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**Urban Mass
Transportation
Administration**

THE EFFECTIVENESS OF TELEPHONE INFORMATION SERVICE IN TRANSIT

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Prepared for
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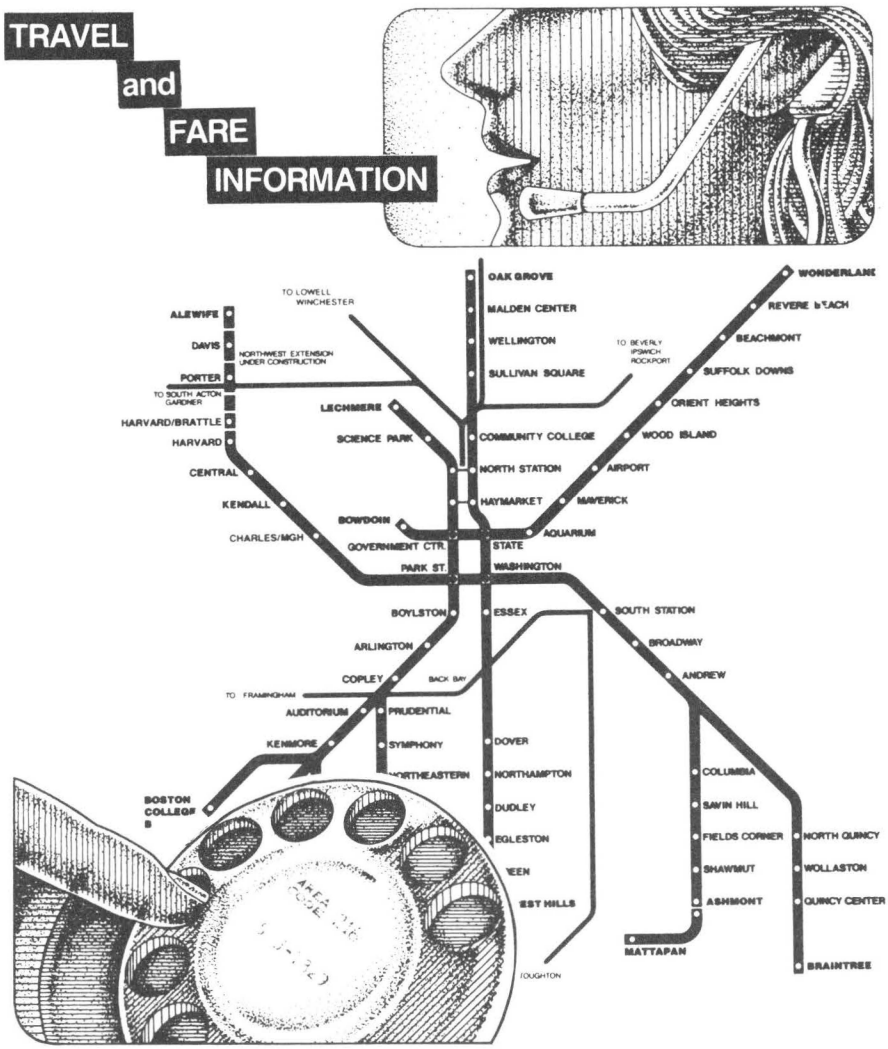

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16. Abstract

This report analyzes the effectiveness of telephone information services provided by public transit authorities in the United States. The report is based primarily on the results of fifteen case studies conducted at diverse transit authorities, as well as a literature search. The following technologies are examined: 1) microfiche and computerized methods of data retrieval; 2) automatic-call-distributor equipment with management information system (MIS) capability; and 3) computerized rider information systems (CRIS). In addition, institutional and labor issues involved in the provision of telephone information service are discussed. The report provides both an issue-by-issue analysis as well as a description of how each case study site provides telephone information, including performance measurements, costs, and benefits.

A draft of this report was reviewed by each case study site which provided primary data, and by the Transportation Systems Center and Urban Mass Transportation Administration. Their comments have been incorporated into the final report in a manner which ensures that the objectivity of the assessment is not compromised.

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PREFACE

This report examines the operation of telephone information services by public transit authorities. This assessment was funded by the U.S. Department of Transportation, Urban Mass Transportation Administration, Office of Technical Assistance. The work was performed by DYNATREND INCORPORATED, under contract to the Transportation Systems Center.

The officials of many public transportation authorities willingly contributed their time and expertise to this project. We would like to particularly thank the following individuals:

Ms. Mary Brouch	Regional Transit Authority (Chicago)
Mr. Doug Anderson	Southern California Rapid Transit District (Los Angeles)
Mr. Michael Noonchester & Mr. Patrick Fowler	Washington Metropolitan Area Transportation Authority
Mr. Larry Coffman & Ms. Mary Peterson	Seattle Metro
Mr. Robert LaShomb & Ms. Carol Armstrong	Metropolitan Transit Commission (St. Paul)
Mr. Robert Prowda & Ms. Lana Nelson	Tri-Metropolitan Transportation Authority of Oregon (Portland)
Mr. Joseph Jakobsche	Metro Transit Agency (Miami)
Mr. Joseph A. Caruso & Mr. Val Salmins	Milwaukee County Transit
Ms. Patricia Garza	VIA Metropolitan Transit (San Antonio)
Mr. Chuck Chapman	Orange County Transit District (California)
Ms. Lynn Lawson	Transit Authority of River City (Louisville)
Mr. Mark Lowthian	San Diego Transit Corporation
Mr. Jack Reilly & Mr. Carmino Basile	Capital District Transportation Authority (Albany)
Mr. Denis Meyers	Lehigh and Northampton Transportation Authority (Allentown)
Ms. Mary Beth McAdams	South Bend Public Transportation Corporation

We would also like to acknowledge the support of Ms. Mary Jane Miner who coordinated this project at the Transportation Systems Center, Mr. John Durham of the Urban Mass Transportation Administration, and Mr. Fred Rutyna of the Transportation Systems Center. The project manager was Mr. Marc Cutler. Technical support was provided by Ms. Ruth Potter.

