots, or traffic zones. Smaller grids than provided in the WBZ/ALA Program, however, are only possible given a greater level of participation.

- Based on the WBZ/ALA experience, it may be advantageous to structure the size or nature of the origin zones after the level of participation is gauged. An ideal solution may be to map the response density over the region's outreach area and then accordingly delimit feasible origin zones in accordance with clustering and maximum tolerable levels of route deviation.

- The low rate of matching achieved within the WBZ/ALA Program suggests the need for providing more flexibility of matching criteria variables. In particular, multiple arrival and departure times may be provided as an option for potential carpoolers who are willing to leave earlier or depart later than their normal work hours for the opportunity to carpool.

- More research is needed in the area of commuter preferences. The maximum tolerable route deviation and the importance of other commuter preferences should be gauged in order to structure origin zones more effectively and possibly to include some of these factors in the matching process.

- Mechanisms must be set up which allow for direct personalized communications with regard to the status of a participant's carpool application, and reasons why a match was not generated.

It is difficult to generalize and recommend which kind of matching system, matching criteria, or overall program will best facilitate carpool formation. Although the Commuter Computer Program's matching rate and its effect on carpool formation was disappointing, there is clearly not enough information here to devise foolproof solutions.

Further information which is presented in Chapters 7 and 8 will provide a more complete picture of participants' experiences with the program and lead to more definite recommendations relative to carpooling.

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[1] It should be noted that this is actually a cumulative rate, since for any particular run all participants who have been matched during that or preceding runs are counted. Another point to note is that participants with atypical arrival/ departure times (i.e. times other than those specified on the matching request application) are not reflected in these figures, since they were processed manually.

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[2] This model is described more fully in the report by Kendall, op. cit., pp. 89-103.

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[3] Although the original carpool application collected information on both arrival and departure times, only arrival times were utilized in the matching process.

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[4] The original WBZ/ALA application form requested information on drive/ride and male/female preferences. However, since the participant pool did not reach the level anticipated, these preferences were never incorporated into the matching process.

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[5] The "other" category under destination specified a boundary on or within Route 128. Nonetheless, the "write-in" feature resulted in a doubling of destinations, including a sizable number outside the Route 128 boundary.

[6] This percentage may overstate the true percentage of carpoolers among the WBZ/ALA Follow-Up Survey sample of 10,581 participants, since the telephone bias check for the Eastern Massachusetts Survey revealed that carpoolers were more likely to respond to the mailback survey than noncarpoolers. On the other hand, it is possible that participants unable to form carpools viewed the WBZ/ALA Survey as an opportunity to air their complaints or reaffirm their interest in carpooling, and hence were more likely to respond than carpoolers.

[7] The absence of the phrase "as a result of" in these response categories precludes automatically attributing these respondents' carpool formation to the program's matching process.

[8] It should be noted that 12 survey respondents failed to indicate their carpooling status. The term noncarpoolers is only used here to facilitate the distinction between program participants who formed carpools vs. participants who were not carpooling at the time of the survey. Theoretically, it must be kept in mind that both carpoolers and noncarpoolers represent potential carpoolers, or groups who hoped to form a carpool as a result of their participation in the program. An examination of characteristics other than the matching criteria variables is inappropriate due to the homogenous nature of the two subgroups and the fact that other characteristics did not affect their chances of being matched through the program.

[9] Although departure times were not utilized in the matching process, informally they still represent important criteria in a respondent's attempt to locate a suitable carpool partner.

CHAPTER 7

CARPOOL CHARACTERISTICS AND CARPOOLER ATTITUDES

The previous chapter identified that approximately 25% of the respondents to the WBZ/ALA Follow-Up Survey were carpooling at the time of the survey. This group included commuters who were carpooling prior to the Commuter Computer Program, formed carpools directly as a result of the program, or formed carpools independently of the program. This chapter takes a closer look at these carpoolers by examining the characteristics of their carpools and the perceived advantages and disadvantages of carpooling. Where appropriate, comparisons are drawn between WBZ/ALA Survey carpoolers and Eastern Massachusetts Survey carpoolers, who comprise 18% of all respondents to that survey. Moreover, the findings of two prior studies on carpooling[1] are also used as a basis for comparison.

7.1 CARPOOL CHARACTERISTICS

In general, "carpools" define a variety of shared ride alternatives. Although a carpool has been broadly defined as two or more people traveling together on a regular basis (including family members), in reality there are any number or carpool types depending on the number of members, days-a-week in operation, driving arrangement, cost sharing plans, etc. Table 16 presents selected carpool characteristics of

TABLE 16. CARPOOL CHARACTERISTICS OF WBZ/ALA SURVEY CARPOOLERS AND EASTERN MASSACHUSETTS SURVEY CARPOOLERS

	WBZ/ALA Survey Carpoolers (n=1,084)	Eastern Mass Survey Carpoolers (n=520)
FORMER TRAVEL MODE DISTRIBUTION		
Drove alone	53%	75%
Member of carpool	28	--
Public transportation	18	19
Transit only	7	11
Combination	11	8
Other	1	6
CARPOOL SIZE DISTRIBUTION		
2 persons	36%	50%
3 persons	27	27
4 persons	22	13
5 or more persons	15	10
DRIVING ARRANGEMENT DISTRIBUTION		
All share driving	61%	51%
Some share driving	11	8
One person drives all the time	27	41
Other	1	--
CARPOOL DURATION DISTRIBUTION		
Less than 6 months	49%	26%
6 months to 1 year	33	30
Over 1 year	18	44

the WBZ/ALA Survey carpoolers and the Eastern Massachusetts Survey carpoolers.[2]

7.1.1 FORMER TRAVEL MODE

In order to gauge the extent of diversion from single-occupant auto vs. other modes, both surveys contained questions on carpoolers' prior mode. In the case of the WBZ/ALA Survey, prior mode was defined as mode of travel before hearing about the WBZ/ALA Program.[3]

About one-half of WBZ/ALA carpoolers were diverted from single-passenger autos, about one-quarter were previously carpooling, and another one-fifth were diverted from transit. The level of transit diversion, while considerable in percentage terms, is not discouraging in relation to the NORC statistic (35%) and in view of the fact that the transit users who participated in the program tend to represent the "fringe" users in terms of time, cost, and convenience. Two-thirds of this group used a combination of transit and auto, which tends to be costly, time-consuming and inconvenient relative to the same trip in a carpool.

Eastern Massachusetts Survey respondent carpoolers showed similar patterns of modal diversion as WBZ/ALA carpoolers. The difference in the "drove alone" percentages for the two groups is due to the fact that the WBZ/ALA percentage does not reflect the prior mode of the persons already carpooling when they heard about the program. It

can be presumed that most of those persons were originally diverted from the solo driver auto mode.

7.1.2 CARPOOL SIZE

Approximately one-third of WBZ/ALA carpoolers were traveling in two-person carpools, one-quarter were in three-person carpools, and another 20% were in four-person carpools (see Table 16). In contrast, the typical Eastern Massachusetts carpool was smaller, with one-half of carpoolers in two person carpools and another one-quarter in three-person carpools.[4] One possible reason for the greater size of WBZ/ALA carpools is the fact that many participants wrote into the program to increase the size of pre-existing carpools.

7.1.3 DRIVING ARRANGEMENT

The type of driving arrangement adhered to in a carpool is a function of individual commuter needs. Although the majority of WBZ/ALA respondent carpoolers were in carpool arrangements where all members shared the driving, other arrangements (such as one person always responsible for the driving) were frequently reported, and again may reflect carpool functions, i.e. the need to make the car available to other family members (see Table 16). Among Eastern Massachusetts carpoolers, there was a smaller percentage in shared driving arrangements (51% vs. 61% for WBZ/ALA

carpoolers) and a larger proportion in carpools where one person drives all the time (41% vs. 27%). These differences may reflect the higher auto ownership (and presumably higher auto availability) among Eastern Massachusetts Survey respondents.

Carpools formed during the energy crisis showed a higher percentage of shared driving arrangements than carpools formed at other times, due to the decrease in the percentage of family-based carpools. Previous research[5] has indicated that shared driving arrangements are less common among family-based carpools than among employer-based carpools, since family-based carpools are more likeley to have a pre-defined driver (i.e., husband or parent).

7.1.4 DAYS-A-WEEK TRAVELING IN CARPOOL

As expected, most carpool arrangements reflected a normal five-day work week; 73% of WBZ/ALA carpoolers were found to be traveling by carpool <u>at least</u> five days a week (see Table 17).

TABLE 17. NUMBER OF DAYS PER WEEK WBZ/ALA CARPOOLERS TRAVEL TO WORK IN CARPOOL

Number of Days Per Week	Percent of WBZ/ALA Carpoolers (n=1,067)
1	-
2	3%
3	6
4	18
5	73
Total	100%

Presumably, reported carpool arrangements of less than five days a week are indicative of either four-day work weeks, a special need for a car during work one day a week, or other individual and family needs.

7.1.5 CARPOOL DURATION

The vast majority of WBZ/ALA Survey carpoolers (82%) indicated that they had formed/joined their carpools within the last year -- i.e., since July 1973 (see Table 16). This is not surprising, since most of these people had participated in the Commuter Computer Program within that period specifically in order to carpool. The Eastern Massachusetts Survey shows carpools of generally longer

duration. Only 56% are less than a year old, and 6% are over 10 years old.

The WBZ/ALA Survey data provide some indication of the stability of carpools over time. From the beginning of the Commuter Computer Program to the time of the WBZ/ALA Follow-Up Survey, there were 844 respondents who had formed/joined a carpool. These persons' carpools were relatively stable, as only 61 or 7% of these carpoolers had stopped carpooling by the time of the survey. As will be described in the next chapter, the primary cause of carpool dissolution are factors such as residential and job changes, rather than dissatisfaction with carpooling.

7.1.6 INCREMENTAL TRAVEL TIME

Generally travel time is expected to increase when one joins a carpool, with the amount of increase being dependent on such factors as carpool driving arrangement, number of carpool members, or the residential and work locations of other carpool partners. NORC Survey data show that persons traveling greater distances and persons living in sparsely populated areas tend to travel further out of their way to pick up passengers than those traveling shorter distances or residing in denser areas.

In order to obtain some additional empirical data on the incremental time incurred as a result of carpooling, both surveys asked carpoolers the following question: "How

long does it usually take you to get to work under each of the following conditions: when you drive by yourself; when you drive other members of your carpool; when you are a passenger in your carpool?" Travel time increments for the carpool driver case were computed as the difference between the time when driving others and the time when driving alone. Travel time increments for the carpool passenger car were similarly computed using time when driving alone as a base. Table 18 shows the resulting distribution of travel time increments for the two surveys.[6] The respondent bases in this table are considerably smaller than the number of carpooler respondents in each survey, owing to the fact that not all respondents reported times for the comparative situations.

Overall, the Eastern Massachusetts Survey carpoolers appear to incur smaller travel time increments than the WBZ/ALA Survey carpoolers. To some extent, this may reflect the shorter average commuting times of the former group (32 minutes vs. 44 minutes for the drive alone case) and the smaller average carpool size. However, another possible explanation is that WBZ/ALA carpoolers are more willing to go out of their way to carpool than the typical areawide commuter, perhaps on account of their greater commitment to carpooling. The findings on average incremental time for carpooling, if used as guides for delimiting grid sizes for

TABLE 18. DISTRIBUTION OF CARPOOLERS' REPORTED INCREASE IN TRAVEL TIME BY TYPE OF DRIVING ARRANGEMENT

Travel Time Increase (in minutes)	Percent of WBZ/ALA Carpoolers Reporting Given Travel Time Increase When Carpool Passenger (n=941)	Carpool Driver (n=872)
0	33%	49%
1-5	23	17
6-10	19	16
11-15	17	12
16 or more	8	6
Total	100%	100%

Travel Time Increase (in minutes)	Percent of Eastern Massachusetts Carpoolers Reporting Given Travel Time Increase When Carpool Passenger (n=404)	Carpool Driver (n=454)
0	48%	64%
1-5	22	19
6-10	17	10
11-15	8	6
16 or more	4	2
Total	100%	100%

carpool matching, would tend to suggest a maximum time radius of around 10 minutes.

7.2 PERCEIVED ADVANTAGES AND DISADVANTAGES OF CARPOOLING

Outside of the free computer matching service, there were no planned incentives such as lower parking costs, express highway lanes, or preferential parking spaces to induce carpooling. Thus the perceived benefits that carpooling would afford a commuter was a relatively individual matter, with motivations stemming from a unique combination of individual commuting needs.

7.2.1 REASONS FOR WANTING TO CARPOOL

In order to gauge their various expectations concerning carpooling, carpoolers were asked: "What were your main reasons for wanting to join a carpool?" In the WBZ/ALA Survey, there were eight possible reasons which respondents could check off (multiple response permitted), whereas the Eastern Massachusetts Survey question was open-ended. Table 19 shows the responses for the two surveys, with reasons phrased to obtain as much comparability as possible.[7] It should be noted that there is some overlap among the various reasons, as well as the possibility of varying interpretations of reasons by respondents. For example, the energy crisis as a motivating factor may be somewhat synonomous with a desire to share expenses. Moreover, the

TABLE 19. CARPOOLERS' MAIN REASONS FOR WANTING TO CARPOOL

Reason	Percent of WBZ/ALA Carpoolers Citing Reason (n=1,084)	Percent of Eastern Mass Carpoolers Citing Reason (n=520)
Cost savings	75	62
Energy crisis	65	15
Environmental concern		4
Driving relief	38	10
Increased availability of car to family	29	8
Companionship	21	10
Dissatisfaction with former mode	19	8
No other means of getting to work	4	3
Others traveled same way	NA	11
Convenience	NA	10
Others needed ride to work	NA	7
Other	6	5

term convenience might refer to any combination of the following reasons: driving relief (sharing of driving chore), increased availability of car to other family members, or others traveled some way (other persons had similar origins and destinations). Nevertheless, a brief examination of the frequencies with which carpoolers cite the various reasons for wanting to carpool does provide some insight into behavioral motivations.

In light of the energy crisis and increased gasoline prices, it is not surprising that the most important motivation was cost savings (cited by 75% of WBZ/ALA carpoolers and 62% of Eastern Massachusetts carpoolers). The next most frequently cited reasons involved the energy crisis and concern for the environment[8] (cited by 65% of WBZ/ALA carpoolers and 19% of Eastern Massachusetts carpoolers). The relatively high percentage of WBZ/ALA carpoolers citing environmental concern is consistent with the percentage of all WBZ/ALA respondents indicating that the energy crisis caused them to look into carpooling (67%), and with the program's appeal to higher income, more highly educated commuters, whose behavior is influenced by societal considerations more than that of persons of lower socieconomic status.[9] However, the relatively high percentage of WBZ/ALA carpoolers citing this factor may also reflect the fact that the question had a pre-defined set of

responses rather than requiring respondents to think of and write in their own responses.

Factors associated with the actual trip segment (i.e. time spent in the vehicle) such as companionship and the desire to share driving were cited less frequently as reasons for wanting to carpool. Finally, it is also noteworthy that carpooling in order to free a car for use by other family members is a relatively unimportant motivating force -- an indication that carpooling would not be used to free vehicles for counter-productive non-work trips. In general, respondents' reasons for wanting to join a carpool seem to involve the positive features of carpools rather than the negative features associated with former travel modes.

A stratification of carpoolers by prior mode reveals striking differences in the ranking of reasons by mode (see Table 20). For carpoolers of both surveys, cost savings is the most important reason among former car and former car/transit users, whereas dissatisfaction with former mode is the highest ranking reason among former transit users. In the case of WBZ/ALA carpoolers, environmental concern (which presumably was interpreted by respondents to mean the energy crisis) closely follows cost savings in motivational importance for all modes. However, among Eastern Massachusetts carpoolers, the energy crisis is relatively unimportant (though second-ranking) for car users, but less

TABLE 20. REASONS FOR CARPOOLING RANKED BY PRIOR MODE*

Prior Mode	WBZ/ALA Carpoolers	Eastern Massachusetts Carpoolers
Car	n=562	n=376
	Cost savings (80%) Environmental concern (75%) Driving relief (42%) Increased availability of car to family (27%) Companionship (23%)	Cost savings (67%) Energy crisis (18%) Driving relief (11%) Companionship (11%) Others traveled same was (10%)
Transit	n=70	n=55
	Dissatisfaction with former mode (71%) Cost savings (50%) Environmental concern (31%) Increased availability of car to family (21%) Companionship (17%)	Dissatisfaction with former mode (43%) Cost savings (26%) Convenience (22%) Others traveled same way (11%) Public transit not available (9%)
Car and transit	n=118	n=38
	Cost savings (64%) Environmental concern (53%) Dissatisfaction with former mode (36%) Driving relief (27%) Increased availability of car to family (26%)	Cost savings (40%) Dissatisfaction with former mode (21%) Convenience (18%) Public transit not available (16%) Other traveled same way (13%)

*Figures in parentheses denote the percent of carpoolers in each prior mode category citing reason.

than fifth-ranking for the other two groups. In general, it can be observed that former car users tend to have been motivated to carpool by the positive features associated with carpooling, while transit users and car/transit users were primarily motivated by the negative features associated with their former mode.

It is also interesting to note that the reasons given by Eastern Massachusetts carpoolers for wanting to carpool vary according to time of carpool formation. The percentage of energy crisis carpoolers citing cost savings is much higher than the percentage of before- or after-crisis carpoolers citing this reason (71% vs. 52% and 56%, respectively), reflecting higher gasoline prices during the energy crisis. As would be expected, the importance of the energy crisis itself as a motivating factor is highest among energy crisis carpoolers (36% of this group vs. about 6% of other carpoolers). On the other hand, energy crisis carpoolers are less likely than non-crisis carpoolers to have cited convenience, dissatisfaction with transit, and unavailability of transit as reasons for wanting to carpool. In part this reflects the lower level of diversion from transit to carpooling during the energy crisis.

7.2.2 MOST LIKED FEATURES OF CARPOOLING

In order to see if their original expectations about carpooling were upheld, WBZ/ALA carpoolers were asked: "What are the features of carpooling that you like the most (check as many as applicable)?" Responses are presented in Table 21.

TABLE 21. FEATURES OF CARPOOLING MOST LIKED BY WBZ/ALA CARPOOLERS

Feature	Percent of WBZ/ALA Carpoolers Citing Feature (n=1,084)
Cost savings	84%
Helping to alleviate congestion and pollution problems	55
Driving relief	51
Companionship	36
Increased availability of car to other household members	29
Increased convenience	20
Time savings	12
Other	4

As can be seen, consistent with commuters' original motivation to form a carpool, the primary factors of cost savings, a desire to help alleviate congestion/pollution (environmental factors), and driving relief were most often cited as the best features of carpooling. The desire for

companionship and the need to free a car for use by other family members emerged as secondary factors, and convenience and time savings were cited least frequently.

In general, the high priority given to the benefits of cost savings, environmental factors, and driving relief correlates strongly with WBZ/ALA carpoolers' perceived benefits (i.e., reasons for wanting to carpool).[10] Upon closer examination of those factors, cost savings was found to be strongly related to carpool size (93% of those in a five-person carpool cited cost savings) while, as expected, driving relief was cited more frequently among commuters with longer travel times. In general, response rate was undifferentiated by either demographic or travel characteristics of respondents for these two factors as well as for those citing environmental factors as a best feature of carpooling.

Although both increased convenience and time savings were infrequently mentioned as one of the best features of carpooling, it is interesting to note that a significantly larger proportion of former transit users (68%) cited these factors than former lone auto drivers (8%). Although convenience was not found to be highly correlated with other factors, the proportion selecting time savings was higher among those in larger carpools and among those in carpools where one person drives all the time.

7.2.3 LEAST LIKED FEATURES OF CARPOOLING

In order to identify and assess the importance of various problems associated with carpooling, WBZ/ALA carpoolers were asked: "What are the features of carpooling that you like the least?" (multiple responses permitted). Their responses are shown in Table 22.

TABLE 22. FEATURES OF CARPOOLING LEAST LIKED BY WBZ/ALA CARPOOLERS

Feature	Percent of WBZ/ALA Carpoolers Citing Feature (n=1,084)
Reduced independence and mobility	60%
Difficulties of adhering to schedule	26
Other people's driving habits	21
Inconvenience	19
Responsibility to other carpool members	19
Increased travel time	18
Reduced privacy	8
Other	5

It is interesting to note that the aggregate percentage of WBZ/ALA carpoolers citing negative features of carpooling is considerably less than the aggregate percentage citing positive features. This may be indicative of a relatively high degree of satisfaction with carpooling among these

carpoolers. The negative features cited most frequently are reminiscent of features often associated with transit -- i.e., reduced mobility, schedule adherence problems, and inconvenience.

Overwhelmingly, reduced independence and mobility was selected as the least liked feature of carpooling. The high priority given this item is presumably a function of both a pragmatic and psychological need to "come and go as one pleases." In general, it is believed that carpooling constrains non-work functions (to be performed before, during, or after regular working hours) for which a car is needed. It may be, however, that the feeling of reduced independence and mobility is more of a perceived rather than an actual problem. In this regard, a recent Los Angelse study[11] which produced a psychological profile of potential carpoolers indicates: "It appears that the need for a car during business hours, whether for business or personal reasons, is more of an imagined or rationalized deterrent to carpooling. It may be more of an excuse than a reason."

Scheduling difficulties and drivers' habit were the next most frequently cited dislikes with carpooling. Some prevalent problems here include work hour variances, tardiness of those driving, drive/ride preference, personality problems, etc. In general, it was found that the percent listing scheduling and drivers' habit as a difficulty was highest among higher income commuters.

Some of the difficulty encountered with scheduling and drivers' habits may in fact be minimized with more elaborate sorting procedures regarding drive/ride preferences, income and occupational compatibility, and other characteristics. Indeed there were requests for non-smoker or all male/female carpools from among program participants. But the fact remains that this can be done only at the expense of lower matching rate. As noted previously, for instance, drive/ride preferences were not included as part of the sorting routine (even though such information was available) because of the depressive effect it would have had on the matching rate. This type of sorting is possible only with an extremely large base of potential carpoolers or perhaps in destination-based carpool programs where the number of carpool markets is limited.

Surprisingly, the percentage of WBZ/ALA carpoolers citing inconvenience and increased travel time as deleterious features of carpooling was relatively low, (less than 20% in each case). The low priority given these items may reflect the fact that they are insignificant disadvantages of carpooling when compared to potential reductions in driving relief or cost savings (one-half or more) that carpooling may afford them. Data in the WBZ/ALA Survey indicate, for instance, only a minimal increase in travel time when carpoolers are a passenger (9%) or are driving other members of a carpool (14%). On the average

then, a 44-minute trip would only be increased a minimum of 4 minutes and a maximum of 6 minutes.

It is often claimed that carpooling entails a certain responsibility to other carpool members which is mainfested in worries about being punctual and rigidly adhering to the prescribed schedule and driving arrangement. In general, responsiblity to other carpool members did not seem to pose a siqnificant worry for most WBZ/ALA carpoolers, as only 18% cited it as a negative feature. Upon closer examination, there appears to be only random variation when looking at response rates by income, sex, or age. However, this feature is cited by former users of public transit more often than by those formerly traveling by other modes.

Finally, survey results indicate that the concern for privacy is an insignificant drawback of carpooling. Given the fact that one-third of all WBZ/ALA carpoolers listed companionship as one of the best features of carpooling, it is not surprising to find that only 8% listed privacy concerns as a deleterious feature of carpooling. It was found that privacy is of more concern among higher income commuters, females, and former lone auto drivers. Althouqh minimal, the problem is in all likelihood a function of the psychological and social problems associated with adjustment to other passengers (after years of riding alone perhaps) and the desire to avoid company, personality problems, etc. This may be especially compounded in an areawide carpooling

program where few if any of those matched by computer know each other beforehand or work at the same place of employment.

7.2.4 OVERALL SATISFACTION WITH CARPOOLING

The level of satisfaction generated by commuting by carpools is presumably related to the individual's perceived benefits and disbenefits associated with carpooling. Although their current membership in a carpool may signify a certain level of commitment and thus satisfaction, WBZ/ALA carpoolers were asked specifically "How satisfied are you with your present carpool?"

Results indicate that 62% were very satisfied, 36% were moderately satisfied, and only 2% reported dissatisfaction. Although satisfaction was lower among carpoolers who had been in a carpool from one to two years, satisfaction was greatest among those carpooling for two years or longer. The data may indicate that negative features of carpooling reach their greatest magnitude during the first and second years, causing some carpooler attrition or carpool dissolution. However, the level of satisfaction among carpoolers who have "survived" the initial two years may signify a long term contentment and commitment to carpooling.

7.3 SUMMARY

With respect to carpool characteristics, the WBZ/ALA carpoolers and the Eastern Massachusetts carpoolers are fairly similar in terms of prior mode (predominantly solo drive auto). In addition, they are similar with respect to motivations for carpooling, with cost savings and the energy crisis constituting the first and second most important reasons. However, the Eastern Massachusetts carpools are generally smaller, of longer duration, and are characterized by smaller incremental travel times and a larger percentage of shared driving arrangements.

The experiences of WBZ/ALA carpoolers seem to be indicative of an overwhelming satisfaction with carpooling. Their satisfaction with carpooling appears to be related primarily to reported cost savings, driving relief, and the desire to help alleviate problems of congestion, air pollution, and fuel shortage. The high ranking of the latter feature seems to be indicative of a high degree of public interest among those carpoolers (and probably among participants in general), perhaps emerging out of energy crisis events.

Among WBZ/ALA carpoolers there do not seem to be significant problems associated with carpooling. Indeed, such factors as increased travel time, drivers habits, inconvenience, privacy, etc. were infrequently mentioned as negative features and thus seem to be relatively unimportant

factors compared to cost savings and other such benefits. The most troublesome barriers seem to be the individual's psychological dependence on traveling alone and the more mechanical problems of scheduling.

The Eastern Massachusetts Survey did not contain questions regarding carpoolers' satisfaction with carpooling. Thus there is no means of judging how representative the attitudes of WBZ/ALA carpoolers are relative to those of areawide carpoolers. However, the next chapter, which deals with noncarpooler behavior and attitudes, does provide some measures of comparison between the WBZ/ALA sample and the general areawide sample.

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[1] NORC Survey data (reported in Kendall, op. cit., pp. 24-45) and Voorhees, Commuter Vehicle Occupancy on the Hollywood Freeway, op. cit.

[2] See Appendix C, Questions 15, 17, and 19, and Appendix D, Questions 5, 6, 9, and 10 for the tabulation of responses to the questions on which this exhibit is based.

[3] It should be noted that the question on pre-program travel mode was asked of all respondents to the WBZ/ALA Survey (see Table 8 in Chapter 5). The breakdown in Table 16 shows prior mode of carpoolers only. The 28% of carpoolers who were formerly in carpools is consistent with the 9% of WBZ/ALA Survey respondents in that category, given a 4:1 ratio between all respondents (N=4,293) and carpooler respondents (n=1,084). The "drove alone" and "transit" percentages for carpoolers are lower than those percentages for all respondents to reflect the nearly 4:1 difference in the "number of carpool" percentage.

[4] It should be noted that Eastern Massachusetts carpools formed during and after the energy crisis tended to be smaller than those formed before the crisis.

[5] For example, the report by Kendall, op. cit.

[6] See Appendix C, Question 20 and Appendix D, Question 11 for the tabulation of responses to the three parts of this question.

[7] See Appendix C, Question 21 and Appendix D, Question 7 for the tabulation of responses to the questions on which this table is based.

[8] It should be noted that the WBZ/ALA response category did not distinguish the fuel shortage from other sources of environmental concern such as congestion and pollution.

[9] Past literature has suggested that such groups are more apt to support or participate in programs which emphasize societal rather than individual benefits. The exogenous factors surrounding the Commuter Computer Program served to increase the relative importance of societal concerns as a motivating factor.

[10] Questions 21 and 22 of the WBZ/ALA Follow-Up Survey constitute the source for the data in Tables 19 and 21. It should be noted that the two questions appear together on the questionnaire and have similar response categories. Methodologically, this may have induced an undetermined amount of bias on the part of respondents to answer the two questions alike. Secondly, it should be noted that question 21 refers to an earlier time period than question 22, and thus is susceptible to recall errors.

[11] Voorhees, op. cit., p. 67.

CHAPTER 8

EXPERIENCES AND ATTITUDES OF NONCARPOOLERS

This chapter examines noncarpooler respondents from the two surveys with the objective of learning about (1) their experience in attempting to form carpools (WBZ/ALA noncarpoolers only), (2) their prior experience with carpooling, and (3) their interest in carpooling. In the case of the WBZ/ALA Survey, there are 3,197 noncarpoolers (comprising 75% of all respondents), and they are distributed into the following three categories:

(1)	those who were carpooling before the program but stopped during the program period	58
(2)	those who formed or joined a carpool and stopped carpooling during the program period	61
(3)	those who did not form or join a carpool during the program period	3,078
		3,197

In the case of the Eastern Massachusetts Survey, there are 2,336 noncarpoolers comprising 82% of all respondents.

Although this chapter will draw some comparisons between the two sets of respondents, an important distinction between them should be kept in mind. The WBZ/ALA noncarpoolers can be considered to represent potential carpoolers, since they voluntarily sent matching

request applications into WBZ/ALA, presumably in the hope of ultimately forming/joining a carpool. On the other hand, such an assumption is not valid for the Eastern Massachusetts noncarpoolers, who portray areawide commuting behavior. As will be seen later in this chapter, only a small proportion of these noncarpoolers indicate an interest in carpooling, even in the face of special carpool incentives.

8.1 EXPERIENCES OF WBZ/ALA NONCARPOOLERS

The WBZ/ALA Follow-up Survey contained four questions to be answered exclusively by noncarpoolers. The first of these was esentially a filter question: noncarpoolers were asked to select the description which best applied to their experience. Responses are shown in Table 23.

TABLE 23. EXPERIENCES OF WBZ/ALA NONCARPOOLERS

Description of Experience	Percent of WBZ/ALA Noncarpoolers (n=3,171)
Unable to make satisfactory arrangements	92% (n=2,934)
Joined a carpool as a result of the program that has since disbanded	2 (n=61)
Changed my mind about wanting to carpool	2
Never intended to form a carpool	1
Still in process of organizing carpool	1
Other (e.g., no longer commuting)	2
Total	100%

The filter question served to identify two groups of particular interest: (1) noncarpoolers who had been unable to make satisfactory arrangements (92%), and (2) noncarpoolers who had joined a carpool that had since disbanded (2%). The next two questions in the WBZ/ALA Follow-Up Survey probed these groups, respectively, to obtain more detail regarding their experiences. The last question asked noncarpoolers about their continued interest in carpooling.

The 2,934 noncarpoolers who had been unable to make satisfactory arrangements were asked to elaborate on the reasons (multiple responses permitted). As can be seen in Table 24, the difficulty in making arrangements was

primarily related the the quantity of matches and secondarily related to the quality of matches or individual factors.

TABLE 24. REASONS FOR WBZ/ALA NONCARPOOLERS' INABILITY TO MAKE SATISFACTORY ARRANGEMENTS

Reason	Percent of WBZ/ALA Noncarpoolers Citing Reason (n=2,934)
Quantity of the Matches	
I received no name or not enough names	89%
Quality of the Matches	
Persons on the list had different work hours	7
Persons on the list lived too far	5
Persons on the list worked too far	3
Individual Factors	
I moved	5
I changed jobs	5
Other	3

The high number of noncarpoolers who did not receive any or enough names reflects the low program matching rate (no names) and the insufficient number of prospective candidates on the listings of those who were matched (not enough names). The act of being matched did not guarantee carpool formation: it was possible that matched participants would find themselves incompatible from the

standpoint of matching variables (origin, destination or arrival time)[1] or other variables which did not enter into the matching process (departure time, drive/ride preference, male/female preference, personality characteristics). Given these potential problems, a large number of prospective choices would have been desirable to maximize the chance of carpool formation. However, the dispersion of program participants by origin and destination (see discussion in Chapter VI) is probably indicative of a very low level of multiple matches (i.e., listings with more than one name).

The 15% of noncarpoolers in the next three categories of Table 24 may overlap to some extent with persons in the "not enough names" category, since multiple responses were permitted for this question. In general, the comments above related to the quality of the matching process apply. The somewhat higher response frequency for the "different work hours" category may reflect the fact that departure time was not used as a matching variable. The different level of peaking in participants' arrival and departure time distributions (see Figure 13 above) suggest some variations in workday length among participants, which in turn would cause this particular compatibility problem to emerge.

The hindering effect of factors such as moving and changing jobs on carpool formation points clearly to the need for an updating mechanism, which the Commuter Computer Program essentially lacked. It should be noted that the

survey responses probably understate the significance of residential moves; about 200 WBZ/ALA Follow-Up Survey questionnaires were returned unopened to TSC because people had left no forwarding address.

Comments by WBZ/ALA noncarpooler respondents elaborated on some of the above reasons and added additional insight into their overall experiences. Some noncarpoolers indicated that they had received no correspondence from WBZ/ALA. Other participants indicated that they had changed their minds about wanting to carpool due to the long waiting period. Additional factors mentioned were errors in the matching process -- e.g., being matched with persons living 20 miles away in the wrong direction, being matched with themselves,[2] not being matched with other persons who were already in their carpool,[3] and compatibility problems -- e.g., unwillingness to be flexible about travel times, unwillingness of men to carpool with women, or vice versa.

Overall, noncarpoolers' experiences reveal that a second, and perhaps more important, matching process took place after the computer process. Clearly commuter preferences over and above the matching on geographic and time criteria entered into the final negotiation period. In addition, it is clear that the lack of continued communication between WBZ/ALA and program participants decreased the potential rate of carpool formation.

The examination of noncarpoolers' experiences reinforces the basis for the recommendations in Chapter 6 relative to the matching process and program outreach. Additional recommendations, developed out of insight gained from participants' comments and survey responses, are presented below:

- There is a need for an updating system which will accommodate changes in a participants' carpooling needs and matching data.
- There is a need for a post-matching mechanism to facilitate carpool formation among matched participants. Specific areas of assistance might be providing an informal atmosphere for people to "negotiate" carpool arrangements and helping people work out special scheduling or other operational problems. Local community organizations or employers would be likely groups to perform this function.

8.2 NONCARPOOLERS' REASONS FOR STOPPING CARPOOLING

Of the 3,197 WBZ/ALA noncarpoolers, 61 (2%) had successfully formed a carpool, as a result of the program, that disbanded during the program period. Although this group is small in absolute numbers, the experiences of these persons do provide some insight into factors affecting carpool longevity. The Eastern Massachusetts Survey provides a larger base of noncarpoolers with which to examine reasons for stopping carpooling, as 29% of this survey's 2,336 noncarpoolers carpooled at some time in the past.[4]

For the 61 WBZ/ALA noncarpoolers who had started and stopped carpooling during the program period, the average carpool duration was 13 weeks, with two-thirds of the carpools lasting less than three months. In order to determine whether their decision to forego carpooling was due to difficulties with carpool operation, normal turnover, or perhaps the waning of the energy crisis, these noncarpoolers were asked: "If you joined a carpool that has since disbanded, why did it disband?" (multiple responses permitted). Table 25 shows the distribution of responses.

As can be seen, the major reason for carpools disbanding was job changes, residential shifts, and other factors related to normal attrition. With respect to operational problems of carpooling, the most frequently cited factor was schedule adherence difficulties, followed by the psychological problem of reduced freedom. It is interesting to note that the order of these two factors is the reverse of their order in Table 22, which shows the features of carpooling least liked by carpoolers. Overall, the small number of carpools that did disband is indicative of the relative stability of carpools that formed through the program.

For Eastern Massachusetts Survey noncarpoolers, the ranking of reasons for carpool dissolution is fairly similar to that of the 61 WBZ/ALA noncarpoolers (see Table 25). However, the factors related to normal attrition are far

more prevalent as reasons for disbanding, and scheduling difficulties figure less importantly as reasons. It is of significant interest to note the low percentage of noncarpoolers indicating that they stopped carpooling because of greater gasoline availability.

TABLE 25. REASONS FOR CARPOOL DISSOLUTION

Reason	Percent of WBZ/ALA Noncarpoolers Citing Reason (n=61)	Percent of Eastern Mass. Noncarpoolers Citing Reason (n=641)
Members experienced difficulties adhering to schedule	33%	18
Members disliked lack of freedom	18	4
Too inconvenient (e.g., members lived too far apart)	10	7
Members did not get along with each other	5	3
Members disliked reduced privacy	3	1
Moved, changed jobs, etc.	57	73
Gasoline became more readily available	10	1
Other		10

8.3 NONCARPOOLERS' INTEREST IN CARPOOLING

Both the WBZ/ALA Survey and the Eastern Massachusetts Survey questioned noncarpoolers about their interest in carpooling. In the case of the WBZ/ALA noncarpoolers, there was a hypothesis that the failure of personal and program efforts in forming a carpool, the waning of the energy crisis, and the reduced level of media publicity regarding carpooling would have combined to create a rather low level of continued interest in carpooling. In the case of the Eastern Massachusetts noncarpoolers, information on the extent of interest in carpooling could be used to predict the potential level of carpooling in the area as well as provide additional insight into people's attitudes toward carpooling and their receptivity toward various carpooling incentives.

8.3.1 CONTINUED INTEREST IN CARPOOLING AMONG WBZ/ALA NONCARPOOLERS

Overall, the 3,197 WBZ/ALA noncarpoolers show a high level of continued interest in carpooling, with 73% responding affirmatively to the question, "Are you still interested in forming a carpool?" An examination of noncarpoolers' continued interest as a function of various demographic and travel characteristics reveals fairly noteworthy relationships with travel mode, income, and previous interest in carpooling.

Understandably, noncarpoolers who relied more on the auto exhibited a greater degree of continued interest in carpooling than respondents using other modes. For those traveling in single passenger autos, 76% were still interested in forming a carpool vs. 73% of those using car/transit and only 60% of those relying on transit alone. The continued commitment among lone auto drivers is especially significant in light of the fact that the disincentives associated with the energy crisis had subsided by the time of the survey, and this was the group least interested in carpooling before the program and the energy crisis events.

Consistent with the high proportion of lone auto drivers still interested in carpooling, sustained interest was found to be higher among high income commuters. The continued interest in carpooling among higher income groups is noteworthy from two standpoints: (1) higher income commuters were more auto dependent, and (2) higher income commuters were least interested in carpooling before the WBZ/ALA Program. Thus the relatively high level of continued interest in this group lends credence to the idea that their interest was not short-term but instead represented a more permanent attitude change toward carpooling.

Presumably, the experience of having been in a carpool or the desire to join a carpool prior to the program would

be predictive of a greater desire to carpool despite failure to do so thus far. This expectation was only partly borne out by the data. Although prior interest in carpooling was found to be positively related to continued interest, noncarpoolers with previous carpool experience were only slightly more interested in carpooling than their counterparts with no carpool experience. Overall, however, it is clear that commitment to carpooling remained strong irrespective of either previous experience or interest in carpooling.

For those 27% of WBZ/ALA noncarpoolers no longer interested in carpooling, a prime factor cited was the lack of communication regarding the status of their application. Additional reasons were changes in participants' personal situation (e.g., retirement, loss of job) which eliminated the need for carpooling.