Three other research projects may be of particular relevance to the reader interested in this subject matter. "Assessment of Transit Passenger Information Systems" (June, 1983), by N.D. Lea, Inc., presents an excellent overview of the concepts discussed in this report, as well as three case studies. "Socio-Economic Impact Assessment of Automated Transit Information Systems (ATIS) Technology-National Report" (draft, May, 1982), by Wilson-Hill Associates, examines in detail the implementation of automated data retrieval systems in Washington (WMATA) and Los Angeles (SCRTD). Presently, the Transportation Systems Center, through several contractors, is conducting in-depth examinations of computerized rider information systems (CRIS) in Pittsburg, Salt Lake City, Columbus, and Erie.

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EXECUTIVE SUMMARY

This report analyzes the effectiveness of telephone information services provided by public transit authorities in the United States. Three general topics are considered:

- How are these services provided, both technologically and institutionally?
- What is the role of telephone information in an overall marketing strategy?
- What are the benefits to a transit authority of providing telephone information, and how can those benefits be measured?

The report is based primarily on the results of 15 case studies conducted at selected transit authorities. These case studies are diverse in terms of geographic location, size of the transit authority, and technologies used to provide telephone information. Three technologies, in particular, are focused on in this study: 1) automated and microfiche methods of data retrieval, 2) automatic-call-distributor (ACD) equipment with management-information-system (MIS) capability, and 3) computerized rider information systems (CRIS). In addition to the case studies, additional research was conducted on methods of quantifying the benefits of telephone information.

The principal findings of the report are summarized below, organized into six issue areas. A statistical summary of the data acquired at the case study sites is provided in Figure 1 at the conclusion of the Executive Summary.

1. The Role of Technology

- **The key finding of this report is that Automatic-Call-Distributor (ACD) equipment with MIS capability has improved the productivity of telephone information services.** This has been accomplished through enhanced monitoring of agent performance. For transit authorities concerned about improving the productivity of their telephone information services, we recommend new ACD equipment as the principal means of accomplishing this goal.
- **The principal demonstrated advantage of automated data retrieval systems is an improvement in the quality and consistency of telephone information.** These systems are able to improve productivity only in conjunction with ACD equipment.
- **There are no demonstrated advantages to microfiche data retrieval systems.** Disadvantages include frequent equipment breakdown, inefficient updating, and difficulty in handling complex itinerary questions.
- **The ability of a computerized rider information system (CRIS) to increase transit ridership in San Diego (a community with a benevolent climate) was not demonstrated.** CRIS is capable of diverting calls from the traditional telephone system, thus enhancing the ability of a transit authority to meet the demand for telephone information.

2. Labor Relations

- **The efficient management of labor is crucial to the productive provision of telephone information service.** Two transit authorities have undertaken dramatic actions. Chicago has contracted out the operation of its telephone service to a private firm utilizing less-costly, non-unionized employees. Portland has replaced most of its live agents with pre-recorded announcements. Both actions have resulted in significant cost reductions. While productivity in Chicago has improved, there are several possible causes. The adequacy of the transit information provided by Portland to all market segments has not been documented.

- **More than half of the case study authorities employ part-time agents and three use predominantly part-timers. No negative impacts were reported.** Part-timers can provide greater flexibility in matching supply of service with demand.

- **Ten of the 15 transit authorities employ unionized telephone agents. Unionization is perceived by management primarily as a limiting factor on the ability of transit authorities to improve agent productivity.**

- **Only three of the 15 transit authorities employ former bus drivers as telephone agents.** Two authorities hope to phase out the practice while Portland has eliminated most of its agents. The other authorities use entry level personnel. Former bus drivers are expensive and perceived as temperamentally unsuited to the job.

3. The Benefits of Telephone Information

- **There is a relationship between telephone information and transit ridership.** Market research conducted by Washington, D.C., and Orange County, California, found that approximately 80% of people who call telephone information take the specific trip about which they called. Of these, Washington found that 67% would not have taken the trip by transit if telephone information had not been available. Extrapolating from these results, Washington estimated a net annual revenue gain of $520,000 generated from telephone information, and a return on the investment in telephone information of 38%.

4. Supply/Demand Ratio (How much telephone information service is provided?)

- **The principal factor in determining the supply/demand ratio of telephone information service is transit authority size and geographic location.** Sunbelt cities (and to a lesser extent small cities) with lower levels of transit knowledge in the community and less frequent transit service have lower ratios of revenue vehicles/agent and passenger trips/call than do other cities. The largest transit authorities have the highest ratios of trips/call due to their high total volume of trips and high trip/capita ratio.

- **Sunbelt cities and small cities have unusually low trips/call ratios but more typical population/call ratios.** The factors which account for this dichotomy are as follows. Riders call for information

relatively frequently due to long headways, lack of traditional transit usage, and a fluid service structure and population base. These factors are reflected in the low trip/call ratios. However, since transit usage has not deeply penetrated the community, most people don't ride or call at all (they are completely outside the transit authority), hence the more typical population/call ratios.

5. Service Efficiency

- **The principal factors impacting service efficiency are ACD equipment, transit authority size, management philosophy, and labor relations.** Larger authorities tend to be less efficient in answering telephone queries due to the greater complexity of questions. Authorities which stress quantity (handling many calls) over quality (providing in-depth answers) are more efficient.