8.3.2 INTEREST IN CARPOOLING AMONG EASTERN MASSACHUSETTS NONCARPOOLERS

In terms of interest in carpooling, the 2,336 Eastern Massachusetts noncarpoolers present a very different perspective on carpooling potential from the WBZ/ALA noncarpoolers. Only 25% of the former group indicated that they would be very or somewhat interested, as opposed to 73% of WBZ/ALA noncarpoolers indicating continued interest in carpooling.

In general, the level of interest in carpooling among Eastern Massachusetts noncarpoolers was found to vary with both demographic and travel-related characteristics. As can be seen from Table 26, there is a tendency for the percentage of noncarpoolers very or somewhat interested in carpooling to be highest among females, persons under 35 years of age, and clerical and professional workers, and to be negatively related to income and auto ownership.[5] Table 27 shows slight relationships with regard to trip origin and trip destination, but much stronger relationships with regard to trip flow patterns, trip time, and trip length. Persons who are traveling radially outward from Boston and persons who are making longer intra-suburban trips (i.e., outer-to-inner suburban trips or inner-to-outer suburban trips) are more likely to be interested in carpooling. The lack of transit facilities for such trips may be a partial explanation for these findings. In addition, persons with longer trip times and trip lengths are more likely to be interested in carpooling.[6] Persons who have had prior carpooling experience are more likely to be interested in carpooling (31%) than are persons with no prior carpooling experience (21%). It is interesting to note that the apparent relationship between carpooling interest and these demographic and travel characteristics is similar to the traditionally cited relationships between actual carpooling behavior and commuter characteristics. This is in marked

TABLE 26. PERCENT OF EASTERN MASSACHUSETTS NONCARPOOLERS INTERESTED IN CARPOOLING BY DEMOGRAPHIC CHARACTERISTICS

		% of Noncarpoolers Interested in Carpooling*	x^2 Test
SEX:	Male	24	Not significant at .05 level
	Female	28	
AGE:	25 or under	29	Significant at .05 level
	26-35	30	
	36-45	23	
	46-55	23	
	56-65	18	
	66 or over	16	
INCOME:	<$5,000	32	Not significant at .05 level
	$5-10,000	27	
	$10-15,000	28	
	$15-25,000	26	
	>$25,000	15	
EDUCATION:	Attended grade school	23**	Not significant at .05 level
	Finished grade school	19	
	Finished high school	24	
	Attended college	26	
	Finished college	25	
OCCUPATION:	Professional	27	Not significant at .05 level
	Managerial	23	
	Sales	16	
	Clerical	30	
	Craftsmen	25	
	Operatives	25	
	Laborers	23	
	Service Workers	20	

*Denotes percent of noncarpooler respondents in each category interested in carpooling.

**Denotes cell with fewer than 15 respondents.

TABLE 27. PERCENT OF EASTERN MASSACHUSETTS NONCARPOOLERS INTERESTED IN CARPOOLING BY TRAVEL-RELATED CHARACTERISTICS

		% of Noncarpoolers Interested in Carpooling*	x^2 Test
NO. OF AUTOS:	0	10**	Not significant at .05 level
	1	26	
	2	24	
	3 or more	21	
ORIGIN:	Boston	24	Not significant at .05 level
	0-5 mi.	20	
	5-10 mi.	21	
	10-20 mi.	26	
	Over 20 mi.	27	
DESTINATION:	Boston	20	Not significant at .05 level
	0-10 mi.	24	
	Over 10 mi.	21	
TRIP FLOW:	Outer suburbs to Boston	20	Significant at .001 level
	Inner suburbs to Boston	20	
	Outer suburbs to inner suburbs	34	
	Within inner suburbs	23	
	Within outer suburbs	20	
	Inner suburbs to outer suburbs	35	
	Boston to outside Boston	36	
	Within Boston	19	
TRIP TIME:	0-9 min.	8	Significant at .001 level
	10-19 min.	18	
	20-29 min.	29	
	30-39 min.	29	
	40-59 min.	34	
	60 or more min.	28	
TRIP LENGTH:	0-4 mi.	11	Significant at .001 level
	5-9 mi.	25	
	10-14 mi.	26	
	15-19 mi.	30	
	20-29 mi.	36	
	30-39 mi.	40	
	40 or more mi.	35	

*Denotes percent of noncarpooler respondents in each category interested in carpooling.

**Denotes cell with fewer than 15 respondents.

contrast to the findings for Eastern Massachusetts carpoolers, whose characteristics for the most part differ from those of the traditional carpooler (see discussion above in Chapter 4).

Eastern Massachusetts noncarpoolers were asked to indicate reasons for their interest or lack of interest in carpooling. Responses are given in Tables 28 and 29. For the 564 noncarpoolers interested in carpooling, it can be seen that cost savings is the first-ranking reason for interest in carpooling, being cited five times as frequently as any other reason. In general, this group's ranking of reasons for interest in carpooling resembles Eastern Massachusetts carpoolers' ranking of reasons for wanting to carpool (see Chapter 7), except for the relatively lesser importance of the energy crisis as a motivation among potential carpoolers.

Among those noncarpoolers not very or not at all interested in carpooling (1,741 persons, or 75% of all noncarpoolers), the major reasons cited for lack of interest were unusual working hours, need for a car becuase of type of work, reduced mobility, and short commuting distance. An analysis of reasons for wanting to carpool by occupational category reveals that unusual working hours was cited most often by professional workers and blue collar workers, and less frequently by clerical and sales workers, who generally have more regular work schedules. Moreover, need for a car

TABLE 28. EASTERN MASSACHUSETTS NONCARPOOLERS' REASONS FOR INTEREST IN CARPOOLING

Reason	Percent of Interested Noncarpoolers Citing Reason (n=564)
Cost savings	46
Driving relief	9
Companionship	8
Environmental concern	7
Energy crisis	7
Increased availability of car to other family members	5
Dissatisfaction with transit	4
Convenient	3

TABLE 29. EASTERN MASSACHUSETTS NONCARPOOLERS' REASONS FOR LACK OF INTEREST IN CARPOOLING

Reason	Percent of Non-Interested Noncarpoolers Citing Reason (n=1,741)
Unusual or irregular working hours	54
Car needed because of type of work	25
Reduced mobility and independence	15
Distance to work is short	13
Others do not travel in same direction	9
Other reason	9
Car needed during the day	4
Increased travel time	2
Reduced privacy	2
Other people's driving habits	1
Use mass transit	1

because of type of work is also related to occupation, being cited most often by managerial workers, sales workers, and laborers. It is interesting to note that three out of the four top-ranking reasons for lack of interest are what might be considered legitimate obstacles to carpooling, and that negative attitudes toward carpooling (e.g., perceived disadvantages related to travel time, convenience, and travel amenities) are relatively unimportant factors.

Following the questions relating to interest, Eastern Massachusetts noncarpooler respondents were presented with a list of eight incentives and were asked to indicate whether they would be likely or not likely to carpool in response to each incentive. The incentives were all phrased as positive incentives for carpoolers rather than as penalties, or disincentives, for solo drivers.[7] They fall into four basic categories:

(1) Economic incentives -- monetary payment or monetary savings for carpoolers

(2) Parking incentives -- provision of parking at carpool staging areas or preferential or reserved parking at the workplace, resulting in convenience, travel time, and/or economic benefits

(3) Matching assistance -- formal carpool matching services to facilitate carpool formation

(4) Highway incentives -- provision of special carpool lanes or entrance ramps, resulting in travel times savings.

Table 30 shows the percentage of noncarpoolers responding favorably to each incentive, with noncarpoolers divided into those interested and those not interested in carpooling. It can be seen that for each incentive listed, the percentage of noncarpoolers responding "likely to carpool" is higher among interested than noninterested noncarpoolers. Moreover, the range in percentage response to the various incentives is not large (especially in the case of noninterested noncarpoolers), owing to the fact that most respondents tended to answer in a blanket fashion, i.e., all "likely," "not likely," or blanks.

For both groups, the gas tax refund/income tax refund for carpoolers has the highest percent responding favorably (70% of intrested noncarpoolers, 32% of noninterested noncarpoolers). In general, the remaining two economic incentives, involving parking fees and tolls, rank higher among interested noncarpoolers than among noninterested noncarpoolers. Carpool matching service is a relatively high-ranking incentive among both groups of Eastern Massachusetts noncarpoolers. This is somewhat surprising in view of the generally high level of awarencess of the WBZ/ALA Commuter Computer Program, and may indicate perceived shortcomings in the service provided by the WBZ/ALA Program and/or a desire for more employer-based programs.

TABLE 30. EASTERN MASSACHUSETTS NONCARPOOLERS' REACTION TO SELECTED CARPOOL INCENTIVES

Incentive	Percent Indicating They Would Be Likely to Carpool in Response to Incentive	
	Noncarpoolers Interested in Carpooling (n=564)	Noncarpoolers Not Interested in Carpooling (n=1,741)
Economic		
Gas tax refund or income tax refund for carpoolers	70	32
Free or lower parking fees for carpoolers	50	23
Lower tolls for carpoolers during rush hours	36	17
Parking		
Low-cost or free parking near highway where one could meet other carpoolers	52	19
Preferential or reserved parking at destination	50	22
Matching Assistance		
Carpool matching service provided by employers or public agencies	66	19
Highway		
Reserved highway lane for carpools	37	15
Special lanes at highway entrance ramps that allow carpools to enter faster	33	15

For both groups of noncarpoolers, the two parking incentives, plus the one parking-relative economic incentive (lower parking fees) are closely grouped in terms of percent responding favorably, and tend to be in the middle ranking. The two highway incentives, plus the one highway-related economic incentive (lower tolls), are likewise grouped together with respect to percentage response and are the lowest ranking of the eight incentives.

The above survey findings relative to incentives provide some indication of the amenability of Eastern Massachusetts noncarpoolers to carpooling under selected conditions. However, they are by no means representative of the feasiblity of the incentives in other locales, nor are they the result of a rigorous or comprehensive empirical analysis of the comparative effectiveness of various incentives. Forthcoming research sponsered by the Federal Energy Administration should furnish considerably more insight on the subject of incentives. The FEA-sponsored study will generate estimates of modal split, vehicle miles of travel, and related impacts for the following carpooling incentive policies: (1) four varieties of parking surcharge policy; (2) two levels of per gallon gasoline sales surcharges; (3) a rationing of gasoline supply to 75 percent of current levels; (4) an annual rebate to members of qualifying carpools; (5) two types of carpool matching programs; (6) two programs for improving transportation for

employees during midday; and (7) operation of suburban carpool park-and-ride lots.[8]

Data from the Eastern Massachusetts Survey on noncarpoolers' interest in carpooling and their reaction to selected incentives can be used to estimate the potential level of carpooling among Eastern Massachusetts commuters, who constitute the survey universe. If it is assumed that a set of incentives including the first-ranked, gas tax/income tax refund, were implemented such that each noncarpooler indicating "likely to carpool" did in fact form or join a carpool, then the maximum potential level of carpooling in the Eastern Massachusetts Region can be estimated as follows:

Estimated maximum potential level of carpooling =		
Persons carpooling at time of survey	520	(18%)
Interested noncarpoolers responding favorably to incentives (.70 X 564)	395	
Noninterested noncarpoolers responding favorably to incentives (.32 X 1,741)	557	
	1,472	(52%)

It should be emphasized that 52% represents a maximum projected level, based on some arbitarary assumptions regarding (1) the feasibility of implementing the set of incentives, and (2) the likelihood that noncarpoolers responding favorably to the hypothetical situation posed in the survey will in fact be willing or able to carpool once

the incentives are implemented.[9] It should also be noted that statistics on actual (18%) or maximum potential level of carpooling (52%) may not be fully representative of the Eastern Massachusetts Region because of possible sampling bias (use of auto registrants) and non-response bias discussed in Chapter 4. Still another point to note is the fact that the two most prevalent reasons given by disinterested noncarpoolers were unusual working hours and need for a car because of type of work. Clearly, some institutional changes over and above the eight listed incentives (e.g., provision of company car for employee use during the day) would be required in order to overcome these obstacles to carpooling. Given these qualifications, a more conservative estimate of carpooling potential in the Boston area may be half of the projected maximum, or 26% of all commuters. Interestingly, this latter estimate is consistent with the percentage of WBZ/ALA Survey respondents in carpools (25%) and the percentage of NORC Survey respondents in carpools in 1974 (27%).

An overall note of caution is warranted with respect to the applicability of the preceding estimates of carpooling potential for the Boston area or their generalizability to other locales. The methodology used to derive these estimates can be characterized as a crude approach designed to utilize data available from the Eastern Massachusetts Survey. An analysis aimed specifically at determining the

potential level of carpooling either locally or nationally would no doubt involve a more refined methodological approach and fewer unvalidated assumptions.

8.4 SUMMARY AND RECOMMENDATIONS

The WBZ/ALA Follow-Up Survey Provided information on the experiences and attitudes of 3,197 noncarpoolers -- i.e., persons who had participated in the Commuter Computer Program but had been unable to form carpools. The Eastern Massachusetts Survey provided similar type of information on 2,336 noncarpoolers who, unlike the WBZ/ALA noncarpoolers, did not voluntarily request carpool matching and cannot be presumed to have ever been interested in carpooling.

The inability of WBZ/ALA noncarpoolers to translate their interest in carpooling into actual carpool formation was due to both program and individual factors. Specifically, the Commuter Computer Program did not produce matches in sufficient quantity or quality to effect carpool formation by a significant number of participants. Matching goes beyond commonality of origin, destination, and work schedules; evidence indicates that there is a second matching process among participants which takes places once "suitable" carpool partners are located. In particular, compromises must be worked out regarding drive/ride, male/female, work hour flexibility and other such preferences. The program's matching process resulted in too

few matches per person to allow sufficient latitude for subsequent screening based on more personal factors. Compounding these program-related factors was the rather large number of participants who moved, changed jobs, or experienced other changes which either invalidated their matches or removed them from the carpool candidate group. The program lacked an updating mechanism to accommodate these individual factors.

An investigation into noncarpoolers' reasons for stopping carpooling revealed that for both WBZ/ALA and Eastern Massachusetts noncarpoolers, the major cause of disbanding was normal attrition factors such as residential and job changes, rather than operational problems or increased gasoline availability.

Overall, WBZ/ALA noncarpoolers were found to be a hopeful group still interested in carpooling despite their failure to do so thus far. Seventy-three percent of those currently not carpooling were still interested in forming a carpool. An analysis of noncarpoolers' continued interest by certain variables suggests an attitude change toward carpooling over the duration of the program, especially among higher-income, auto-oriented commuters who constitute the traditional "resisters" to carpooling.

On the other hand, the extent of interest in carpooling was far less among Eastern Massachusetts noncarpoolers than among WBZ/ALA noncarpoolers. Only one-quarter of the former

group expressed interest in carpooling, with greater interest on the part of persons with traditional carpooler characteristics -- e.g., female, younger, lower income, with longer trip times/distances. In general, the reasons given for lack of interest in carpooling related to the impracticality or inconvenience of carpooling. On the basis of their reactions to possible economic, parking, highway, and matching assistance incentives, Eastern Massachusetts noncarpoolers appeared to be somewhat less resistant to carpooling than indicated by the 25% interested, 75% not interested statistics. The gas tax refund/income tax refund elicited the highest percent favorable response, with 70% of interested noncarpoolers and 43% of noninterested noncarpoolers indicating that they would be likely to carpool if that particular incentive were implemented.

Based on the above data for Eastern Massachusetts noncarpoolers on interest and incentives, rough projections were made as to the potential level of carpooling in the area. The maximum potential level was estimated to be 52% of all Eastern Massachusetts commuters, and a more conservative level was estimated to be 26%. Though the estimated range of carpooling potential indicates considerable margin for increase over the actual level in the area (18%) obtained from the Eastern Massachusetts Survey, its applicability for local planning purposes and its generalizability to other locales are limited by the

coarseness of the methodology and the various assumptions used.

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[1] The incompatibility with respect to matching variables might stem from errors by the participant (e.g., incorrect origin zipcode in the matching request application sent to WBZ/ALA), errors in the processing of applicant requests (e.g., keypunch error in origin zip code), or from individual standards regarding maximum tolerable route deviation.

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[2] This was caused by the fact that several participants submitted more than one matching request application in order to maximize chances of winning the free car contest or of being successfully matched.

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[3] Due to the use of zip codes for origin geo-coding, it was entirely possible that two commuters, living and working close to one another, would not be matched if they lived in different towns.

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[4] Thirty-two percent of WBZ/ALA noncarpoolers indicated that they had been in carpools at some time in the past. However, information on resons for stopping was requested only of those noncarpoolers who had started and stopped carpooling during the program period.

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[5] Although these tendencies are apparent in the percentages, they are not strong enough (with the exception of age) to produce chi-squares significant at the .05 level.

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[6] Trip flow, trip time and trip length show differences that produce chi-squares significant at the .001 level; trip origin and trip destination do not have significant chi-square statistics at the .05 level.

[7] It should be noted, however, that many positive incentives for carpoolers may tacitly imply disincentives for solo drivers. For example, preferential parking for carpoolers could mean more inconvenient parking arrangements for noncarpoolers. Interestingly, comments by some respondents indicated that they perceived the negative aspects of these incentives.

[8] Source: Fact sheet on "FEA Research on Carpool Incentives" distributed at the 1975 National Conference on Areawide Carpooling, Houston, December 8-10, 1975.

[9] There is also the opposite possibility to consider: that persons responding negatively to the incentives posed in the survey would actually carpool if the incentives were implemented.

CHAPTER 9

CONCLUSIONS AND BROADER IMPLICATIONS

9.1 CASE STUDY CONCLUSIONS

This report has presented a case study evaluation of the WBZ/ALA Commuter Computer Program, an areawide carpooling program in operation in the Boston area between August, 1973 and August, 1974. The program was examined from a sequential perspective -- starting with program participation, proceeding to the computer matching and carpool formation process, and ending with the experiences of carpoolers and noncarpoolers. The evaluation involved two surveys, the WBZ/ALA Follow-Up Survey of program participants and the Eastern Massachusetts Survey of areawide commuters, as well as an assessment of the program's operational components.

The major conclusions of this evaluation are as follows:

- The level of public participation in the program was low -- only 13,500 out of approximately 1.5 million workers in the area -- owing to program-related factors, attitudinal factors, and competition from other carpool formation mechanisms.
- Program participants exhibited typical travel-related characteristics but atypical demographic characteristics relative to expected carpooler traits.

- The national energy crisis, by expanding the ranks of participants to include persons traditionally resistant to carpooling, caused the participation level to be higher than it would have been under normal circumstances.

- The program's matching rate was low -- 25% -- on account of the low level of participation and the large area coverage.

- Though WBZ/ALA Survey results indicated 25% of participants carpooling, less than one-quarter of these carpoolers attributed carpool formation to the program's matching process. The program's limited effect on carpool formation among participants was due to the low matching rate and shortcomings in the matching and post-matching process.

- The program had a negligible impact on carpool formation or interest in carpooling among Boston area commuters.

- Program participants indicated a greater predisposition and more favorable attitude toward carpooling than the auto commuter population at large. This reflects the fact that program participants constituted a unique group of potential commuters -- that is, commuters with a latent or easily aroused interest in carpooling.

Although the program itself achieved disappointing results in terms of public participation, matching of participants, and carpool formation, the overall prognosis for carpooling as a mode of travel appears favorable based on the following findings: (1) WBZ/ALA carpoolers are for the most part satisfied with carpooling; (2) WBZ/ALA noncarpoolers are generally still interested in carpooling; (3) Eastern Massachusetts noncarpoolers, though indicating a lower level of interest in carpooling than WBZ/ALA noncarpoolers, show potential receptivity toward various

carpooling incentives; (4) interest in carpooling appears to have continued beyond the peak of the energy crisis; and (5) among WBZ/ALA and Eastern Massachusetts noncarpoolers who formerly carpooled, the major reasons cited for carpool dissolution are normal attrition factors rather than problems with carpooling.

Whatever the ultimate conclusions regarding the effectiveness of the Commuter Computer Program, it must be remembered that this program was the first of its type in the country. The sponsors of the program, WBZ-Radio and TV and the ALA Auto and Travel Club, deserve recognition for their foresight in anticipating that "transportation" would become a major issue (as it did once the energy crisis surfaced), and for their innovativeness in planning, implementing, and operating a program of this scope without existing models to emulate. Furthermore, the sponsors should be given commendation for the assistance they provided to other cities which, in the crunch of the energy crisis, decided to establish areawide carpooling programs based on the Boston area program. In adapting the WBZ/ALA program to their specific local needs and resources, these other cities had only the operating model in Boston to work from and lacked the benefit of well digested experience. Hopefully, the specific analyses and recommendations in this case study evaluation will enhance the utility and applicability of the WBZ/ALA Program as a model for their programs.

9.2 CASE STUDY FINDINGS VIEWED IN A BROADER PERSPECTIVE

Throughout this report, the Commuter Computer Program has been examined and evaluated strictly in the context of its being one example of an areawide carpooling program. The analysis of program attributes such as the participation level and the matching rate leaned heavily on the regional scope of the program as an explanatory factor for the program's disappointing performance. Moreover, the recommendations presented at the end of certain chapters pertained to areawide carpooling programs, in that they consisted of suggestions on how the Commuter Computer Program or a program like it could be modified or structured to be more effective.

It would seem, however, that the insight gained from this case study has a further application beyond pointing to recommendations for areawide programs. In particular, the findings of the case study can form the basis for comparisons of areawide programs with other types of carpooling programs and for some tentative recommendations as to universally desirable features of carpool programs, regardless of their generic type.

As was briefly mentioned in Chapter 1, the past few years have seen a dramatic growth in the number of formal carpooling programs. A cursory review of these programs discloses a variety of sponsors, promotional schemes, and matching systems. Sponsors have included radio and

television stations, auto clubs, state and local governments, Chambers of Commerce, and employers of various sizes. Promotional efforts have ranged from broad-based mass media techniques such as radio, television, and newspaper advertising to more localized or personalized techniques such as company-sponsored pep talks and newsletters. Some programs have involved special incentives -- for example, preferential parking, monetary bonuses, and exclusive highway lanes for carpools. Matching systems have ranged from informal manual systems using grid maps to sophisticated computer systems.

With the increasing role of carpooling programs in areawide transportation plans and EPA Air Quality Control Plans, there is an increasing need to understand the appropriate role and structure of formal programs to encourage and facilitate carpool formation. On the basis of sporadic evaluation data available for existing programs as well as the more detailed evaluation findings for the Boston area program, some generalizations can be made regarding the relative effectiveness of areawide programs vs. other program types in terms of outreach (exposure), participation level (response), matching rate, and carpool formation. The other program types specifically mentioned in this section are employer-based and community-based programs. Combination programs involving either areawide promotion with employer matching or central matching of aggregated

employer data bases are excluded from the discussion for purposes of brevity and simplicity. However, it should be noted that combination programs, if they incorporate the best features of the two extremes, have the potential to be (and, in fact, have generally been) the most successful. The recently implemented MASSPOOL Program (see description in Appendix E) is an example of a combination program involving areawide promotion and employer matching.

There is no doubt that areawide programs have the potential to reach a far greater number of people than employer-based or community-based programs. First of all, areawide programs are more likely to involve mass media promotion techniques, via which large segments of the public can efficiently be informed of the program's existence and the benefits of carpooling. Second and perhaps more important, there is probably no feasible means of requiring all employers, communities, or other small units to institute carpooling programs of their own; thus, areawide programs provide the best assurance of "broad brush" coverage.

With respect to attracting program participants, however, areawide programs do not seem as effective as other program types. The WBZ/ALA Program exhibited the principal shortcoming of this type of program -- namely, the impersonality of the promotional effort and matching system. It was pointed out that the use of carpooling incentives and

reinforcement at a more individual level (features which the Boston area program lacked) could overcome this disadvantage. Nonetheless, it is questionable whether areawide programs, even with the appropriate mix of incentives and with adequate local endorsement, could ever have the drawing power of employer- or community-based programs which can exert special incentives and/or pressures to participate or can exude a grass roots appeal.

In terms of matching prospective carpoolers, the relative effectiveness of areawide vs. other types of programs is difficult to judge. Employer-based or community-based programs have an advantage because of the automatic geographic and/or temporal clustering of participants; on the other hand, areawide programs, although having to match participants on the basis of at least three criteria (origin, destination, arrival time), have the advantage of not being restricted to single firms or communities. As discussed in Chapter 6, areawide programs run the risk of achieving low matching rates if measures are not taken to scale the program outreach area (number of carpool markets) in accordance with carpool potential.

Considering the final criterion of program effectiveness -- carpool formation -- areawide programs appear to be inferior to other program types. Their major shortcoming in this respect, as in the case of attracting participants, is their impersonality. The WBZ/ALA case

study evaluation confirmed the importance of commuter compatibility as a factor influencing the formation as well as long-term stability of carpools. Moreover, the evaluation revealed the significant role of the post-matching "negotiation" process in carpool formation. It would seem that areawide programs, which essentially process total strangers through a central matching system, cannot possible compete with other types of programs where participants have some bond beside their desire to carpool. Not only can these other types of programs facilitate the post-matching process by holding "get acquainted" meetings, but also they can provide certain kinds of incentives which will "pull" participants through the all-important last step involved in forming a carpool.

It is beyond the scope of this study -- and perhaps beyond the present level of knowledge about carpooling programs -- to prescribe a single best type of carpool program, or to indicate which types of programs are most effective for particular types of urban areas. However, the evaluation of the WBZ/ALA Commuter Computer Program and the brief consideration of areawide vs. other types of carpool programs suggest the desirability of the following general carpool program characteristics, which can be incorporated into any type of program.

- The program should be consistent with local transportation policies, plans, and programs (ideally, the program should be planned and implemented in coordination with local transportation agencies).

- The program should provide specific incentives for carpooling and should emphasize any unique local conditions or exogenous factors which make carpooling beneficial.

- The sponsor should have sufficient resources and authority to provide a well-conceived and smoothly operating program.

- Promotional techniques should be used throughout the program period, and should serve the dual function of (1) informing potential participants about the existence and operating details of the program, and (2) stimulating interest in carpooling, especially among those commuters traditionally resistant to this mode of travel.

- If mass media promotional techniques are employed, they should be reinforced at the local, individual level.

- The matching system should be flexible to accommodate (1) changes in the level of participation; (2) changes in the distribution of participants with respect to origin, destination, and other matching variables; and (3) varying preferences with respect to route deviation and carpool mate characteristics.

- The matching system should be responsive to participant needs; in particular, it should provide adequate feedback to individual participants regarding their matching status, and it should contain an updating mechanism to accommodate changes in participants' matching characteristics and carpooling preferences.

Clearly, there is a need for more empirical research and analysis focusing on carpool programs. As a first step in this regard, sponsors of carpool programs should be encouraged to perform evaluations of their programs; at a

minimum, quantitative data are needed on the level of program-induced carpool function. As more empirical information is obtained and then synthesized relative to the operating experiences and effectiveness of various programs, a better understanding of appropriate carpool program structures will be achieved.

APPENDIX A

WBZ/ALA FOLLOW-UP SURVEY PROCEDURE

By April 1974, plans for a follow-up survey to the WBZ/ALA Commuter Computer Program had begun to take shape. It was decided that a follow-up survey questionnaire (Figure A-1) would be mailed to the participants in the program as of March 1974. Names and addresses of these 10,581 participants as well as the information contained in their original questionnaires submitted to WBZ/ALA requesting matching (Figure A-2) would be obtained from WBZ/ALA, with special procedures used to preserve the confidentiality of all data.

THE SURVEY INSTRUMENT:

The WBZ/ALA Follow-Up Survey questionnaire consisted of three major parts: (1) page 1 - for all respondents, ten questions relating to prior mode of travel to work, carpooling interest, the WBZ/ALA promotional effort, and the energy crisis; (2) page 2 - for respondents who were <u>not carpoolers</u> as of the survey date, four questions dealing with their experience with the program and whether or not there was continued interest in carpooling; page 3 - for respondents who were <u>carpoolers</u> as of the survey date, ten questions about their carpooling experiences, motives, and attitudes; and (3) page 4 - for all respondents, seven

OMB No. 04-S74021

The U.S. Department of Transportation is currently conducting a follow-up survey of the people who mailed in the WBZ/ALA "Commuter Computer" questionnaire. This ongoing carpool campaign in the Boston area represents the first major effort in the country to organize carpooling on a large scale. As a participant in the program, your personal opinions and experience are of particular value to us. This information will be extremely useful to other cities which are considering measures to encourage carpools, and to possible future efforts here.

We would appreciate it if you would spend a few minutes to fill out the following questionnaire and return it in the enclosed envelope at your earliest convenience. The answers which you furnish will be combined with your responses to the original Commuter Computer questionnaire. In order to insure the confidentiality of this information, we have replaced your name and address with a numerical code. Your completed questionnaire will not be used for any purpose other than the evaluation of the Commuter Computer carpool program.

Thank you for your cooperation.

1. How did you *usually* travel to work before hearing about the Commuter Computer program? (Check one)
   - 1 ☐ Carpool to transit or rail station
   - 2 ☐ Dropped off at transit or rail station by another automobile driver
   - 3 ☐ Drove alone to transit or rail station
   - 4 ☐ Drove alone
   - 5 ☐ Member of carpool
   - 6 ☐ Used public transportation
   - 7 ☐ Taxi
   - 8 ☐ Other (specify) _____

2. How long did it take you to get to work by this means?

   ☐ hours ☐ minutes

3. How much money, if any, did you spend on the following items when you commuted by this means?

   Daily parking fee per car at place of employment or at transit station _____

   Tolls per car (one way) _____

   Transit fare (one way) _____

   Taxi fare (one way) _____

4. Were you interested in joining a carpool before hearing about the Commuter Computer program?
   - 1 ☐ Yes
   - 2 ☐ No

5. Had you ever been in a carpool before?
   - 1 ☐ Yes
   - 2 ☐ No

*NOTE: Questions on origin, destination, and arrival/departure times were not included, since this information was available from the original matching request application submitted to WBZ/ALA. A numerical coding scheme was devised to merge data on these applications with Follow-Up Survey responses.

6. Which of the following promotional efforts do you recall seeing or hearing in connection with the Commuter Computer program?
   - 1 ☐ TV ads, editorials
   - 2 ☐ Special WBZ TV program
   - 3 ☐ Radio ads
   - 4 ☐ Newspaper ads
   - 5 ☐ Magazine ads
   - 6 ☐ Billboards

7. Of the items checked above, which appealed to you most? (Check one)
   - 1 ☐ TV ads, editorials
   - 2 ☐ Special WBZ TV program
   - 3 ☐ Radio ads
   - 4 ☐ Newspaper ads
   - 5 ☐ Magazine ads
   - 6 ☐ Billboards

8. What was your main reason for sending in a questionnaire to WBZ/ALA? (Check one)
   - 1 ☐ Curiosity
   - 2 ☐ Chance of winning free car
   - 3 ☐ Desire to join carpool
   - 4 ☐ Desire to expand existing carpool
   - 5 ☐ Pressure from employer
   - 6 ☐ Other (specify) _____

9. Did gasoline cost or availability cause you to look into carpooling?
   - 1 ☐ Yes
   - 2 ☐ No

10. Are you currently a member of a carpool?
    - 1 ☐ Yes
    - 2 ☐ No

IF ANSWER TO QUESTION 10 IS YES, PLEASE GO TO PAGE 3, QUESTION 15.

Figure A-1 WBZ/ALA Follow-Up Survey

IF YOU CURRENTLY ARE NOT A MEMBER OF A CARPOOL:

11. Which of the following best describes your experience?
    1 ☐ Still in process of organizing carpool
    2 ☐ Changed my mind about wanting to carpool
    3 ☐ Unable to make satisfactory arrangements
    4 ☐ Joined a carpool, as a result of Commuter Computer program, that has since disbanded
    5 ☐ Never intended to form carpool
    6 ☐ Other (specify) _____

12. If you were unable to make satisfactory arrangements, what were the reasons? (Check as many as applicable)
    1 ☐ I didn't receive any names or enough names of prospective carpoolers from WBZ/ALA
    2 ☐ People on WBZ/ALA computer listing lived too far away from me
    3 ☐ People on WBZ/ALA computer listing worked too far away from me
    4 ☐ People on WBZ/ALA computer listing had different work hours
    5 ☐ No one on the listing was willing to drive
    6 ☐ I moved to another location
    7 ☐ I changed jobs
    8 ☐ Other (specify) _____

13. If you joined a carpool, as a result of the Commuter Computer program, that has since disbanded --
    a. How long did it last?
    _____days/weeks/months (Circle appropriate)
    b. Why did it disband? (Check as many as applicable)
    1 ☐ Members experienced difficulties adhering to schedule
    2 ☐ Too inconvenient (e.g., members lived too far apart)
    3 ☐ Members disliked lack of freedom
    4 ☐ Members disliked reduced privacy
    5 ☐ Members did not get along with each other
    6 ☐ Gasoline became more readily available
    7 ☐ Other (specify) _____

14. Are you still interested in forming a carpool?
    1 ☐ Yes
    2 ☐ No
    Comments _____

PLEASE GO TO PAGE 4, QUESTION 25.

Figure A-1 WBZ/ALA Follow-Up Survey (Continued)

IF YOU ARE CURRENTLY A MEMBER OF A CARPOOL:

15. How long have you been in your current carpool?

_____ days/weeks/months (Circle appropriate)

16. How, if at all, did the Commuter Computer program affect the size or membership of your carpool?

1 ☐ No effect
2 ☐ I joined a carpool which formed as a result of the Commuter Computer program
3 ☐ I joined a carpool which had existed before the Commuter Computer program
4 ☐ New member(s) joined my carpool, which had existed before the Commuter Computer program
5 ☐ Other (specify) _____

17. How many people are in your carpool (including yourself)?

_____

So that we can avoid double-counting the number of carpools, please indicate the *first letter of the last name* of each member (including yourself):

___ ___ ___ ___ ___ ___ ___ ___ ___

18. How many days a week do you usually travel to work in your carpool?

_____

19. Which of the following best describes your carpool arrangement? (Check one)

1 ☐ Driving is shared by all carpool members
2 ☐ Driving is shared by some carpool members
3 ☐ One person drives all the time
4 ☐ Other (specify) _____

20. How long does it usually take you to get to work under the following conditions:

When you drive *by yourself* ☐ hours ☐ minutes
When you drive the other members of your carpool ☐ hours ☐ minutes
When you are a passenger in your carpool ☐ hours ☐ minutes

21. Please check your main reason or reasons for wanting to join a carpool. (Check as many as applicable)

1 ☐ Wanted to share expense
2 ☐ Wanted to share driving
3 ☐ Wanted to increase availability of car to other household members
4 ☐ Wanted company during journey to work
5 ☐ Wanted to help alleviate problems of fuel shortage, congestion, pollution, etc.
6 ☐ Dissatisfied with how I was commuting to work
7 ☐ Had no other means of getting to work
8 ☐ Other (specify) _____

22. Please check the feature or features of carpooling you like *most*. (Check as many as applicable)

1 ☐ Cost savings
2 ☐ Driving relief
3 ☐ Increased availability of car to other household members
4 ☐ Companionship
5 ☐ Helping to alleviate congestion, pollution problems
6 ☐ Time savings
7 ☐ Increased convenience
8 ☐ Other (specify) _____

23. Please check the feature or features of carpooling you like *least*. (Check as many as applicable)

1 ☐ Difficulties of adhering to schedule
2 ☐ Reduced independence and mobility
3 ☐ Inconvenience
4 ☐ Increased travel time
5 ☐ Responsibility to other members of carpool
6 ☐ Reduced privacy
7 ☐ Other people's driving habits
8 ☐ Other (specify) _____

24. How satisfied are you with your current carpool?

1 ☐ Very satisfied
2 ☐ Moderately satisfied
3 ☐ Dissatisfied

Please list reasons _____

PLEASE GO TO PAGE 4.

Figure A-1 WBZ/ALA Follow-Up Survey (Continued)

We would be most appreciative if you would also answer the following questions. Your responses will be used solely to compare the results of this survey with those of other transportation surveys. The more of these questions you answer, the more useful this survey will be.

25. Are you a licensed driver?
    1 ☐ Yes
    2 ☐ No

26. How many drivers live in your household (including yourself)?

    _____

27. How many autos are there in your household?

    _____

28. Age
    1 ☐ 25 or under
    2 ☐ 26-35
    3 ☐ 36-45
    4 ☐ 46-55
    5 ☐ 56-65
    6 ☐ 66 or over

29. Education
    1 ☐ Attended grade school
    2 ☐ Finished grade school
    3 ☐ Finished high school
    4 ☐ Attended college
    5 ☐ Finished college

30. Occupation

    _____

31. Annual personal income
    1 ☐ Less than $5,000
    2 ☐ $5,000-9,999
    3 ☐ $10,000-14,999
    4 ☐ $15,000-24,999
    5 ☐ $25,000 and over

Thank you. Your cooperation is appreciated.

Figure A-1 WBZ/ALA Follow-Up Survey (Continued)

WBZ RADIO's COMMUTER COMPUTER CLUBCAR

QUESTIONNAIRE

☐ MS
☐ MR

ADDRESS _____

CITY _____ ZIP _____ (DO NOT OMIT ZIP CODE #)

PHONE _____

1. CHECK THE ONE POINT IN THE FOLLOWING LIST CLOSEST TO YOUR COMMUTING DESTINATION

1. ☐ Government Center / City Hall
2. ☐ P.O. Square / Financial Dist.
3. ☐ State House / Beacon Hill
4. ☐ Wash. St. / Shopping District
5. ☐ Pru. Center / Copley Square
6. ☐ Park Square
7. ☐ North Station
8. ☐ South Station
9. ☐ B.U. / Kenmore Square
10. ☐ Northeastern U. / Fenway
11. ☐ City Square / Charlestown
12. ☐ South End / City Hospital
13. ☐ Faneuil Hall / North End
14. ☐ Charles Circ. / Mass. General
15. ☐ Columbia Pt. / Boston Globe
16. ☐ Army Base / Fargo Building
17. ☐ Logan Airport
18. ☐ M.I.T. (Cambridge)
19. ☐ Harvard (Cambridge)
20. ☐ Gillette Plant / South Boston
21. ☐ Boston Herald American
22. ☐ Lechmere Square (Cambridge)
23. ☐ Dedham / 128 Industrial Parks
24. ☐ Needham / 128 Industrial Parks
25. ☐ South Shore Plaza
26. ☐ Waltham Industrial Park / 128
27. ☐ Polaroid / 128
28. ☐ Burlington Mall
29. ☐ Intersection 128/93, Woburn
30. ☐ Other (On or within Route 128, Major Street or Landmark)

MBTA DRIVE / RIDE LOCATIONS

31. ☐ Riverside Station
32. ☐ Quincy Center Station
33. ☐ Wonderland Station
34. ☐ Everett Station
35. ☐ No. Quincy Station
36. ☐ Dedham / 128 Railroad Station

2. CHECK THE TIME AT WHICH YOU MUST BE AT YOUR MORNING DESTINATION

1. ☐ 6:30AM
2. ☐ 7:00AM
3. ☐ 7:30AM
4. ☐ 8:00AM
5. ☐ 8:30AM
6. ☐ 9:00AM
7. ☐ 9:30AM
8. ☐ Other

3. AT WHAT TIME DO YOU LEAVE IN THE AFTERNOON

1. ☐ 3:00PM
2. ☐ 3:30PM
3. ☐ 4:00PM
4. ☐ 4:30PM
5. ☐ 5:00PM
6. ☐ 5:30PM
7. ☐ 6:00PM
8. ☐ Other

4. CHECK HERE IF YOU NEED THE NAMES OF PEOPLE WHO LEAVE FOR HOME ONE HOUR AFTER YOU NORMALLY DO ☐

5. CHECK YOUR CLUBCAR PREFERENCE

- ☐ Drive only
- ☐ Ride only
- ☐ Alternate driving
- ☐ All male
- ☐ All female
- ☐ No preference

6. CHECK ANY OF THESE SPORTING EVENTS WHICH YOU REGULARLY ATTEND IF YOU WOULD LIKE TO RIDE THE CLUBCAR TO THEM:

1. ☐ Patriots Games at Schaefer
2. ☐ Bruins Games at Boston Garden
3. ☐ Celtics Games at Boston Garden
4. ☐ B.C. Football at Alumni Stadium
5. ☐ Whalers at Boston Garden
6. ☐ Red Sox Games at Fenway Park
7. ☐ Braves at Boston Garden

IMPORTANT—It should be understood by all persons using the Commuter Computer service that its sole function is to match on file data of information provided but without investigation of driving records and other relevant information of prospective drivers with prospective riders. THE UNDERSIGNED HEREBY AGREES THAT WBZ AND ALA WILL NOT BE LIABLE FOR ANY ACTION TAKEN OR OMITTED IN GOOD FAITH BY WBZ OR ALA AND THEIR AGENTS AND EMPLOYEES IN CONNECTION WITH THE COMMUTER COMPUTER SERVICE. THE UNDERSIGNED AGREES TO ASSUME ALL RESPONSIBILITY FOR CONTACTING, INVESTIGATING AND DRIVING OR COMMUTING WITH THE PERSONS WHOSE NAMES ARE FURNISHED BY WBZ OR ALA, AND THE UNDERSIGNED AUTHORIZES WBZ AND ALA TO RELEASE THE NAME AND TELEPHONE NUMBER OF THE UNDERSIGNED TO ANY POTENTIAL DRIVER OR RIDER SELECTED BY ALA.