6. Marketing Philosophy

- **The provision of live agent telephone information is almost universally perceived as an essential public service.** However, only half of the transit authority officials who hold this view also believe that telephone information can be a positive marketing tool. These officials tend to represent transit authorities with fluid service area populations and route structures. Only in Portland, Oregon, did we find a serious effort to replace live agent service with another informational tool, pre-recorded route-specific announcements. The ability of this system to meet the needs of new or infrequent riders over the long-term has not been documented.

	Average	Range
1. Percent of Operating Budget Devoted to Marketing Activities:		
Telephone Information	0.6%	0.2%-1.4%
Schedules/Signs	0.4%	0.1%-1.1%
Media Advertising	0.5%	0.0%-1.2%
Total	1.7%	1.0%-2.7%
2. Process Effectiveness Measurements		
a. Hold Levels		
1) Calls sent to hold*	57.75%	5%-90%
2) Average waiting time on hold	1:50	0:08-7:00
3) Lost call level	11.1%	2%-26.4%
b. Ring Busy	15.7%	1%-50%
c. Agent Effectiveness		
1) Calls/Agent/Hour	30.9	20-41
2) Transaction Time	1:50	0:30-3:30
3. Supply/Demand Ratios		
a. Number of Agents		
1) Revenue Vehicles/Total Agents	46.9	17.0-117.9
2) Revenue Vehicles/Peak Period Agents	89.6	28.3-316.9
b. Calls Serviced		
1) Population/Call	1.9	0.7-4.4
2) Passengers Trips/Call	74.0	15-341
4. Costs		
a. Average Starting Agent Salary	$7.07/hour	$4.09-$9.01
b. Average Cost/Call**	$0.50	$0.22-$0.94

*Several authorities automatically place all callers on hold (if only briefly) accounting for the wide range in this factor.
**Does not include the cost of telephone equipment and service.

FIGURE 1. STATISTICAL SUMMARY

1.0 INTRODUCTION

Our original assignment was to develop a methodology for analyzing the benefits of telephone information services provided by public transit authorities, and to employ this methodology at a variety of field settings. The report which we have prepared, while addressing this initial question, has been broadened to include a wide-ranging discussion and analysis of the major issues involved in the provision of telephone information service.

Despite concerted efforts to develop hard data on the value of telephone information, the question of "benefits" remains somewhat theoretical. A variety of methodologies for quantifying the benefits of telephone information are presented in Sections 3.0 and 5.0. We believe that these methodologies can be employed today by transit authorities interested in evaluating the benefits of their telephone information services. However, only three of the transit authorities included as case studies had collected the data necessary to utilize even one of these methodologies.

For the purpose of this report, "telephone information" includes only the provision of information on the services offered by transit authorities, and not complaint-handling and other related functions handled by telephone.

The field of telephone information is particularly interesting and dynamic today due to the introduction of new technologies, encouraged by UMTA's Automated Transit Information System (ATIS) program. Three trends are particularly noteworthy:

- The use of microfiche and computerized methods of agent data retrieval in place of manual retrieval, hard-copy systems.

- The development of Automatic-Call-Distributor (ACD) equipment which can provide detailed management information on the operation of the telephone system as a whole and on the performance of individual telephone information agents. The advancement of this technology has coincided with the break-up of AT&T, making it possible for transit authorities to obtain this equipment in a highly competitive environment.

- The experimentation with computerized rider information systems (CRIS) which provide schedule and status reports on a route-by-route basis by means of a computer-generated voice response system.

The development of these technologies has created both opportunity and dilemmas for transit authorities. All the technologies, in one form or another, hold out the potential for more productive and responsive telephone information service. But they also raise questions. Do they meet the needs of the specific area? Are they consistent with the telephone information and marketing philosophy of the transit authority? Is the capital cost worth the investment?

These questions are particularly important today as transit authorities attempt to adapt both the investment analysis and marketing philosophies of the private sector.

The purpose of this report is not to conduct detailed examinations of these technologies, which others have done very capably. Rather, our purpose is to examine these technologies in a broader context and to compare and contrast them with authorities utilizing more traditional technologies. In particular, we endeavor to raise and answer the following questions:

- What is the role of telephone information? How does it fit into an overall marketing strategy?
- What are the cost and benefits of providing telephone information?
- How do certain qualities of the transit authority relate to the type of telephone information it provides?
- How can the productivity of telephone information be measured?
- What are the institutional arrangements for the provision of telephone information and other marketing activities?
- Given that telephone information is tremendously labor-intensive, what are the labor arrangements under which the telephone information agent works?

A great deal of statistical data was collected in the conduct of this report. This data is utilized to point out trends, employing a variety of analytical techniques. Nevertheless, our approach is primarily eclectic and not statistically-based. The data base is too small to make elaborate claims of statistical validity, although we do believe that the statistics employed in the report are useful for pointing out trends and ranges as well as for making comparative analyses.

We began the research for this report by conducting a thorough literature search and by interviewing individuals active in the field. Appendix A lists the documents reviewed and interviews conducted in this initial phase.

Fifteen on-site case studies were then conducted at transit authorities ranging in size from 57 to 5,071 revenue vehicles. Section 2.0 describes the characteristics of the case study sites, as well as the methodology utilized in selecting and conducting the case studies. Appendix B lists the interviews conducted and documents reviewed in this phase of the project.

Section 3.0 describes the research framework utilized in this report. Section 4.0 discusses the results of the case studies organized around seven critical issues. Section 5.0 provides a more in-depth discussion of methodologies for quantifying the benefits of telephone information. These methodologies were not employed by any of the case study sites. Section 6.0 describes each case study in depth.