Signature

IF YOU DRIVE TO WORK ALONE — CUT IT OUT.

Cut out the questionnaire. Answer all questions. Then mail to: Commuter Computer Clubcar, Box 103, Boston, MA 02134.

Questionnaires must be accompanied by a dime or 10¢ in stamps for return postage and handling, or they cannot be processed.

Along with your Commuter Computer printout, you will also receive a Clubcar "Clubcard," side and rear window decals, a what-to-do-in-case-of-accident reference card, and a special "Visor Advisor" with alternate route maps, emergency phone numbers and downtown parking information, designed to fit on your sun visor, out of sight until you need it.

The Commuter Computer Clubcar is a service of WBZ Radio and WBZ Television, created in cooperation with the ALA Auto and Travel Club.

WBZ RADIO 103 W
WBZ-TV 4
ALA Auto & Travel Club

Figure A-2 WBZ/ALA Commuter Questionnaire

questions concerned with auto ownership and demographic characteristics. It should be noted that the WBZ/ALA Follow-Up Survey questionnaire did not include questions on residence, work place and work arrival/departure times, since this information was already available from the participants' original forms requesting matching.

The survey instrument was designed so that specific questions about carpooler experiences and noncarpooler experiences were on separate pages. This was done to avoid confusion among respondents as to which questions had to be answered by carpoolers and which by noncarpoolers and, also, to minimize error in the coding, editing, and keypunching operations.

THE USE OF A NUMERICAL CODE FOR RESPONDENT IDENTIFICATION:

An important aspect of many surveys is insuring that the identity of individual respondents will not be known. The problem of insuring confidentiality and anonymity for those who responded to the WBZ/ALA Follow-Up Survey was complicated by (1) the necessity of planning for a second mailing among nonrespondents should the initial response prove unsatisfactory, and (2) survey design plans which called for matching and merging a participant's data from the original questionnaire with that participant's response to the Follow-Up Survey.

In order to provide for the contingency of a second mailing and the merging of the data, while insuring confidentiality and anonymity for those who responded, the names and addresses of the 10,581 participants were replaced by a numerical code. This code was placed on the participant's data card from the original questionnaire, the participant's mailing label, and the WBZ/ALA Follow-Up Survey questionnaire sent to that participant. When the participant returned the Follow-Up questionnaire, the numerical code on that questionnaire would be recorded. In the event that a second mailing was required, those code numbers not recorded (the numerical code ran consecutively from 00001 to 10,581) would be identified and the original data cards of those nonrespondents would be pulled. For this group a second set of mailing labels would be made and a second mailing to these nonrespondents would take place.

THE MAILING:

The mailing of the Follow-Up Survey took place between July 9 and July 12, 1974. Returns began arriving immediately and by the end of July, 94% of what was to be approximately 4,400 questionnaires (by the August 12 cut-off date) had been received. An additional 200 questionnaires were returned by the post office because participants had either moved and left no forwarding address or the address from the original WBZ/ALA listing was incorrect.

As a check to determine whether or not the 300 or so late respondents were significantly different from those who responded during the first month, a comparison was made between these two groups' answers to four major questions from the Follow-Up Survey (questions 4, 5, 10,and 16). The comparison showed little if any difference between early and late or straggler-type respondents.

Survey returns resulted in 4,293 usable questionnaires (a completed questionnaire was one in which two-thirds of the relevant questions were answered). The high response rate of about 41% eliminated any need for a second mailing.

DATA PROCESSING:

Survey forms were coded and keypunched as they were received. After the data from all 4,293 Follow-Up Survey questionnaires were put on tape, it was edited and merged with data from the original questionnaire via the numerical coding scheme, and a new data base was created.

The Statistical Package for the Social Sciences (SPSS), version 2.4 A was used to perform analysis of the merged data base. The data were generated in the form of simple frequency distributions and two-way and three-way cross-tabulations. An example of the SPSS output format (for a three-way cross-tabulation) is presented in Figure A-3. Questions 3 and 20 required special programming in order to yield a suitable type of output for analysis.

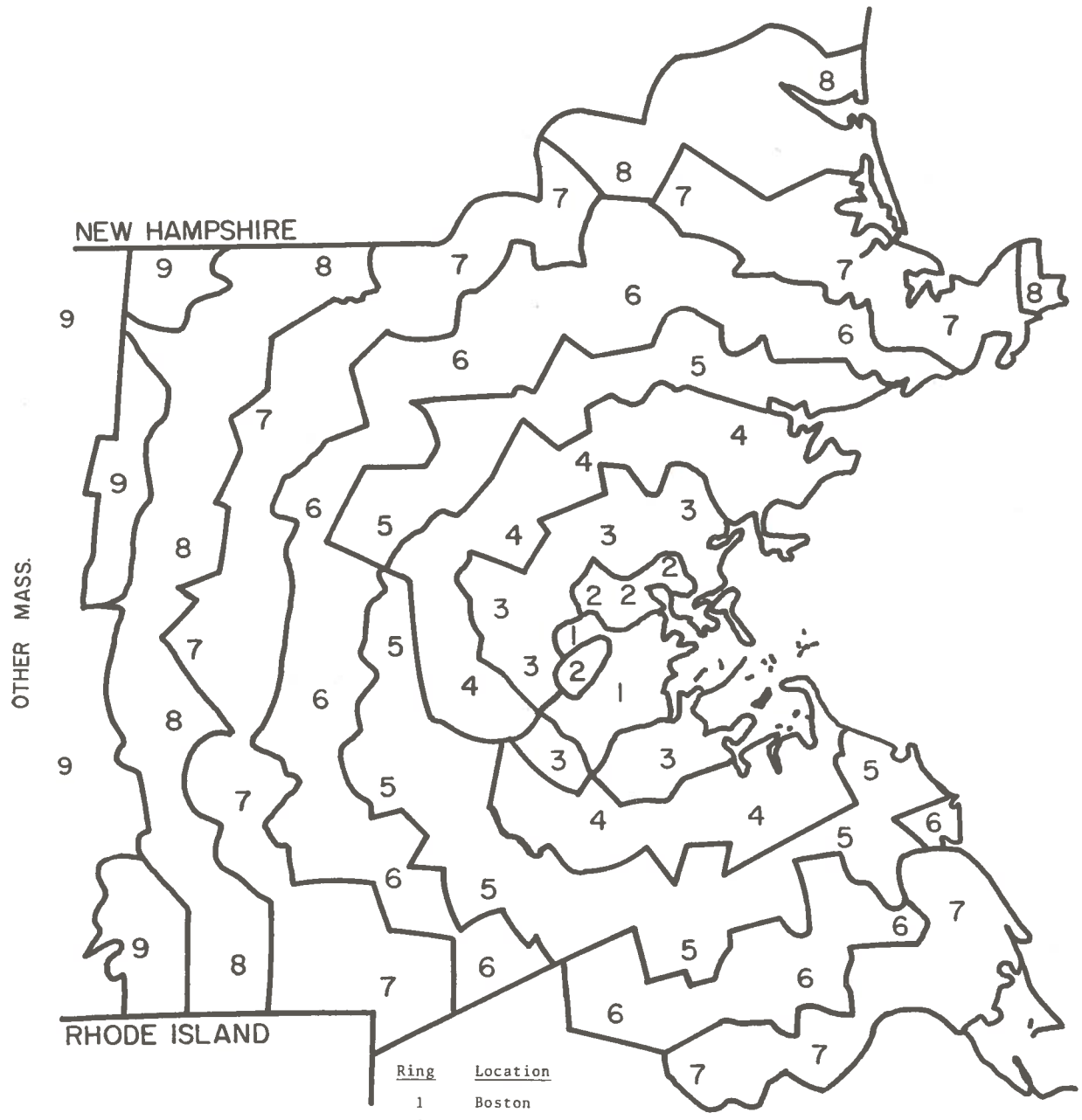
```
FINAL REPORT2                                                          11-OCT-74        PAGE    4

FILE    WBZ      (CREATION DATE = 10-OCT-74)

* * * * * * * * * * * * * * * * *   C R O S S T A B U L A T I O N   O F   * * * * * * * * * * * * * * * * * *
    EVER      HAD YOU EVER BEEN IN A CAR POOL                BY  INTEREST  WAS THERE INTEREST IN A CAR POOL
CONTROLLING FOR..
    NOWMEMB   ARE YOU NOW A MEMBER OF A CAR POOL           VALUE        2,00  NO
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *  PAGE  1 OF  1

                     INTEREST
             COUNT  I
           ROW PCT  I            YES       NO                 ROW
           COL PCT  I                                         TOTAL
           TOT PCT  I     0,00I    1,00I    2,00I    3,00I
EVER        --------I--------I--------I--------I--------I
              0,00  I      3 I      5 I      1 I      0 I       9
                    I   33,3 I   55,6 I   11,1 I    0,0 I     0,3
                    I   18,8 I    0,2 I    0,1 I    0,0 I
                    I    0,1 I    0,2 I    0,0 I    0,0 I
                    -I--------I--------I--------I--------I
              1,00  I      5 I    713 I    247 I     37 I    1002
    YES             I    0,5 I   71,2 I   24,7 I    3,7 I    31,3
                    I   31,3 I   35,1 I   22,4 I   80,4 I
                    I    0,2 I   22,3 I    7,7 I    1,2 I
                    -I--------I--------I--------I--------I
              2,00  I      8 I   1314 I    855 I      9 I    2186
    NO              I    0,4 I   60,1 I   39,1 I    0,4 I    65,4
                    I   50,0 I   64,7 I   77,5 I   19,6 I
                    I    0,3 I   41,1 I   26,7 I    0,3 I
                    -I--------I--------I--------I--------I
            COLUMN        16     2032     1103       46      3197
             TOTAL       0,5     63,6     34,5      1,4     100,0
```

Figure A-3 Sample SPSS Output Format

SPECIAL CODING PROCEDURES:

In the original WBZ/ALA carpooling questionnaire which served as the basis for the matching process, participants' origins were recorded in the form of zip codes and destinations were recorded in the form of place names. Overall, the 10,581 participants involved in the Follow-Up Survey represented 486 zip codes and 74 work places. In order to simplify the analysis of origin-destination patterns and facilitate the comparison of the survey data base with other data bases, the individual zip codes and work places were aggregated into larger categories.

In the case of origin zip codes, the aggregation scheme consisted of concentric rings surrounding the Boston central city at approximately five-mile intervals. Figure A-4 shows the rings comprising towns (zip codes) in the Eastern Massachusetts Region. The origin zip codes for the respondents were aggregated into eight rings which parallel the outer boundary of the Eastern Massachusetts Region. The area between rings 4 and 5 closely parallels Route 128, a boundary often referred to in the analysis. Because of the scattering of origins outside the area, four additional rings are also used to include those respondents living in (1) New Hampshire, (2) Rhode Island, (3) areas of Massachusetts outside of the Eastern Massachusetts Region, and (4) other areas. All together, 12 rings were created



Ring	Location
1	Boston
2	0-5 mi. from CBD
3	5-10 "
4	10-15 "
5	15-20 "
6	20-25 "
7	25-30 "
8	30-40 "
9	Other Massachusetts
10	New Hampshire
11	Rhode Island
12	Other

Figure A-4 Aggregation Scheme for Origin Zip Codes

for the study area to include all possible origins (residences) of the respondents.

With respect to destination, the original WBZ/ALA questionnaire included 36 commuting destinations shown in Figure A-2. Despite the fact that participants were supposed to work within Route 128, many participants indicated destinations beyond Route 128 under "other". Destinations were aggregated into six work sites as follows:

(1) Central Business District
(2) Other downtown areas in Boston (including parts of Cambridge)
(3) Destinations within Route 128
(4) Destinations along Route 128
(5) Destinations outside of Route 128
(6) MBTA drive/ride locations

Together these categories encompass all of the original destinations on the WBZ/ALA application and all are situated within Route 495, the circumferential highway belt that parallels the outer boundary of the EMR region.

COMPARISON BETWEEN RESPONDENTS AND NONRESPONDENTS:

Although the survey response rate was very high, there still remained a question as to whether or not respondents to the survey were significantly different from

nonrespondents. A major concern in any survey is to see if there is a significant difference (or bias) between the respondent and nonrespondent populations. The ultimate question to be answered is how representative the respondent attributes are relative to those of members of the survey universe. Ideally, the two subgroups should differ only slightly due to the random variation expected in measuring any attribute. Bias may be introduced, however, due to some factor(s) that systematically affect the response rate of the sampled population.

In order to determine the existence of any nonresponse bias, the 4,293 respondents and the 6,288 nonrespondents were compared in terms of five characteristics: sex, origin ring, destination zone, arrival time, and departure time. These five variables were available from the original matching request application (Figure A-2). They were considered appropriate for the bias check in that they are utilized in mass transportation studies and include the basic characteristics of the journey to work. Moreover, they have a low likelihood of misrepresentation since they were furnished by participants specifically for the matching process.

Because of the unusually high return rate for the WBZ/ALA Follow-Up Survey, little difference was expected between the respondents and nonrespondents. This hypothesis was generally borne out by the data (Table A-1), as a

TABLE A-1 COMPARISON OF WBZ/ALA FOLLOW-UP SURVEY RESPONDENTS vs. NONRESPONDENTS

SEX	RESPONDENTS	NONRESPONDENTS	% DIFFERENCE
Male	66.3%	57.3%	9.0%
Female	33.7	42.7	9.0
ORIGIN			
Boston	1.0%	1.3%	.3%
0-5 mi from core	10.6	13.8	3.2
5-10 mi from core	17.8	19.3	1.5
10-15 mi from core	17.4	17.7	.3
15-20 mi from core	15.2	13.9	1.3
20-25 mi from core	14.7	12.3	2.4
25-30 mi from core	11.2	10.2	1.0
30-40 mi from core	3.6	2.8	.8
Other Mass.	3.4	2.9	.5
New Hampshire	4.3	3.2	2.1
Rhode Island	.4	.9	.5
Other	.0	.9	.9
DESTINATION			
Boston	34.6%	38.5%	3.9%
Downtown	25.7	24.4	1.3
Within 128	9.8	7.4	2.4
Along 128	20.7	18.1	2.6
Outside 128	5.3	6.4	1.1
MBTA stops	4.1	4.8	.7
ARRIVAL TIME			
6:30 a.m.	1.7%	1.6%	.1%
7:00	4.9	6.3	1.4
7:30	11.0	10.6	.4
8:00	30.4	28.9	1.5
8:30	32.1	32.6	.5
9:00	17.7	17.2	.5
9:30	2.6	2.3	.3
DEPARTURE TIME			
3:30p.m.	3.7%	4.1%	.4%
4:00	3.3	4.9	1.6
4:30	9.2	9.3	.1
5:00	20.9	20.5	.4
5:30	44.2	43.8	.4
6:00	13.1	11.4	1.8
6:30	5.2	5.5	.3

comparison of the frequency distribution for the two groups on all five variables revealed little variation. At most, a 9% percentage difference was found in any one category with most of the comparisons yielding smaller (1 to 2 percentage point) deviations.

Overall the high level of convergence between the two groups seem to be indicative of the lack of any systematic bias which may have influenced who did or did not return the questionnaire. In all likelihood, the small variations recorded may be traced to random errors due to the transient aspects of the individual's situation at the time the questionnaire was filled out, or lack of clarity in the measuring instrument itself.

APPENDIX B

EASTERN MASSACHUSETTS SURVEY PROCEDURE

In the fall of 1974, approximately six months after the completion of the WBZ/ALA Follow-up Survey, the Eastern Massachusetts Survey (Figure B-1) was undertaken.

THE SURVEY INSTRUMENT:

In overall format the Eastern Massachusetts Survey questionnaire was quite similar to that of the WBZ/ALA Follow-Up Survey questionnaire, although individual questions were not always the same. In the first section (questions 1 to 4) all respondents were asked to give characteristics of their journey to work, including mode, travel distance, travel time, and carpool status. In the second section (questions 5 to 11), carpooler respondents were asked to provide various carpool characteristics, including length of time carpooling, prior mode of travel, reasons for starting to carpool, method of carpool formation, carpool driving arrangement, and amount of route deviation necessitated by carpooling. In the third section (questions 12 to 16) noncarpooler respondents were asked to indicate their degree of interest in carpooling, past

OMB No. 004-S7-4931

COMMUNITY-UNIVERSITY RESEARCH ASSOCIATES, INC.

12 ARROW STREET
CAMBRIDGE, MASSACHUSETTS 02138

This survey is one part of a larger transportation study focusing on commuter behavior, preferences and opinions in eastern Massachusetts. Results from this survey will be combined with other survey findings to provide input into national transportation research and planning.

Won't you take a few minutes to fill out this questionnaire and return it in the enclosed envelope at your earliest convenience? The more people who respond to this survey, the more confident we can be that the survey results accurately reflect public opinion. Your responses will be strictly anonymous, and will be kept confidential.

If the questions in this survey do not apply to you (e.g., if you work from home or you are retired), there is no need for you to complete this questionnaire. However, we would appreciate it if you would write "Not applicable" on the top of this questionnaire and return it in the enclosed envelope.

Thank you for your cooperation.