The detailed description of the case studies is lengthy and is intended for those with a deep interest in the subject matter. The major findings of the report can be grasped without reading the individual case studies. Each case study description stands alone and so the reader may want to select those

which have maximum relevance due to the characteristics of the transit authority or the telephone information system. These characteristics are outlined in Section 2.0.

Section 5.0 is provided for the reader with an interest in the specific question of the "benefits" of telephone information. Since the methodologies discussed in this section were not employed at the case study sites, it is not necessary to read this Section to grasp the findings of the case studies.

Given the large number of case study sites, transit authorities are referred to throughout this report by city (or county) name, rather than by transit authority name or acronym. This was done to enhance the readability of the report, and is not intended to imply that these transit authorities are city (or county) agencies. A complete listing of the case study authorities is provided in Section 2.0.

The officials of the transit authorities visited were extraordinarily well-organized, knowledgeable, generous of their time, and interested in the project. Their cooperation is appreciated.

2.0 SELECTION AND CONDUCT OF CASE STUDIES

This section discusses the process of selecting the case study sites, and the procedures for carrying out the case studies.

2.1 SELECTION OF CASE STUDY SITES

The selection of case study sites began by contacting all the transit authorities which were represented at the 1979 ATIS Workshop in Washington, DC. Several additional authorities were contacted on the recommendation of the UMTA Project Manager. In many cases, this initial contact produced a reference to another authority which the contact believed had the qualities for which we were looking. In all, 31 transit authorities were contacted.

The goal of the selection process was to chose authorities which utilized a variety of telephone information technologies and which were sufficiently diverse in terms of geography, size, and marketing philosophy.

Figure 2-1 summarizes the characteristics of each case study site. Figure 2-2 provides the address, phone number and contact person at each site. Section 2.1.1 below describes the characteristics of the transit authorities and service areas, while Section 2.1.2 describes the characteristics of the telephone information systems at the selected transit authorities.

2.1.1 Transit Authority Characteristics

The transit authorities in Figure 2-1 are listed in descending order of number of revenue vehicles. This is the most common categorization utilized in the report. It is also the order in which the individual case studies are presented in Section 6.0. Only fixed-route vehicles are included.

The five authorities with more than 1,000 revenue vehicles (Chicago, Los Angeles, Washington, Seattle and St. Paul) are defined as "large" authorities with similar needs and problems. A reader interested in authorities of this size is advised to read the first five case studies in Section 6.0. The next eight authorities listed have between 240 and 660 revenue vehicles apiece and are considered "medium-size" authorities. Subsections 6.6-6.13 in the case study section describe these authorities in depth. The final two authorities (Allentown and South Bend) have 59 and 57 revenue vehicles respectively and are considered "small authorities". They are described in the final two subsections of the case study descriptions.

In addition to number of revenue vehicles, transit authorities are also categorized by service area population and intensity of transit usage. Figure 2-1 (Column 3) illustrates the service area population of each authority in millions of people, and the population rank of the authority among the 15 case study sites.

Intensity (column 4 on Figure 2-1) measures the extent of transit usage by the service area population. Intensity equals the ratio of total annual passenger trips to service area population. Included are large, transit-oriented, densely populated, older cities such as Chicago, Washington, and Milwaukee

Transit Authority	Number of Revenue Vehicles	Population In Millions (Rank)	Intensity Ratio (Rank)	Type of Data Retrieval	Special Characteristics
Regional Transit Authority (RTA) (CHICAGO)	5,071*	7.0 (2)	97.3 (1)	Microfiche	1. Microfiche data retrieval 2. Change to outside contracting firm
Southern California Rapid Transit District (SCRTD) (LOS ANGELES)	2,905	7.1 (1)	53.7 (4)	Automated	1. Automated data retrieval 2. Recent change to new ACD equipment
WASHINGTON Metropolitan Area Transit Authority (WMATA)	2,061	2.7 (3)	51.8 (2)	Automated	1. Automated data retrieval 2. Market research on the impact of telephone information
SEATTLE Metro	1,299	1.3 (7)	48.5 (6)	Manual	De-emphasis of telephone information
Metropolitan Transit Commission (MTC) (ST. PAUL)	1,078	1.8 (4)	42.0 (7)	Automated	1. Automated data retrieval 2. ACD-MIS
Tri-County Metropolitan Transportation District of Oregon (Tri-Met) (PORTLAND)	660	1.0 (9)	40.3 (8)	Microfiche	1. De-emphasis of telephone information 2. Use of pre-recorded schedule information 3. Microfiche data retrieval
Metro Transit Agency (Metrobus) (MIAMI)	608	1.5 (6)	51.8 (5)	Manual	1. Strong emphasis on telephone information 2. Unique demographic area 3. In-process change to new ACD equipment

*Includes all vehicles operated by or under contract to both the RTA and the Chicago Transit Authority (CTA). RTA provides telephone information for both itself and CTA.

FIGURE 2-1. CASE STUDY SITE CHARACTERISTICS

Transit Authority	Number of Revenue Vehicles	Population In Millions (Rank)	Intensity Ratio (Rank)	Type of Data Retrieval	Special Characteristics
MILWAUKEE County Transit System (MCT)	595	1.0 (10)	64.8 (3)	Manual	Recent change to ACD-MIS
VIA Metropolitan Transit (SAN ANTONIO)	546	1.0 (11)	29.7 (9)	Manual	Strong emphasis on telephone information
ORANGE COUNTY Transit District (OCTD)	497	1.9 (5)	16.4 (14)	Microfiche	1. Microfiche data retrieval 2. Market research on the impact of telephone information
Transit Authority of River City (TARC) (LOUISVILLE)	311	0.8 (12)	25.1 (10)	Manual	Strong emphasis on telephone information
SAN DIEGO Transit Corporation (SDT)	280	1.2 (8)	20.8 (11)	Manual	CRIS experiment
Capital District Transportation Authority (CDTA) (ALBANY)	240	0.8 (13)	19.8 (12)	Manual	Reduction in hours of telephone service
Lehigh and Northampton Transportation Authority (LANTA) (ALLENTOWN)	59	0.3 (14)	15.2 (15)	Manual	De-emphasis of telephone information
SOUTH BEND Public Transportation Corporation (TRANSPO)	57	0.2 (15)	18.1 (13)	Manual	Researched expansion of telephone service

FIGURE 2-1. CASE STUDY SITE CHARACTERISTICS (Cont'd)

Regional Transportation Authority 300 North State Street Chicago, IL 60610 Contact: Mary Brouch Section Manager, Consumer Information 312-836-4000	Metrobus (Metro Transit Agency) 3300 NW 32nd Avenue P.O. Box 520887 Miami, FL 33152 Contact: Joseph Jakobsche Director of Planning, Marketing & Scheduling 305-638-6131
Southern California Rapid Transit District 425 South Main Street Los Angeles, CA 90013 Contact: Doug Anderson Systems Coordinator 213-972-3530	Milwaukee County Transit System 4212 West Highland Boulevard Milwaukee, WI 53208 Contact: Joseph Caruso Marketing Director 414-344-4550
Washington Metropolitan Area Transit Authority 600 Fifth Street, NW Washington, DC 20001 Contact: Michael Noonchester Assistant Director of Marketing 202-637-1234	VIA Metropolitan Transit P.O. Box 12489 800 West Myrtle Street San Antonio, TX 78212 Contact: Patricia Garza Director of Marketing Promotions 512-227-5371
Seattle Metro 821 Second Avenue Exchange Building Seattle, WA 98104 Contact: Larry Coffman Director of Marketing 206-447-6666	Orange County Transit District P.O. Box 3005 Garden Grove, CA 92642 Contact: Chuck Chapman Supervisor of Customer Relations 714-971-6332
Metropolitan Transit Commission 801 American Center Building 160 East Kellogg Boulevard St. Paul, MN 55101 Contact: Robert LaShomb Director of Communications 612-221-0939	Transit Authority of River City 1000 West Broadway Louisville, KY 40203 Contact: Lynn Lawson Director of Marketing 502-587-3641
Tri-County Metropolitan Transportation District of Oregon 4012 SE 17th Avenue Portland, OR 97202 Contact: Robert Prowda Marketing Director 503-238-4823	San Diego Transit Corporation P.O. Box 2511 San Diego, CA 92112 Contact: Mark Lowthian Information Services Representative 619-238-0100

FIGURE 2-2. CONTACT INFORMATION - CASE STUDIES

Capital District Transportation Authority 110 Watervliet Avenue Albany, NY 12206 Contact: Jack Reilly Manager of Planning and Development 518-482-1125
Lehigh and Northampton Transportation Authority 12th and Cumberland Streets Allentown, PA 18103-3898 Contact: Denis J. Meyers Director of Development 215-435-4517
South Bend Public Transportation Corporation 901 East Northside Boulevard P.O. Box 1437 South Bend, IN 46624 Contact: Mary Beth McAdams Director of Marketing 219-232-9901

FIGURE 2-2. CONTACT INFORMATION - CASE STUDIES (Cont'd)

with high ratios, as well as small cities and sunbelt cities with much lower ratios. This intensity factor is helpful in explaining some of the differences found in the provision of telephone information service from authority-to-authority. This ratio is included in Figure 2-1 as well as the intensity rank of the authority among all the case study sites.

These authorities also represent a cross-section of geographic locations and modes. Figure 2-3 displays the geographic location of the case studies. Included are two authorities with major rail components (Washington and Chicago), two authorities with single light rail lines (San Diego and Seattle), and two authorities (Miami and Portland) where the advent of rail in the near future is a major factor in determining their attitude toward telephone information.

2.1.2 Telephone Information Characteristics

The following telephone information technologies were included among the case study sites:

1. Data Retrieval Systems
   - Automated
   - Microfiche
   - Manual
2. Automatic-Call Distributor Equipment (ACD) with MIS capability
3. Computerized Rider Information Systems (CRIS)

The following authorities were selected as examples of automated data retrieval: Washington, DC (WMATA), Los Angeles (SCRTD), and St. Paul, Minnesota (MTC). Both Washington and Los Angeles had implemented automated data retrieval under UMTA R&D grants and had been studied previously in considerable depth. The purpose of this report was not to repeat the detailed analysis of automated retrieval previously conducted. For such an analysis, the reader is referred to "Socio-Economic Impact Assessment of Automated Transit Information Systems (ATIS) Technology-National Report," Wilson-Hill Associates, Inc., May 10, 1982[1]. Rather, it was our goal to update developments at these authorities since the completion of the Wilson-Hill study, and to place them in the overall analytical framework described in Section 3.0.

Two authorities were selected as examples of microfiche data retrieval: Chicago (RTA) and Orange County, California (OCTD). In addition, although not selected for this reason, Portland, Oregon (Tri-Met) also utilizes microfiche retrieval. The remaining authorities utilize the traditional method of manual data retrieval.

[1]This is a draft document with final version scheduled for publication.