1. How do you usually travel to work? (Check one)
   - 1 ☐ Car
   - 2 ☐ Public transportation
   - 3 ☐ Combination car and public transportation
   - 4 ☐ Taxi
   - 5 ☐ Other (specify) _____

2. About how many miles do you travel to work *one way* (from home to work)?
   ☐ miles

3. How long does it usually take you to travel to work *one way* (from home to work)?
   ☐ hours ☐ minutes

4. Are you currently a member of a carpool? (A carpool is defined as 2 or more people who ride together on a regular basis, including family members.)
   - 1 ☐ Yes **(GO TO QUESTION 5)**
   - 2 ☐ No **(GO TO PAGE 2, QUESTION 12)**

* * * * * *

IF YOU ARE CURRENTLY A MEMBER OF A CARPOOL:

5. How long have you been in your carpool?
   _____days/weeks/months (Circle appropriate)

6. How did you *usually* travel to work before you joined a carpool? (Check one)
   - 1 ☐ Car–drove alone
   - 2 ☐ Public transportation
   - 3 ☐ Combination car and public transportation
   - 4 ☐ Taxi
   - 5 ☐ Other (specify) _____

7. Initially, what were your main reasons for wanting to join a carpool? (Give as many as apply to you)

8. How was your carpool formed? (Check one)
   - 1 ☐ Family members decided to ride together
   - 2 ☐ Neighbors decided to ride together
   - 3 ☐ People at work got together informally
   - 4 ☐ Through employer/company program
   - 5 ☐ Through community-sponsored program
   - 6 ☐ Through ads in newspaper
   - 7 ☐ Through WBZ/ALA Commuter Computer Program
   - 8 ☐ Other (specify) _____

9. How many people are in your carpool (including yourself)?
   _____

10. Which of the following best describes your carpool arrangement? (Check one)
    - 1 ☐ Driving is shared by all carpool members
    - 2 ☐ Driving is shared by some carpool members
    - 3 ☐ One person drives all the time
    - 4 ☐ Other (specify) _____

11. How long does it usually take you to get to work under *each* of the following conditions:

When you drive *by yourself*	☐ hours	☐ minutes
When you drive the other members of your carpool	☐ hours	☐ minutes
When you are a passenger in your carpool	☐ hours	☐ minutes

PLEASE GO TO PAGE 2, QUESTION 17.

Figure B-1 Eastern Massachusetts Survey

IF YOU CURRENTLY ARE NOT A MEMBER OF A CARPOOL:

12. How interested would you be in joining a carpool? (Check one)

    1 ☐ Very interested
    2 ☐ Somewhat interested
    3 ☐ Not very interested
    4 ☐ Not at all interested

13. What are your *main* reasons for feeling this way? (Give as many as apply to you)

    _____
    _____
    _____
    _____
    _____
    _____

14. Have you ever been a member of a carpool before?

    1 ☐ Yes **(GO TO QUESTION 15)**
    2 ☐ No **(GO TO QUESTION 16)**

15. Why did you stop carpooling? (Give as many reasons as apply to you)

    _____
    _____
    _____
    _____
    _____
    _____

16. Below is a list of some incentives that could be used to encourage carpooling. For *each* one, please indicate how likely you would be to carpool if the incentive were implemented.

	Likely	*Not Likely*
1. Carpool matching service provided by employers or public agencies for commuters interested in carpooling	☐	☐
2. Preferential or reserved parking at destination point	☐	☐
3. Low-cost or free parking near or next to highways where you could meet other members of your carpool	☐	☐
4. Lower tolls for carpools during rush hours	☐	☐
5. Special lanes at highway entrance ramps that would allow carpools onto highways faster than other cars	☐	☐
6. Gas tax refund or income tax refund for carpoolers	☐	☐
7. Reserved highway lane for carpools	☐	☐
8. Free or lower parking fees for carpoolers	☐	☐

17. In the last few months have you heard or seen anything about the WBZ/ALA Commuter Computer Program?

    1 ☐ Yes
    2 ☐ No

The following questions are included for statistical purposes. They will be used solely to compare the results of this study with those of other transportation surveys.

18. What city or town do you *live* in?

    _____

19. What city or town do you *work* in?

    _____

20. Sex

    1 ☐ Male
    2 ☐ Female

21. Are you a licensed driver?

    1 ☐ Yes
    2 ☐ No

22. How many drivers live in your household (including yourself)?

    _____

23. How many autos are there in your household?

    _____

24. Please check your age category.

    1 ☐ 25 or under
    2 ☐ 26–35
    3 ☐ 36–45
    4 ☐ 46–55
    5 ☐ 56–65
    6 ☐ 66 or over

25. Please check your educational category.

    1 ☐ Attended grade school
    2 ☐ Finished grade school
    3 ☐ Finished high school
    4 ☐ Attended college
    5 ☐ Finished college

26. Occupation (please describe briefly the kind of work you do -- for example, retail salesperson, construction worker, etc.)

    _____
    _____

27. Annual personal income

    1 ☐ Less than $5,000
    2 ☐ $5,000–9,999
    3 ☐ $10,000–14,999
    4 ☐ $15,000–24,999
    5 ☐ $25,000 and over

Thank you. Your cooperation is appreciated.

Figure B-1 Eastern Massachusetts Survey (continued)

carpooling experience (if any), and their likelihood of carpooling in response to selected incentives. In the final section of the questionnaire (questions 17 to 27), all respondents were asked to indicate awareness of the WBZ/ALA Commuter Computer Program and to provide information on auto ownership and basic demographic characteristics.

It should be noted that noncommuter respondents (e.g., retired, unemployed) were instructed to write "not applicable" on the form and return it unanswered.

THE SURVEY SAMPLE:

The Eastern Massachusetts Survey was intended to provide a backdrop of information against which to evaluate the WBZ/ALA Program and its participants. Accordingly, it was determined that the universe for this survey would have to be compatible with the program's target group and outreach area. The resultant universe selected was the approximately 1.5 million commuters in the Eastern Massachusetts Region. The sampling source for the survey was 955,000 auto registrants living in an area slightly smaller than the Eastern Massachusetts Region (135 out of 152 towns in the region). Auto registrants were the most feasible sampling source for reaching commuters and were felt to coincide fairly well with the population of commuters that a regional carpool program would hope to attract. It was recognized, however, that this sampling

source excluded two potential groups of carpoolers: non-auto-owners with no transit available and dissatisfied transit users.

Since the usual response rate for a mailback survey was known to range from 5% to 10%, it was determined that a sample of 25,000 would generate an acceptable number of respondents. A probability sample of 25,000 auto registrants, weighted by population densities, was drawn by selecting every 38th name from R. L. Polk's files of auto registrants in the 135-town area.

THE MAILING:

Eastern Massachusetts Survey questionnaires were sent out on November 6, 1974, and responses were received throughout November. By the end of November, a total of 3,864 completed forms had been received, yielding a 15% response rate. Of these, 1,008 were found to be inapplicable because the respondent was not a commuter, leaving 2,856 usable responses (a net usable response rate of 11%).

DATA PROCESSING AND CODING:

Usable questionnaires were edited, coded and keypunched and then processed using the Statistical Package for the Social Sciences (SPSS), version 2.4A. As in the case of the WBZ/ALA Follow-Up Survey data, the SPSS processing yielded

simple frequency distributions and two-way and three-way cross-tabulations. Question 11 required special programming in order to yield a suitable type of output for analysis.

Whereas the WBZ/ALA Survey data on origins and destinations were coded using different aggregation schemes, both origins and destinations of Eastern Massachusetts Survey respondents were coded using the concentric ring scheme described in Appendix A (Figure A-4). In order to compare work destination distributions of the two groups of respondents, it was necessary to devise a rough correspondence scheme between the six geographically defined destination zones of WBZ/ALA respondents and the eight concentric zones of Eastern Massachusetts respondents.

THE TELEPHONE BIAS SURVEY:

In January, 1975, a telephone bias survey (see Figure B-2) was undertaken to determine if the mailback survey respondents differed significantly from nonrespondents. Using the mailback survey sample of 25,000 auto registrants, a second systematic sample of 1,848 persons was drawn by pulling every Nth page from the 25,000-person listing. Phone numbers were obtained for 600 persons in the bias survey sample, and a one-and-a-half week effort resulted in the identification and phone interviewing of 318 mailback survey nonrespondents.

Interviewer _____

New Telephone Number/Alternate Number

Label _____ Completed ☐

Refused ☐

Reason _____

	Date	No Answer	Suggested Date/Time to Call Back
First Try			
Second Try			
Third Try			
Fourth Try			

GOOD EVENING. I'D LIKE TO SPEAK WITH _____.

If person answers, continue.
If someone else answers and says person not at home, ask "WHEN DO YOU EXPECT HIM/HER TO RETURN?, and record date/time. Say "THANK YOU."
If someone else answers and says person is home but busy, ask "WHEN DO YOU EXPECT HIM/HER TO BE FREE? and record time. Say "THANK YOU."
If no answer, check "no answer" column and try again later that evening or next evening.
If busy signal, try a few minutes later.

I'M CALLING IN REGARD TO A SURVEY ON COMMUTING HABITS IN EASTERN MASSACHUSETTS. BACK IN NOVEMBER WE MAILED YOU A QUESTIONNAIRE.

1. DO YOU REMEMBER RECEIVING THIS QUESTIONNAIRE?

( ) Yes - "DID YOU FILL OUR AND RETURN THE FORM?"

( ) Yes - "IN THAT CASE I HAVE NO FURTHER QUESTIONS. THANK YOU FOR YOUR COOPERATION." (Terminate interview and record person's sex at bottom of form.)

( ) No →
( ) No → I'D APPRECIATE IT, THEN, IF YOU WOULD ANSWER A FEW QUESTIONS. YOUR RESPONSES WILL BE STRICTLY CONFIDENTIAL. (Go to Ouestion 2)
( ) Don't know →

2. HOW DO YOU USUALLY TRAVEL TO WORK?

( ) Not applicable - If person does not work, is retired, works at home, or walks to work, terminate interview by saying, → " SINCE THIS SURVEY IS FOCUSING ON COMMUTING HABITS, I HAVE NO FURTHER QUESTIONS. THANK YOU FOR YOUR COOPERATION." (Record person's sex at bottom of form.)

( ) Car → "ARE YOU A MEMBER OF A CARPOOL?" (define carpool if necessary - 2 OR MORE PEOPLE WHO RIDE TOGETHER ON A REGULAR BASIS, INCLUDING FAMILY MEMBERS)

( ) Yes ( ) No

( ) Public transportation

( ) Combination car and public transportation → " ARE YOU A MEMBER OF A CARPOOL?" (Define carpool if necessary)

( ) Yes ( ) No

( ) Taxi

( ) Other _____ (If car is involved, ask," ARE YOU A MEMBER OF A CARPOOL?")
specify

( ) Yes ( ) No

Figure B-2 Telephone Bias Survey

3. HOW LONG DOES IT USUALLY TAKE YOU TO TRAVEL TO WORK ONE WAY? _____hours ____minutes

4. WHAT CITY OR TOWN DO YOU WORK IN? _____

NOW I'M GOING TO ASK SOME QUESTIONS FOR STATISTICAL PURPOSES, SO THAT WE CAN COMPARE THE RESULTS OF THIS STUDY WITH OTHER TRANSPORTATION SURVEYS.

5. WHAT IS YOUR APPROXIMATE AGE?

( ) 25 or under ( ) 46-55 ( ) No reply

( ) 26-35 ( ) 56-65

( ) 36-45 ( ) 66 or over

6. WHAT IS YOUR EDUCATION?

( ) Attended grade school ( ) Attended college

( ) Finished grade school ( ) Finished college

( ) Finished high school ( ) No reply

7. APPROXIMATELY WHAT IS YOUR ANNUAL PERSONAL INCOME?

( ) Less than $5,000 ( ) $10,000 - 14,999 ( ) $25,000 and over

( ) $5,000 - 9,999 ( ) $15,000- 24,999 ( ) No reply

THANK YOU VERY MUCH FOR TAKING THE TIME TO ANSWER THESE QUESTIONS. I APPRECIATE YOUR COOPERATION.

Interviewer check respondent's sex.

( ) Male ( ) Female

Figure B-2 Telephone Bias Survey (Continued)

As can be seen from Figure B-3, the telephone bias survey experienced a lower nonresponse rate than the mailback survey -- 11% (67 divided by 600) vs. 15% (3,864 divided by 25,000). This is partly due to the fact that the response rate among inapplicable persons was higher for the telephone survey -- 20% (123 divided by 600) vs. 4% (1,008 divided by 25,000). Clearly, most inapplicable persons in the mailback survey sample did not bother to return the unanswered forms, whereas those in the telephone bias survey were willing to provide this information (which resulted in termination of the interview). The overall mailback survey response rate indicated by the telephone survey (11%, or 64 divided by 600) was equal to the net mailback survey response rate (excluding inapplicable persons) of 11%.

Table B-1 shows the frequency distributions of four demographic characteristics -- sex, age, education, and income -- and five travel-related characteristics -- origin ring, destination ring, travel mode, carpooling status, and travel time -- for the Eastern Massachusetts mailback survey respondents vs. nonrespondents.

In terms of demographic traits, the two groups have fairly similar age and income distributions but different sex and education distributions. The relatively higher proportion of males among telephone bias survey respondents can be explained by distortions arising from use of the telephone (i.e., higher incidence of unlisted numbers among

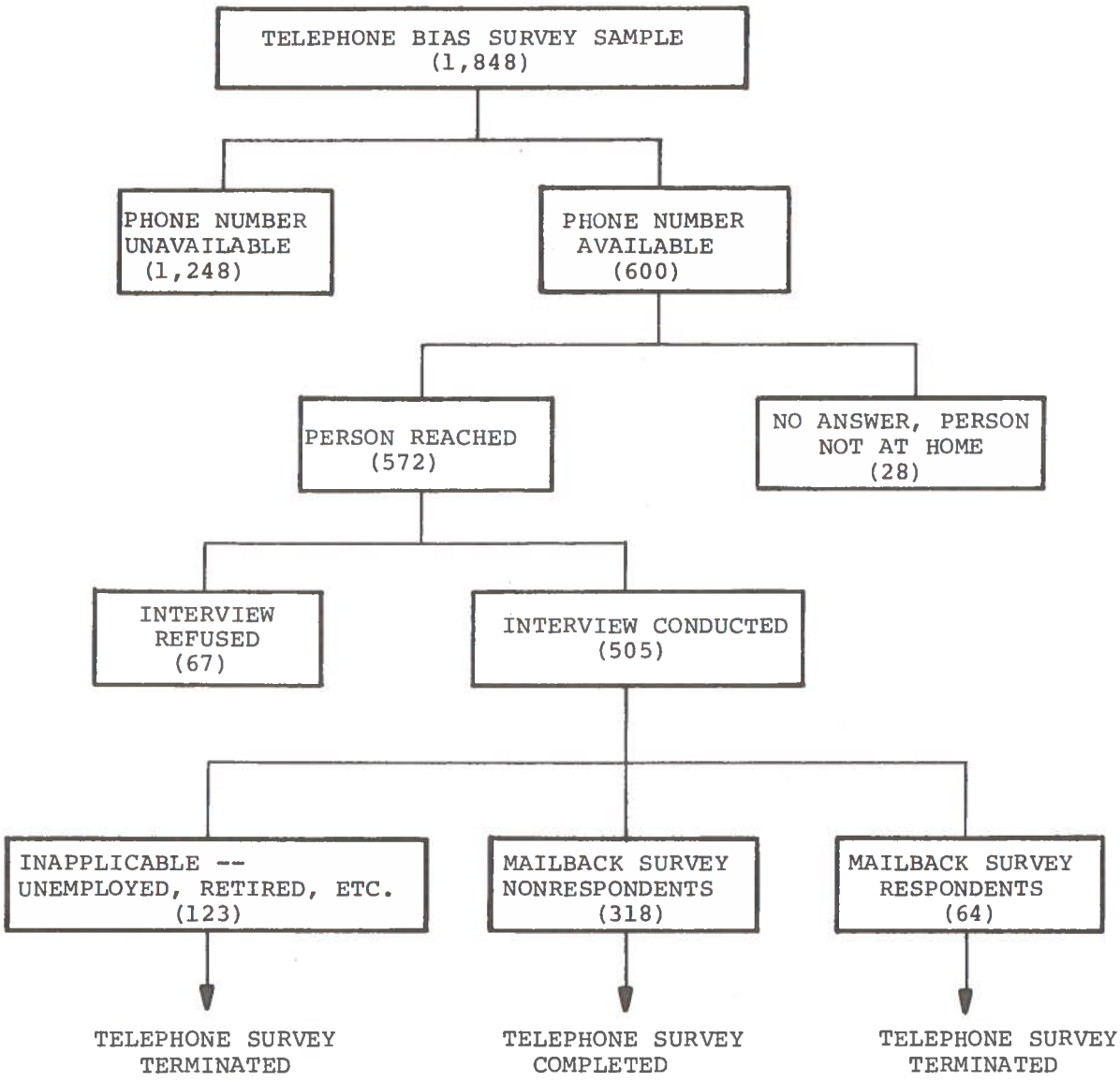


Figure B-3 Telephone Bias Survey Sample Size and Respondent Base

TABLE B-1 COMPARISON OF EASTERN MASSACHUSETTS SURVEY RESPONDENTS vs. NONRESPONDENTS

	MAILBACK SURVEY RESPONDENTS	TELEPHONE BIAS SURVEY RESPONDENTS (MAILBACK SURVEY NONRESPONDENTS)	% DIFFERENCE
SEX			
Male	78.9%	90.3%	11.4%
Female	21.1	9.7	11.4
AGE			
25 or under	7.1	5.5	1.1
26-35	26.7	22.8	3.9
36-45	26.1	26.1	---
46-55	24.4	28.0	3.6
56-65	13.6	16.0	2.4
66 or over	2.1	1.6	0.5
EDUCATION			
Attended grade school	10.6	1.0	9.6
Finished grade school	3.8	10.0	6.2
Finished high school	26.4	40.5	14.1
Attended college	22.9	18.3	3.4
Finished college	46.3	30.2	16.1
INCOME			
Less than $5,000	4.2	2.7	1.5
$5,000-9,999	17.1	20.3	3.2
$10,000-14,999	32.7	36.9	4.2
$15,000-24,999	31.2	30.2	1.0
$25,000 and over	14.7	9.9	4.8
ORIGIN RING			
1	7.9	9.4	1.5
2	5.8	4.4	1.4
3	19.2	23.0	3.8
4	20.3	21.1	0.8
5	16.2	10.4	5.8
6	14.6	10.7	3.9
7	12.9	17.6	4.7
8	2.8	3.5	0.7
9	0.4	---	0.4
DESTINATION RING			
1	27.6	25.8	1.8
2	8.1	5.2	2.9
3	13.9	15.5	1.6
4	17.4	22.3	3.9
5	13.2	10.7	2.5
6	8.3	8.4	0.1
7	6.8	7.9	1.1
8	1.9	2.4	0.5
9	2.8	3.1	0.3
TRAVEL MODE			
Auto	86.0	90.6	4.6
Transit	10.7	8.8	1.9
Other	3.3	0.6	2.7
CARPOOL STATUS			
Carpooler	18.2	13.2	5.0
Noncarpooler	81.8	86.8	5.0
TRAVEL TIME			
0 - 9 mins.	8.3	17.0	8.7
10-19 mins.	24.5	27.0	2.5
20-29 mins.	21.4	20.3	1.1
30-39 mins.	18.6	18.0	0.6
40-59 mins.	20.2	12.3	7.9
60 mins. or more	7.0	5.3	1.7

females), and by the lower incidence of inapplicable persons among males. The discrepancy in educational levels of the two groups (higher among mailback survey respondents than nonrespondents) is consistent with general survey research findings. (See, for example, Marjorie N. Donald, "Implications of Nonresponse for the Interpretation of Mail Questionnaires," in Public Opinion Quarterly, Spring, 1960, pp. 99-114.) Although the income distributions for respondents and nonrespondents are similar, attention should be drawn to the relatively high nonresponse rate on this particular question in the telephone bias survey. This probably reflects people's greater reluctance to provide such information over the phone than by mail, where there is greater anonymity.