FIGURE 2-3. GEOGRAPHIC LOCATIONS OF CASE STUDIES

Miami (Metrobus) and Milwaukee (MCT) were selected as examples of authorities which utilize the state-of-the-art ACD equipment permitting intensive monitoring of agent performance. Milwaukee had switched to this equipment a year earlier, and had excellent "before" and "after" data. Miami was about to make the switch and thus was chosen as the first case study in order to capture "before" and "after" data. Unfortunately, as of this writing, technical problems have delayed the implementation of the new ACD equipment. However, Miami provided a most interesting case study for reasons described below. In addition, Chicago, Los Angeles and St. Paul had also recently installed new ACD equipment.

San Diego Transit Corporation (SDT) was selected as the CRIS example. UMTA, in conjunction with the Transportation Systems Center (TSC), is conducting a detailed examination of CRIS technology at 4 sites: Columbus, Erie, Pittsburg, and Salt Lake City. A fifth site, Albany, will be added shortly. It was our desire to avoid any possible conflict and confusion with this on-going project. Therefore, San Diego, which conducted a 6-month CRIS test on its own initiative, was selected as the case study site.

Several authorities were selected because of a very strongly held philosophy regarding the role of telephone information in marketing. Louisville (TARC), South Bend (TRANSPO), San Antonio (VIA), and Miami were selected due to their strong advocacy of telephone information. Portland, Seattle, and Allentown were selected due to their relative de-emphasis of telephone information compared to the four authorities listed above. In Portland, this de-emphasis took the form of a unique technology: the use of pre-recorded route-specific information in lieu of "live" telephone agents.

Albany (CDTA) was selected due to its recent change from 24-hour/day "live" (agent) telephone service to 12-hour/day service. Reduction in the number of "live" service hours proved to be a common phenomenon, and the Albany case study provided interesting insight into the factors which went into making this decision.

Chicago (RTA), although selected initially for its microfiche retrieval system, also proved to be a useful case study for another reason. The RTA had recently contracted out the operation of its telephone information service to a private company. They were the only case study to have done so, and were able to provide illustrative "before" and "after" data. This study was particularly important since labor concerns emerged as a major issue at many authorities.

A final factor in the selection of case studies concerned our desire to include authorities which had conducted market research on the benefits of telephone information. Orange County (in addition to its microfiche retrieval system) was selected for this reason. DYNATREND was also able to coordinate with Washington (WMATA) the implementation and financing of market research evaluating the benefits of telephone information. The results of both the Washington and Orange County research are discussed in detail.

2.2 CASE STUDY CONDUCT

Figure 2-4 summarizes the data requested of the case study sites. These items will be discussed in detail in Section 3.0. This format was first tested in Miami and revised. Further testing and revision followed the second site visit in Albany. A form similar to that shown in Figure 2-4 was sent to each case study site in advance of our visit to enable the appropriate officials to pull together the requested information and arrange interviews. Documentation relating to telephone information was requested and reviewed in advance of the site visit. Appendix B includes a complete list by site visit of all relevant documents and officials interviewed.

The following general categories of information were requested:

- Transit authority and service area background
- Special circumstances
- Marketing philosophy
- Operating statistics
- Institutional and labor arrangements
- Marketing and telephone information costs
- Market research (where applicable to telephone information)
- Future direction in telephone information

Information in each category was not available at or relevant to all the case study sites. Figure 2-5 summarizes the available information by case study site.

Information was obtained either through "hard" data or the observations of one or more officials closely involved in the provision of telephone information at the local transit authority. Generally, the following individuals were interviewed at each site (in some cases, the same individual performed several functions):

- Director of Marketing
- Manager of Telephone Information
- Telephone Information Supervisors
- Telephone Information Agents (where data was not otherwise available)

DATA REQUESTS

The following questions are intended as guidelines to assist your staff in preparing for a site visit. It is not necessary that your system possess hard data in all of these areas. Estimates, proxy data, or the personal perceptions of staff members are desirable in lieu of and in addition to hard data. Where a significant change has occurred in the operation of your telephone information system, "before" and "after" data/perceptions are desirable.

A. BACKGROUND

1. Total number of revenue vehicles
2. Total number of passenger trips
3. Demographics of ridership
4. Population of service area
5. Significant changes in fares, service levels or equipment since January, 1982
6. Fare structure
7. Total annual budget
8. Transit market penetration

B. COST OF OPERATING PRESENT TELEPHONE INFORMATION SYSTEM

1. Operator training
2. Facilities and equipment
3. Direct labor
4. Maintenance/updating of data base
5. Overhead
6. Telephone service
7. Average cost/call

C. PRODUCTIVITY MEASURES OF PRESENT TELEPHONE INFORMATION SYSTEM

1. Number of operators at peak period and on average
2. Hours of operation
3. Percent of calls placed on "hold"
4. Percent of calls "lost" (hang-up after being placed on hold)
5. Average waiting time on "hold"
6. Percent of calls which never get through
7. Calls serviced/hour/day/year
8. Average transaction time (actual time on-line with operator)
9. Average time needed for operator to retrieve information
10. Number of trunk lines

FIGURE 2-4. DATA REQUESTS

D. NATURE OF CALLS AND CALLERS

1. Demographic breakdown of callers
2. Percentage of calls accounted for by "frequent callers" (more than 20 times/month)
3. Purpose of calls:

   - Itinerary ("How do I get from A to B?)
   - Schedule/fare
   - Reassurance
   - Comment/Complaint

E. BUDGET BY CATEGORY FOR ALL TYPES OF MARKETING OTHER THAN TELEPHONE INFORMATION

1. Media Advertising
2. Production/distribution of schedules and brochures
3. Community relations
4. Other

F. INSTITUTIONAL AND LABOR ARRANGEMENTS

1. How are the various marketing functions organized?
2. Are the telephone agents unioned? How does this impact operations?
3. What are agents starting salaries?
4. Are agents entry-level employees or former bus drivers?
5. Are part-time agents employed?
6. How are agents trained?