With respect to travel-related characteristics, the most noticeable difference between mailback survey respondents and nonrespondents is in travel time distributions, with the latter group exhibiting shorter times. In general, the differences in terms of travel-related characteristics are internally consistent (e.g., the shorter travel time of nonrespondents is consistent with the greater proportion of auto drivers and the larger proportion living close to downtown) and/or are consistent with demographic tendencies (e.g., the greater proportion of auto drivers reflects the greater proportion of males). The difference in the percentage of carpoolers among respondents

vs. nonrespondents (18% vs. 13%) is consistent with demographic and travel-related differences, but the most important explanation would seem to be the differential level of interest in the survey subject matter. It has been found that mailback surveys tend to be returned more often by persons who are actively interested in the subject matter (see David Wallace, "A Case For- and Against- Mail Questionnaires," Public Opinion Quarterly, Spring, 1954, pp. 40-52). This tendency for nonresponse on the part of noncarpoolers must be taken into account when projecting the areawide level of carpooling on the basis of the mailback survey percentage of 18%.

APPENDIX C

TABULATION OF RESPONSES TO WBZ/ALA FOLLOW-UP SURVEY

Q.1 How did you usually travel to work before hearing about the Commuter Computer program? (Check one)

Category	Frequency		Adjusted %
Carpool to transit or rail station	41		1.0%
Dropped off at transit or rail station by another automobile driver	142		3.4
Drive alone to transit or rail station	322		7.7
Drove alone	2773		66.2
Member of carpool	359		8.6
Used public transportation	480		11.4
Taxi	11		0.3
Other (specify)_____	59		1.4
Total responding to question	4187		100.0
No response	106	(2.4%)	
Total	4293		

Q.2 How long did it take you to get to work by this means?

_____ hours _____ minutes

Category	Frequency		Adjusted %
0 - 9 min.	15		0.3%
10 - 19 min.	145		3.4
20 - 29 min.	471		11.1
30 - 39 min.	878		20.6
40 - 49 min.	1114		26.2
50 - 59 min.	360		8.4
60 min. or more	1272		30.0
Total responding to question	4255		100.0
No response	38	(0.8%)	
Total	4293		

Q.3 How much money, if any, did you spend on the following items when you commuted by this means?

Daily parking fee per car at place of employment or at transit station _____

Category	Frequency	Adjusted %
$0	2880	77.1%
$.01 - .25	68	1.8
$.26 - .50	193	5.2
$.51 - .75	62	1.7
$.76 - 1.00	149	4.0
$1.00 or more	382	10.2
Total responding to question	3734	100.0
No response	559 (13.0%)	
Total	4293	

Average cost = $1.19

Tolls per car (one way) _____

Category	Frequency	Adjusted %
$0	2950	79.0%
$.01 - .25	371	9.9
$.26 - .50	153	4.1
$.51 - .75	164	4.4
$.76 - 1.00	69	1.9
$1.00 or more	25	0.7
Total responding to question	3732	100.0
No response	561 (13.0%)	
Total	4293	

Average cost = $.43

Q.3 continued

Transit fare (one way) _____

Category	Frequency	Adjusted %
$0	2766	74.1%
$.01 - .25	138	3.7
$.26 - .50	276	7.4
$.51 - .75	110	3.0
$.76 - 1.00	131	3.5
$1.00 or more	310	8.3
Total responding to question	3731	100.0
No response	562 (13.0%)	
Total	4293	

Average cost = $.85

Taxi fare (one way) _____

Category	Frequency	Adjusted %
$0	3701	99.2%
$.01 - .25	1	-
$.26 - .50	1	-
$.51 - .75	0	-
$.76 -1.00	1	0.8
$1.00 or more	27	-
Total responding to question	3731	100.0
No response	562 (13.0%)	
Total	4293	

Average cost = $2.31

Q.3 continued

Tabulation of incidence and level of fee by travel mode

Travel Mode	% paying one or more fees	Average cost for those paying	Average cost for all respondents
Drive alone	43%	$.94	$.40
Carpool	60	1.25	.75
Drive with family	42	1.18	.49
All transit	97	.90	.88
Car and transit	97	.99	.96
Public transit only	98	.81	.80
Taxi	--	--	--
Other	42	3.18	1.35
All modes	58	.98	.57

Q.4 Were you interested in joining a carpool before hearing about the Commuter Computer Program?

Category	Frequency	Adjusted %
Yes	2669	67.3%
No	1296	32.7
Total responding to question	3965	100.0
No response	328 (7.6%)	
Total	4293	

Q.5 Had you ever been in a carpool before?

Category	Frequency	Adjusted %
Yes	1607	37.6%
No	2665	62.4
Total responding to question	4272	100.0
No response	21 (0.4%)	
Total	4293	

Q.6 Which of the following promotional efforts do you recall seeing or hearing in connection with the Commuter Computer Program?

Category	Frequency	% of Respondents Citing Item*
TV ads, editorials	2412	56.2%
Special WBZ TV program	1622	37.8
Radio ads	2856	66.5
Newspaper ads	1458	34.0
Magazine ads	272	6.3
Billboards	479	11.1
Total respondents	4293	

*Percentages add to more than 100 due to multiple responses.

Q.7 Of the items checked above, which appealed to you most? (Check one)

Category	Frequency	Adjusted %
TV ads, editorials	1171	29.3%
Special WBZ TV program	823	20.6
Radio ads	1631	40.7
Newspaper ads	274	6.8
Magazine ads	51	1.3
Billboards	53	1.3
Total responding to question	4003	100.0
No response	290 (6.7%)	
Total	4293	

Q.8 What was your main reason for sending in a questionnaire to WBZ/ALA? (Check one)

Category	Frequency	Adjusted %
Curiosity	234	5.8%
Chance of winning a free car	26	0.6
Desire to join carpool	3298	81.4
Desire to expand existing carpool	296	7.3
Pressure from employer	53	1.3
Other (specify) _____	144	3.6
Total responding to question	4051	100.0
No response	242 (5.6%)	
Total	4293	

Q.9 Did gasoline cost or availability cause you to look into carpooling?

Category	Frequency	Adjusted %
Yes	2853	67.4%
No	1383	32.6
Total responding to question	4236	100.0
No response	57 (1.3%)	
Total	4293	

Q.10 Are you currently a member of a carpool?

Category	Frequency	Adjusted %
Yes	1084	25.3%
No	3197	74.7
Total responding to question	4281	100.0
No response	12 (0.2%)	
Total	4293	

Questions 11 through 14 apply to noncarpoolers.

Q.11 Which of the following best describes your experience?

Category	Frequency	Adjusted %
Still in process of organizing carpool	40	1.3%
Changed my mind about wanting to carpool	60	1.9
Unable to make satisfactory arrangements	2934	92.3
Joined carpool, as a result of Commuter Computer program, that has since disbanded	61	1.9
Never intended to form carpool	16	0.5
Other (specify)_____	67	2.1
Total responding to question	3178	100.0
No response	19 (0.6%)	
Total noncarpoolers	3197*	

*Based on answer to Q.10.

Q.12 If you were unable to make satisfactory arrangements, what were the reasons? (Check as many as applicable)

Category	Frequency	% of Respondents Citing Item*
I didn't receive any names or enough names of prospective carpoolers from WBZ/ALA	2655	90.6%
People on WBZ/ALA computer listing lived too far away from me	140	4.8
People on WBZ/ALA computer listing worked too far from me	92	3.1
People on WBZ/ALA computer listing had different work hours	209	7.1
No one on the listing was willing to drive	102	3.5
I moved to another location	139	4.7
I changed jobs	161	5.5
Other (specify)_____	74	2.5
Total respondents	2934**	

*Percentages add to more than 100 due to multiple responses.
**Based on answer to Q.11.

Q.13 If you joined a carpool, as a result of the Commuter Computer program, that has since disbanded -

a. How long did it last?

_____ days/weeks/months (Circle appropriate)

Category	Frequency	Adjusted %
1 - 13 weeks	44	64.7%
14 - 26 weeks	18	26.5
27 - 39 weeks	6	8.8
Total	68	100.0

b. Why did it disband? (Check as many as applicable)

	Frequency	% of Respondents Citing Item*
Members experienced difficulties adhering to schedule	21	34.4%
Too inconvenient (e.g., members lived too far apart)	6	9.8
Members disliked lack of freedom	11	18.0
Members disliked reduced privacy	2	3.3
Members did not get along with each other	3	4.9
Gasoline became more readily available	6	9.8
Other (specify_____)	44	72.1
Total respondents	61	

*Percentages add to more than 100 due to multiple responses.

Q.14 Are you still interested in forming a carpool?

Category	Frequency	Adjusted %
Yes	2331	76.2%
No	729	23.8
Total responding to question	3060	100.0
No response	137 (4.2%)	
Total noncarpoolers	3197*	

* Based on answer to Q.10.

Questions 15 through 24 apply to carpoolers.

Q.15 How long have you been in your current carpool?
_____ days/weeks/months (Circle appropriate)

Category	Frequency	Adjusted %
0 - 6 months	493	48.9%
7 - 12 months	336	33.4
13 - 18 months	36	3.6
24 months or more	142	14.1
Total responding to question	1007	100.0
No response	77 (7.1%)	
Total carpoolers	1084*	

Q.16 How, if at all, did the Commuter Computer program affect the size or membership of your carpool?

Category	Frequency	Adjusted %
No effect	749	70.2%
I joined a carpool which formed as a result of the Commuter Computer program	92	8.6
I joined a carpoool which had existed before the Commuter Computer program	106	9.9
New member(s) joined my carpool which had existed before the Commuter Computer program	58	5.4
Other (specify)_____	63	5.9
Total responding to question	1068	100.0
No response	16 (1.4%)	
Total carpoolers	1084*	

*Based on answer to Q.10.

Q.17 How many people are in your carpool (including yourself)? _____

Category	Frequency	Adjusted %
Two	375	35.3%
Three	288	27.1
Four	237	22.3
Five or more	162	15.3
Total responding to question	1062	100.0
No response	22 (2.0%)	
Total carpoolers	1084*	

Q.18 How many days a week do you usually travel to work in your carpool?_____

Category	Frequency	Adjusted %
1	5	0.5%
2	27	2.5
3	66	6.2
4	187	17.5
5	778	72.9
6	4	0.4
Total responding to question	1067	100.0
No response	17 (1.5%)	
Total carpoolers	1084*	

Q.19 Which of the following best describes your carpool arrangement? (Check one)

Category	Frequency	Adjusted %
Driving is shared by all carpool members	659	61.3%
Driving is shared by some carpool members	114	10.6
One person drives all the time	294	27.3
Other (specify)_____	9	0.8
Total responding to question	1076	100.0
No response	8 (0.7%)	
Total carpoolers	1084*	

*Based on answer to Q.10.

Q.20 How long does it usually take you to get to work under each of the following conditions:

When you drive by yourself:

Category	Frequency	Adjusted %
1 - 9 min.	1	.1%
10 - 19 min.	23	2.2
20 - 29 min.	100	9.6
30 - 39 min.	251	24.1
40 - 49 min.	317	30.4
50 - 59 min.	108	10.4
60 min. or more	242	23.2
Total responding to question	1042	100.0
No response	42 (3.9%)	
Total carpoolers	1084*	

Average time for 1042 respondents: 44 minutes

When you drive the other members of your carpool:

Category	Frequency	Adjusted %
1 - 9 min.	3	.3%
10 - 19 min.	11	1.2
20 - 29 min.	50	5.2
30 - 39 min.	155	16.2
40 - 49 min.	257	26.9
50 - 59 min.	147	15.4
60 min. or more	333	34.8
Total responding to question	956	100.0
No response	128 (11.8%)	
Total carpoolers	1084*	

Average time for 956 respondents: 48 minutes

*Based on answer to Q.10.

Q.20 continued

When you are a passenger in your carpool:

Category	Frequency	Adjusted %
1 - 9 min.	2	.2%
10 - 19 min.	16	1.5
20 - 29 min.	78	7.5
30 - 39 min.	190	18.2
40 - 49 min.	268	25.7
50 - 59 min.	129	12.4
60 min. or more	359	34.5
Total responding to question	1042	100.0
No response	42 (3.9%)	
Total carpoolers	1084*	

Average time for 1042 respondents: 50 minutes

*Based on answer to Q.10.

Q.21 Please check your main reason(s) for wanting to join a carpool? (Check as many as applicable)

Category	Frequency	% of Respondents Citing Item*
Wanted to share expense	812	74.9%
Wanted to share driving	416	38.4
Wanted to increase availability of car to other household members	309	28.5
Wanted company during journey to work	233	21.5
Wanted to help alleviate problems of fuel shortage, congestion, pollution, etc.	704	64.9
Dissatisfied with how I was commuting to work	211	19.5
Had no other means of getting to work	46	4.2
Other (specify) _____	63	5.8
Total responding to question	1084	
No response	0	
Total carpoolers	1084**	

Q.22 Please check the feature or features of carpooling you like most. (Check as many as applicable)

Category	Frequency	% of Respondents Citing Item*
Cost savings	912	84.1%
Driving relief	548	50.6
Increased availability of car to other household members	310	28.6
Companionship	391	36.1
Helping to alleviate congestion, pollution problems	593	54.7
Time savings	125	11.5
Increased convenience	216	19.9
Other (specify)	48	4.4
Total responding to question	1084	
No response	0	
Total carpoolers	1084**	

* Percentages add to more than 100 due to multiple responses.
** Based on answer to Q.10.

Q.23 Please check the feature or features of carpooling you like least. (Check as many as applicable)

Category	Frequency	% of Respondents Citing Item*
Difficulties of adhering to schedule	287	26.5%
Reduced independence and mobility	655	60.4
Inconvenience	201	18.5
Increased travel time	196	18.1
Responsibility to other members of carpool	202	18.6
Reduced privacy	86	7.9
Other people's driving habits	233	21.5
Other (specify)	59	0.5
Total responding to question	1084	
No response	0	
Total carpoolers	1084**	

*Percentages add to more than 100 due to multiple responses.
**Based on answer to Q.10.

Q.24 How satisfied are you with your current carpool?

Category	Frequency	Adjusted %
Very satisfied	669	61.9%
Moderately satisfied	391	36.2
Dissatisfied	20	1.9
Total responding to question	1080	100.0
No response	4 (0.3%)	
Total carpoolers	1084*	

*Based on answer to Q.10.

Questions 25 through 31 apply to all respondents.

Q.25 Are you a licensed driver?

Category	Frequency	Adjusted %
Yes	4128	97.4%
No	111	2.6
Total responding to question	4239	100.0
No response	54 (1.3%)	
Total	4293	

Q.26 How many drivers live in your household (including yourself)? _____

Category	Frequency	Adjusted %
1	651	15.7%
2	2747	66.1
3	426	10.3
4	222	5.3
5 or more	108	2.6
Total responding to question	4154	100.0
No response	139 (3.2%)	
Total	4293	

Q.27 How many autos are there in your household?_____

Category	Frequency	Adjusted %
0	116	2.7%
1	1598	37.8
2	2044	48.3
3	354	8.4
4	84	2.0
5 or more	34	0.8
Total responding to question	4230	100.0
No response	63 (1.4%)	
Total	4293	

Q.28 Age

Category	Frequency	Adjusted %
25 or under	682	17.1%
26-35	1799	45.0
36-45	745	18.7
46-55	492	12.3
56-65	261	6.5
66 or over	16	0.4
Total responding to question	3995	100.0
No response	298 (6.9%)	
Total	4293	

Q.29 Education

Category	Frequency	Adjusted %
Attended grade school	3	0.1%
Finished grade school	24	0.6
Finished high school	641	15.4
Attended college	897	21.6
Finished college	2585	62.3
Total responding to question	4150	100.0
No response	143 (3.3%)	
Total	4293	

Q.30 Occupation

Category	Frequency	Adjusted %
Professional, technical and kindred workers	2082	48.5%
Managers, administrators officials and proprietors	708	16.5
Clerical and kindred workers	561	13.1
Sales workers	31	0.7
Operatives and transit workers	45	1.0
Craftsmen, foremen, etc.	169	3.9
Laborers	20	0.5
Service workers	57	1.3
Unemployed	187	4.4
Other	433	10.1
Total responding to question	4293	100.0
No response	0	
Total	4293	

Q.31 Annual personal income

Category	Frequency	Adjusted %
Less than $5,000	169	4.2%
$5,000-9,999	912	22.9
$10,000-14,999	1319	33.1
$15,000-24,999	1285	32.3
$25,000 and over	297	7.5
Total responding to question	3982	100.0
No response	311 (7.2%)	
Total	4293	

Data from original matching request applications.

Table C-1

Sex	Frequency	Adjusted %
Male	2848	66.3
Female	1445	33.7
Total responding to question	4293	100.0
No response	0	
Total	4293	

Table C-2

Origin	Frequency	Adjusted %
Boston	45	1.0
0 - 5 mi. from core	455	10.6
5 - 10 mi. from core	765	17.8
10 - 15 mi. from core	749	17.4
15 - 20 mi. from core	656	15.3
20 - 25 mi. from core	631	14.7
25 - 30 mi. from core	484	11.3
30 - 40 mi. from core	155	3.6
Other Massachusetts	146	3.4
New Hampshire	185	4.3
Rhode Island	20	.5
Other	2	.1
Total responding to question	4293	100.0
No response	0	
Total	4293	

Table C-3

Destination	Frequency	Adjusted %
Boston	1487	34.7
Downtown	1106	25.8
Within Route 128	394	9.2
Along Route 128	892	20.8
Outside Route 128	230	5.3
MBTA Drive/Ride Locations	180	4.2
Total responding to question	4289	100.0
No response	4	
Total	4293	

Table C-4

Arrival Time	Frequency	Adjusted %
6:30 a.m.	75	1.7
7:00 a.m.	210	4.9
7:30 a.m.	471	11.0
8:00 a.m.	1308	30.5
8:30 a.m.	1378	32.1
9:00 a.m.	763	17.8
9:30 a.m.	88	2.0
Total responding to question	4293	100.0
No response	0	
Total	4293	

Table C-5

Departure Time	Frequency	Adjusted %
3:30 p.m.	161	3.8
4:00 p.m.	146	3.4
4:30 p.m.	397	9.2
5:00 p.m.	896	20.9
5:30 p.m.	1904	44.4
6:00 p.m.	563	13.1
6:30 p.m.	223	5.2
Total responding to question	4290	100.0
No response	3	
Total	4293	

APPENDIX D

TABULATION OF RESPONSES TO EASTERN MASSACHUSETTS SURVEY

Q.1 How do you usually travel to work (Check one)?

Category	Frequency	Adjusted %
Car	2457	86.0%
Public transportation	162	5.7
Combination car and public transportation	143	5.0
Taxi	0	0.0
Alternating between car and other mode*	22	0.8
Other	72	2.5
Total responding to question	2856	100.0
No response	0	
Total	2856	

*This category did not appear on the questionnaire but was written in by respondents under "Other."

Q.2 About how many miles do you travel to work one way (from home to work)?

_____ miles

Category	Frequency	Adjusted %
0 - 4 miles	632	22.7%
5 - 9 miles	598	21.5
10 - 14 miles	510	18.3
15 - 19 miles	354	12.7
20 - 29 miles	444	15.9
30 - 39 miles	168	6.0
40 miles or more	81	2.9
Total responding to question	2787	100.0
No response	69 (2.4%)	
Total	2856	

Q.3 How long does it usually take you to travel to work one way (from home to work)?

_____ hours _____ minutes

Category	Frequency	Adjusted %
0 - 9 mins.	232	8.3%
10 - 19 mins.	681	24.5
20 - 29 mins.	597	21.4
30 - 39 mins.	518	18.6
40 - 49 mins.	467	16.8
50 - 59 mins.	95	3.4
60 min. or more	194	7.0
Total responding to question	2784	100.0
No response	72 (2.5%)	
Total	2856	

Q.4 Are you currently a member of a carpool? (A carpool is defined as 2 or more people who ride together on a regular basis, including family members).

Category	Frequency	Adjusted %
Yes	520	18.2%
No	2336	81.8
Total responding to question	2856	100.0
No response	0	
Total	2856	

Questions 5 through 11 apply to carpoolers.