G. JUSTIFICATION FOR THE PROVISION OF TELEPHONE INFORMATION SERVICE. WHAT IS THE ROLE OF TELEPHONE INFORMATION? WHAT ARE THE GOALS AND OBJECTIVES FOR PROVIDING TELEPHONE INFORMATION?

FIGURE 2-4. DATA REQUESTS (Continued)

TRANSIT AUTHORITY	General Background	Special Circumstances	Marketing Philosophy	Operating Statistics	Institutional & Labor	Marketing & Telephone Costs	Market Research	Future Directions
CHICAGO	●	●	●	●	●	○		
LOS ANGELES	●	●	●	●	●	●		●
WASHINGTON	●	●	●	●	●	●	●	●
SEATTLE	●		●	●	●	●	●	●
ST. PAUL	●	●	●	●	●		●	
PORTLAND	●	●	●	●	●	●	●	●
MIAMI	●		●	●	●	●		
MILWAUKEE	●		●	●	●	○		
SAN ANTONIO	●		●	●	●	●	●	
ORANGE COUNTY	●	●	●	●	●	●	●	●
LOUISVILLE	●		●	●	●	●		
SAN DIEGO	●	●	●	●	●	●		●
ALBANY	●	●	●	●	●	●	●	●
ALLENTOWN	●		●	●	●	●		
SOUTH BEND	●	●	●	●	●	○		

● = Information available

○ = Information partially available

FIGURE 2-5. INFORMATION AVAILABILITY BY CASE STUDY

3.0 EVALUATION METHODOLOGY

The goal of our research was to evaluate the provision of telephone information in a variety of both quantitative and qualitative ways. Section 3.1 below discusses three quantitative factors utilized to measure the efficiency of telephone information at the case study sites. Section 3.2 discusses two techniques for evaluating the effectiveness of telephone information. Effectiveness refers to the external benefits derived from telephone information. Section 3.3 discusses three qualitative areas utilized to enhance the reader's understanding of issues involved in the provision of telephone information.

In some cases, quantitative values were obtained from the initial literature search. These values are presented in this section and compared to the actual case study findings in Section 4.0. For the most part, the data in this report is consistent with previously reported findings.

3.1 MEASURING THE EFFICIENCY OF TELEPHONE INFORMATION

Three types of measurements are utilized in this report to evaluate the efficiency of telephone information at the case study sites. These measurements are as follows:

- Service Efficiency
- Supply/Demand Ratio
- Cost of Producing the Service

Service efficiency measures the productivity of telephone information service. The supply/demand ratio measures the relationship between the supply of telephone information service and the demand for information among the service area population. An authority could be very efficient at producing telephone information, but still not meet the demand for that information. The third factor, cost, measures the amount of resources needed to produce the service. Each type of measurement is described in detail below.

3.1.1 Service Efficiency

The following efficiency measurements are utilized:

- The "hold" phenomenon:

  1) Percentage of calls which go on hold and wait in a queue prior to being handled by an agent.
  2) The length of time the average caller spends on hold.
  3) The percentage of calls which are "lost" from hold, i.e., the caller gets tired of waiting and hangs up.

- The percentage of calls which receive a busy signal and thus cannot get into the system at all.

- The number of calls serviced/agent/hour.

- The average transaction time (on-line with an agent) of each call.

Being placed on hold is a tremendously frustrating experience for the consumer. Many will give up and never call again (and perhaps never ride transit again either). The literature indicates that in the transit industry, it is not unusual for 80-90% of calls to be placed on hold.[1]

A caller who receives a busy signal cannot access the system at all. Industries which place a premium on caller access for marketing success, such as the airlines, consider busy rates in excess of 1-3% to be unacceptable. It is believed that busy rates in the transit industry are much higher.[2]

The literature suggests that the number of calls serviced/agent/hour ranges from 20-40. The number of calls which an agent can handle is inversely related to the average transaction time of each call, and the amount of time which the agent spends in productive activity (actually on-line).

Transaction time consists of three components: 1) the time spent by the agent listening to and understanding the question, 2) the time spent by the agent retrieving the answer to the question, and 3) the time spent by the agent explaining the answer to the caller. A breakdown of transaction time into this format proved difficult to obtain from the case studies, although most could estimate total transaction time. Even among authorities which attempted to make these distinctions, there was a lack of uniformity in assigning activity to one category, and there were frequent time overlaps (if an agent starts to look up an answer while the caller is still speaking, how is that time assigned?). Therefore, only total transaction time is utilized in the report.

Clearly, one would expect some interrelationship among these factors. Productive agents who keep calls brief ought to have an impact on minimizing hold rates. The more calls which go to hold, the greater amount of time each will have to spend on hold, and the more likely callers will drop out. However, it is unlikely that even the most productive agents can overcome a system which is simply inadequate to handle the demand for information. Thus, it was necessary to devise a variety of ways to measure the capacity of the telephone system. These measurements are discussed in Section 3.1.2.

3.1.2 Supply/Demand Ratio

The ability of a telephone information center to meet the demand for information is dependent on two factors: 1) how much demand exists for the service, and 2) the "supply" of telephone information.

The amount of telephone information made available (the supply) can be measured by the number of agents providing the service, and the number of trunk lines feeding into the system. While the efficiency measurements discussed in Section 3.1 will impact the number of calls serviced, one would

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[1]Teleride Corporation, "Telerider: A Marketing Tool for Transit," August, 1982.