Q.5 How long have you been in your carpool?
_____days/weeks/months (Circle appropriate)

Category	Frequency	Adjusted %
0 - 1/2 yr. (0-26 wks.)	113	21.7%
1/2 - 1 yr. (27-52 wks.)	135	26.0
1 - 2 yrs. (53-104 wks.)	71	13.6
3 - 10 yrs. (105-520 wks.)	92	17.7
Over 10 yrs. (521-1300 wks.)	31	6.0
Less than 1 year (exact duration unknown)	56	10.8
1 year or more (exact duration unknown)	22	4.2
Total responding to question	520	100.0
No response	0	
Total carpoolers	520*	

Q.6 How did you usually travel to work before you joined a carpool? (Check one)

Category	Frequency	Adjusted %
Car - drove alone	376	74.9%
Public transportation	55	10.9
Car and public transportation	38	7.6
Taxi	1	0.2
Other	32	6.4
Total responding to question	502	100.0
No response	18 (3.5%)	
Total carpoolers	520*	

*Based on answer to Q.4.

Q.7 Initially, what were your main reasons for wanting to join a carpool? (Give as many as apply to you)

Category	Frequency	% of Respondents Citing Item*
Cost savings	299	62.0%
Driving relief	50	10.4
Increased availability of car to other family members	39	8.1
Companionship	47	9.8
Environmental concern	19	4.0
Energy crisis	72	14.9
Other needed ride to work	35	7.3
Others travel same way	54	11.2
Public transit not available	15	3.1
Dissatisfaction with transit	37	7.7
Convenient	46	9.5
Other reason	26	5.4
Total responding to question	482	
No response	38 (7.3%)	
Total carpoolers	520**	

*Percentages add to more than 100 due to multiple responses.
**Based on answer to Q.4.

Q.8 How was your carpool formed? (Check one)

Category	Frequency	Adjusted %
Family members decided to ride together	92	17.9%
Neighbors decided to ride together	88	17.2
People at work got together informally	299	58.3
Through employer/ company program	19	3.7
Through community-sponsored program	0	0.0
Through ads in newspaper	5	1.0
Through WBZ/ALA Commuter Computer Program	1	0.2
Other (specify)_____	9	1.7
Total responding to question	513	100.0
No response	7 (1.3%)	
Total carpoolers	520*	

Q.9 How many people are in your carpool (including yourself)? _____

Category	Frequency	Adjusted %
Two	260	50.3%
Three	141	27.3
Four	64	12.4
Five	27	5.2
Six	19	3.6
Seven	2	0.4
Eight	1	0.2
Nine	3	0.6
Total responding to question	517	100.0
No response	3 (0.6%)	
Total carpoolers	520*	

*Based on answer to Q.4.

Q.10 Which of the following best describes your carpool arrangement? (Check one)

Category	Frequency	Adjusted %
Driving is shared by all carpool members	260	50.6%
Driving is shared by some carpool members	41	8.0
One person drives all the time	213	41.4
Other (specify)_____	-	-
Total responding to question	514	100.0
No response	6 (1.2%)	
Total carpoolers	520*	

Q.11 How long does it usually take you to get to work under each of the following conditions:

When you drive by yourself:

Category	Frequency	Adjusted %
0 - 9 min.	20	4.1%
10 - 19 min.	85	17.3
20 - 29 min.	125	25.4
30 - 39 min.	109	22.2
40 - 49 min.	108	22.0
50 - 59 min.	18	3.7
60 min. or more	26	5.3
Total responding to question	491	100.0
No response	29 (5.6%)	
Total carpoolers	520*	

Average time for 491 respondents: 32.0 minutes

*Based on answer to Q.4.

Q.11 continued

When you drive the other members of your carpool:

Category	Frequency	Adjusted %
0 - 9 min.	14	3.1%
10 - 19 min.	48	10.6
20 - 29 min.	107	23.5
30 - 39 min.	100	22.0
40 - 49 min.	104	22.9
50 - 59 min.	33	7.3
60 min. or more	48	10.6
Total responding to question	454	100.0
No response	66 (12.7%)	
Total carpoolers	520*	

Average time for 454 respondents: 36.4 minutes

When you are a passenger in your carpool:

Category	Frequency	Adjusted %
0 - 9 min.	11	2.7%
10 - 19 min.	53	13.1
20 - 29 min.	98	24.3
30 - 39 min.	91	22.5
40 - 49 min.	98	24.3
50 - 59 min.	22	5.4
60 min. or more	31	7.7
Total responding to question	404	100.0
No response	116 (22.3%)	
Total carpoolers	520*	

Average time for 404 respondents: 34.9 minutes

*Based on answer to Q.4.

Questions 12 through 16 apply to noncarpoolers.

Q.12 How interested would you be in joining a carpool? (Check one)

Category	Frequency	Adjusted %
Very interested	196	8.5%
Somewhat interested	368	16.0
Not very interested	454	19.7
Not at all interested	1287	55.8
Total responding to question	2305	100.0
No response	31 (1.4%)	
Total noncarpoolers	2336*	

*Based on answer to Q.4.

Q.13 What are your main reasons for feeling this way? (Give as many as apply to you)

Category (Positive reasons)	Frequency	% of Respondents Citing Item*
Cost savings	257	45.6%
Driving relief	52	9.2
Increased availability of car to other family members	26	4.6
Companionship	44	7.8
Environmental concern	37	6.6
Energy crisis	40	7.1
Dissatisfaction with transit	25	4.4
Convenient	15	2.7

*Percentage of all noncarpoolers who answered Q.12 "very interested" or "somewhat interested" (n=564). In all but a few cases interested respondents listed positive reasons and non-interested respondents gave negative reasons. Percentages add to more than 100 percent due to multiple responses.

Q.13 continued

Category (Negative reasons)	Frequency	% of Respondents Citing Item*
Reduced mobility and independence	250	14.4%
Inconvenience	133	7.6
Increased travel time	42	2.4
Reduced privacy	35	2.0
Other people's driving habits	23	1.3
Unusual or irregular working hours	944	54.2
Car needed during day	71	4.1
Car needed before and/or after work	137	7.9
Car needed because of type of work	426	24.5
Distance to work is short	221	12.7
Others do not travel in same direction	153	8.8
Uses mass transit	22	1.3
Satisfaction with mass transit	117	6.7
Other reason	152	8.7
No response	127	7.3

*Percentage of all noncarpoolers who answered Q.12 "not very interested" or "not at all interested" (n=1741). Percentages add to more than 100 due to multiple responses.

Q.14 Have you ever been a member of a carpool before?

Category	Frequency	Adjusted %
Yes	656	29.3%
No	1580	70.7
Total responding to question	2236	100.0
No response	100 (4.3%)	
Total noncarpoolers	2336*	

*Based on answer to Q.4.

Q.15 Why did you stop carpooling? (Give as many reasons as apply to you)

Category	Frequency	% of Respondents Citing Item*
Members experienced difficulties adhering to schedule	114	17.8%
Too inconvenient (e.g. members lived too far apart)	42	6.6
Members disliked lack of freedom	25	3.9
Members disliked reduced privacy	7	1.1
Members did not get along with each other	21	3.3
Gasoline became more readily available	6	0.9
One or more members moved, changed jobs or stopped working	407	63.5
One or more members' work schedule changed	60	9.4
Other reason	65	10.1
Total responding to question	641	
No response	15 (2.3%)	
Total former carpoolers	656**	

*Percentages add to more than 100 due to multiple responses.
**Based on answer to Q.14.

Q.16 Below is a list of some incentives that could be used to encourage carpooling. For each one, please indicate how likely you would be to carpool if the incentive were implemented.

1. Carpool matching service provided by employers or public agencies for commuters interested in carpooling

Category	Frequency	Adjusted %
Likely	713	39.2%
Not likely	1105	60.8
Total responding to question	1818	100.0
No response	518 (22.2%)	
Total noncarpoolers	2336*	

2. Preferential or reserved parking at destination point

Category	Frequency	Adjusted %
Likely	664	37.3%
Not likely	1115	62.7
Total responding to question	1779	100.0
No response	557 (23.9%)	
Total noncarpoolers	2336*	

*Based on answer to Q.4.

Q.16 continued

3. Low-cost or free parking near or next to highways where you could meet other members of your carpool

Category	Frequency	Adjusted %
Likely	622	35.2%
Not likely	1144	64.8
Total responding to question	1766	100.0
No response	570 (24.4%)	
Total noncarpoolers	2336*	

4. Lower tolls for carpools during rush hours

Category	Frequency	Adjusted %
Likely	492	28.6%
Not likely	1228	71.4
Total responding to question	1720	100.0
No response	616 (26.4%)	
Total noncarpoolers	2336*	

5. Special lanes at highway entrance ramps that would allow carpools onto highways faster than other cars

Category	Frequency	Adjusted %
Likely	452	26.3%
Not likely	1265	73.7
Total responding to question	1717	100.0
No response	619 (26.5%)	
Total noncarpoolers	2336*	

*Based on answer to Q.4.

Q.16 continued

6. Gas tax refund or income tax refund for carpoolers

Category	Frequency	Adjusted %
Likely	963	53.2%
Not likely	847	46.8
Total responding to question	1810	100.0
No response	526 (22.6%)	
Total noncarpoolers	2336*	

7. Reserved highway lane for carpools

Category	Frequency	Adjusted %
Likely	476	27.8%
Not likely	1237	72.2
Total responding to question	1713	100.0
No response	623 (26.7%)	
Total noncarpoolers	2336*	

8. Free or lower parking fees for carpoolers

Category	Frequency	Adjusted %
Likely	680	38.7%
Not likely	1075	61.3
Total responding to question	1755	100.0
No response	581 (24.9%)	
Total noncarpoolers	2336*	

*Based on answer to Q.4.

Q.17 In the last few months have you heard or seen anything about the WBZ/ALA Commuter Computer Program?

Category	Frequency	Adjusted %
Yes	2179	80.3%
No	533	19.7
Total responding to question	2712	100.0
No response	144 (5.0%)	
Total	2856	

Questions 18 through 27 apply to all respondents.

Q.18 What city or town do you live in? _____

Category	Frequency	Adjusted %
Ring 1 (Boston)	224	7.9%
Ring 2 (0-5 miles)	163	5.8
Ring 3 (6-10 miles)	541	19.2
Ring 4 (11-15 miles)	572	20.3
Ring 5 (16-20 miles)	456	16.2
Ring 6 (21-25 miles)	412	14.6
Ring 7 (26-30 miles)	365	12.9
Ring 8 (31-40 miles)	79	2.8
Ring 9 (All other Mass. towns)	10	2.8
Total responding to question	2822	100.0
No response	34 (1.2%)	
Total	2856	

Q.19 What city or town do you work in? _____

Category	Frequency	Adjusted %
Ring 1 (Boston)	748	27.6%
Ring 2 (0-5 miles)	220	8.1
Ring 3 (6-10 miles)	377	13.9
Ring 4 (11-15 miles)	471	17.4
Ring 5 (16-20 miles)	357	13.2
Ring 6 (21-25 miles)	224	8.3
Ring 7 (26-30 miles)	185	6.8
Ring 8 (31-40 miles)	51	1.9
Ring 9 (All other Mass. towns)	76	2.8
Total responding to question	2709	100.0
No response	147 (5.1%)	
Total	2856	

Q.20 Sex

Category	Frequency	Adjusted %
Male	2242	78.9%
Female	598	21.1
Total responding to question	2840	100.0
No response	16 (0.6%)	
Total	2856	

Q.21 Are you a licensed driver?

Category	Frequency	Adjusted %
Yes	2803	99.2%
No	23	0.8
Total responding to question	2826	100.0
No response	30 (1.1%)	
Total	2856	

Q.22 How many drivers live in your household (including yourself)? _____

Category	Frequency	Adjusted %
0	5	0.2%
1	558	19.7
2	1521	53.8
3	468	16.6
4	200	7.1
5	51	1.8
6	16	0.5
7	5	0.2
8	2	0.1
Total responding to question	2826	100.0
No response	30 (1.1%)	
Total	2856	

Q.23 How many autos are there in your household? _____

Category	Frequency	Adjusted %
0	11	0.4%
1	1019	35.9
2	1395	49.2
3	311	11.0
4	76	2.7
5	16	0.6
6	7	0.2
7	0	-
8	1	-
Total responding to question	2836	100.0
No response	20 (0.7%)	
Total	2856	

Q.24 Please check your age category.

Category	Frequency	Adjusted %
25 or under	200	7.1%
26-35	757	26.7
36-45	739	26.1
46-55	690	24.4
56-65	386	13.6
66 or over	59	2.1
Total responding to question	2831	100.0
No response	25 (0.9%)	
Total	2856	

Q.25 Please check your educational category.

Category	Frequency	Adjusted %
Attended grade school	16	0.6%
Finished grade school	107	3.8
Finished high school	745	26.4
Attended college	647	22.9
Finished college	1307	46.3
Total responding to question	2822	100.0
No response	34 (1.2%)	
Total	2856	

Q.26 Occupation (please describe briefly the kind of work you do -- for example, retail salesperson, construction worker, etc.) _____

Category	Frequency	Adjusted %
Professional, technical and kindred workers	1023	37.2%
Managers, administrators, officials and proprietors	622	22.6
Sales workers	191	7.0
Clerical and kindred workers	327	11.9
Craftsmen, foremen, etc.	275	10.0
Operatives and transit workers	131	4.8
Laborers	68	2.5
Service workers	111	4.0
Total responding to question	2748	100.0
No response	108 (3.8%)	
Total	2856	

Q.27 Annual personal income

Category	Frequency	Adjusted %
Less than $5,000	114	4.2%
$5,000-9,999	464	17.1
$10,000-14,999	886	32.7
$15,000-24,999	846	31.3
$25,000 and over	398	14.7
Total responding to question	2708	100.0
No response	148 (5.2%)	
Total	2856	

APPENDIX E

INFORMATION ON MASSPOOL PROGRAM

Figure E-1 is a fact sheet describing the MASSPOOL Program, the statewide carpooling program implemented by the Massachusetts Executive Office of Transportation and Construction in September, 1975. This program involves areawide promotion and employer matching for the large cities in the State.

210 South Street
Boston MA 02111
617 542 4080

Alan M. Voorhees & Associates, Inc.
Skidmore, Owings & Merrill

Masspool Commonwealth of Massachusetts Carpooling Program

Fact Sheet

PROGRAM TITLE: MASSPOOL - Commonwealth of Massachusetts Ride Sharing Program

SPONSORING AGENCIES: Massachusetts Executive Office of Transportation and Construction - Department of Public Works, Federal Highway Administration

MASSPOOL HEADQUARTERS: 210 South Street
Boston, Massachusetts 02111
617/542-4080

SCOPE OF PROGRAM AND DURATION: Provide technical assistance to large employers statewide to encourage the use of car pools, van pools, public transportation, and other energy efficient forms of transportation to and from places of employment and education; two year program having commenced September, 1975.

MASSPOOL GOALS AND OBJECTIVES: To provide a low cost transportation alternative to single occupant commuting across the state through implementation of continuing ride-sharing programs.

Primary benefits realized from increased ride sharing are:

- reduction in individual commuting costs
- fuel savings
- reduced congestion
- less pollution
- reduction in parking requirements

RANGE OF SERVICES: Masspool is a cooperative effort between the Masspool team and large employers. The Masspool team provides promotional services, proven employee matching techniques, an expert staff and all questionnaires, matching maps, and employee brochures needed to help employers establish continuing ride sharing programs. An estimated 800,000 people working in firms employing more than 250 employees will receive individual assistance through employer site visits. This represents approximately 40 percent of all Massachusetts employees.

Specific services to be provided to individual employers include:

1. Instructional Kit including "how to" carpool/vanpool handbook, employer summary brochure, employee brochure with matching maps; and matching questionnaires.
2. Promotional material including carpool posters, bumper stickers, press releases and public service announcements.

Figure E-1 MASSPOOL Fact Sheet

3. Transit information including route maps, schedules, and specia marketing services, such as MBTA Prepaid Pass Program informatio

4. Personal site visits to provide individual technical assistance to employers.

5. Telephone informational service for all employers to obtain assistance in implementing carpool/vanpool program.

6. Program maintenance effort to insure continuing program effectiveness.

7. Program evaluation to assist in establishing guidelines for follow-up actions.

PROGRAM BENEFITS:

EMPLOYEE

- Drastically reduced commuting costs (as much as $700 savings per year for a 3-person carpool plus an additional $1000 per year if the commuting car is sold)
- Reduced insurance premiums for personal automobile when not driven to work
- Reduced mileage on personal automobile and/or increased mobility for other family members
- Reduced risks and tensions while commuting

EMPLOYER

- Reduction in parking facilities and investment and maintenance in parking
- Reduction in on-site traffic congestion
- Broadens labor market
- Less tardiness and absenteeism
- Better community relations

GENERAL PUBLIC

- Reduced air and noise pollution
- Reduced energy consumption
- Reduced traffic congestion on streets and highways
- Reduced land use for auto-related facilities

Figure E-1 MASSPOOL Fact Sheet (cont.)

APPENDIX F

ANALYSIS OF WBZ/ALA PARTICIPANTS' ATTITUDES TOWARD PROGRAM PROMOTIONAL EFFORT

As described in Chapter II, the WBZ/ALA promotional effort utilized television, radio, newspapers, magazines, and billboard advertisements, as well as station editorials and a 90-minute TV special consisting of humorous skits and informative presentations about carpooling. Respondents to the WBZ/ALA Follow-Up Survey were asked to recall which promotional efforts they had seen or heard in connection with the program. Table F-1 shows that radio ads led the way with nearly two-thirds of all respondents recalling such ads. This is not surprising, as almost two-thirds of all respondents drove alone to work and presumably were exposed to radio during the worktrip.

TABLE F-1 COMMUTER COMPUTER PROGRAM PROMOTIONAL EFFORT: PERCENT RECALLING EACH MEDIA TYPE

Media Type	Percent of WBZ/ALA Respondents Recalling Media Type (N=4,293)
Radio ads	67%
TV ads, editorials	56
Newspaper ads	34
Billboards	11
Magazines	6

More than half of the respondents recalled viewing TV ads or editorials; almost 40% saw the WBZ-TV Special Carpooling Program.

Respondents were also asked to select the one type of promotional effort which most appealed to them. Not surprisingly, these results ranked the various media categories in the same order as the results of the preceding question (see Table F-2).

TABLE F-2 COMMUTER COMPUTER PROGRAM PROMOTIONAL EFFORT: PERCENT SELECTING EACH MEDIA TYPE AS MOST APPEALING

Media Type	Percent of WBZ/ALA Respondents Selecting Media Type (N=4,293)
Radio ads	38%
TV ads, editorials	27
Special program	19
Newspaper ads	6
Billboards	1
Magazines	1
No response	7
Total	100%

This question had a high non response rate relative to other questions. Among other possiblities, this may indicate that no form of the promotional efforts used appealed to these respondents.

Additional insight into promotional effects can be gleaned by examining respondents' preferences for the most appealing promotional effort on the basis of demographic characteristics. In general, radio ads were most frequently

selected by respondents who tended to have the following characteristics: an annual income of over $10,000, a college education, under 45 years old, and occupationally, a professional, manager, or craftsperson. The popularity of radio ads among the over $10,000 income groups can probably be explained in terms of opportunity for exposure, i.e. driving alone. Among those earning over $10,000 per year (n=2,901), approximately 70% drove alone; while among those earning less than $10,000 per year (n=1,081), 51% drove alone. On the other hand, TV ads/editorials and the Special were most popular among those with incomes below $10,000 per year, a high school education, and clerical positions -- i.e., persons who tend to rely more on public transit.

The finding that radio and television appealed to complementary groups, coupled with the relatively limited recall of and response to other aspects of the campaign, suggests that radio and television might have been sufficient media types for the WBZ/ALA Program. However, for other areawide programs which might not have the resources available for saturation-level radio and television promotion, the other forms of media advertising, as well as extensive promotion by employers, would be necessary supplements to radio and television advertising.

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