[2]Douglas R. Shier and Judith F. Gilsinn, "Cost/Benefit Analysis of Automated Transit Information," June, 1977.

expect a close relationship between the number of agents and the number of calls serviced. Similarly, inadequate trunk line capacity will result in a high percentage of busy signals. If callers receive a busy signal, they cannot be brought into the system and serviced.

Alces, in "Analysis of Results of Telephone Information Systems Survey," suggests a relationship between the number of telephone information agents and revenue vehicles.[3] This relationship is tested in this report in two ways: total agents and peak period agents. Since telephone information is subject to the same peak to base ratio problems as transit service itself, peak period agents are perhaps the most accurate reflection of capacity. However, given the wide variance in the number of hours of live telephone information service provided among the authorities studied, it was felt that total number of agents should also be measured.

The measurement selected for trunk line capacity is the ratio of trunk lines to population. This ratio results in very small decimals which are difficult to compare. Therefore, these values have been converted to percentages of the authority with the best ratio of trunk lines/population of those studied. In other words, Washington has the best ratio of trunk lines to population. This ratio is expressed as "100%" and utilized as the standard to measure the other authorities. Thus, if the ratio at a particular site was half the ratio at Washington, that ratio would be expressed as 50%.

The basic measurement utilized for call demand is the number of calls "serviced". A serviced call is a call actually handled by an agent. It is compared to two variables: total annual passenger trips and service area population. These two variables were utilized to account for the wide variation in trips/capita among the authorities visited. For example, an authority could require many people to generate a single call because most people don't ride transit and hence have no need for information. This same authority could require relatively few trips to generate a call because the people who do ride transit have low knowledge levels and lack other means of obtaining the information.

Of course, "calls serviced" represents only one dimension of demand. If an authority has a capacity problem, there will be many callers unable to access the system as a result of busy signals or long holds from which they hang up. These callers, and those who give up completely, represent "latent demand" for telephone information. Latent demand is measured indirectly in this report by comparing "calls serviced" volumes across different transit authorities. In making a comparison of this type, one must take care to consider all possible factors which may account for observed differences. Therefore, we attempt to account for these differences not only by examining the supply of telephone information, but also by examining the characteristics of the transit authority and its service area population.

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[3]James Alces, "Analysis of Results of Telephone Information System Survey," August, 1980.

APTA estimates the ratio of passenger trips/call to be in the range of 50-100 trips.[4] Chase, Rosen and Wallace estimate a range of 33-100 trips.[5]

3.1.3 The Cost of Providing the Service

The third set of measurements evaluates the cost of providing not only telephone information service at each of the authorities, but also the cost of related marketing activities. As stated at the outset, telephone information is viewed as one component of an overall marketing strategy. It is therefore important to compare the amount of money spent on telephone information to the amount spent on other marketing activities. The amount of funds spent on each marketing activity also provides a quantitative measurement of marketing philosophy, in addition to the qualitative values discussed in Section 3.3. The cost of telephone information can be compared to its revenue generation potential (see Section 3.2) to determine a true cost/benefit ratio.

Since the authorities studied vary so widely in size, it would be futile to compare absolute dollars spent. Rather, the share of the total operating budget spent on each marketing activity is compared. The activities evaluated include the following:

- Schedules (and informational signage)
- Media Advertising
- Community Relations
- Telephone Information
- All Marketing Activities

The cost of telephone service and equipment proved difficult to isolate at many authorities. Often, a single bill for "telephone service" covered all telephone service used by the authority. In addition, the tremendously fluid situation brought about by the break-up of AT&T, with many authorities in the process of converting from leased to owned equipment, made it exceedingly difficult to compare the cost of telephone service. It was decided to include only direct labor and overhead and certain additional costs specific to a particular technology (such as automated or microfiche retrieval) in computing the cost of telephone service and the average cost/call. Thus, figures for cost/call should not be viewed as absolute values but as relative values for comparison purposes only.

Schedules and media advertising, on the other hand, usually reflect material costs (printing schedules, buying media time/space), rather than labor costs, which are not disaggregated in this fashion. Informational signage refers to bus stop signs which include specific schedule information.

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[4]American Public Transit Association (APTA), unpublished.

[5]Chase, Rosen and Wallace, "Integration of Telephone Transit Information Systems in Metropolitan New York-New Jersey," January, 1982.

3.2 MEASURING THE EFFECTIVENESS OF TELEPHONE INFORMATION

There are two categories of benefits which can theoretically be generated by telephone information: quantitative and qualitative. Quantitative benefits are measured by the impact on ridership (and revenue) of telephone information. This measurement should be compared to the cost of producing the service, as discussed in Section 3.1.3. In this way, a transit authority can determine the net financial impact of providing telephone information. Qualitative benefits are discussed in Section 3.3.

Two techniques were utilized at the case study sites for measuring the quantitative benefits of telephone information. These techniques are the controlled experiment and public opinion survey. A third technique, combining public opinion surveys and a formula, is discussed separately in Section 5.0. This technique was developed in the private sector and not employed at the case study sites. However, we feel that it is applicable to the public transit industry.

Sections 3.2.1 and 3.2.2 below provide a framework for the use of controlled experiments and public opinion surveys in evaluating the quantitative benefits of telephone information.

3.2.1 Controlled Experiments

Traditionally, service industries (both public and private) have not developed the level of market research which has characterized durable goods industries. There is a logical reason for this phenomenon. It is much more difficult to control the "environment" surrounding the delivery of a service good than a durable good. Consumer attitudes are strongly influenced by the method of delivery as opposed to the product itself. For example, an unfriendly bus driver can negate an objectively "good" bus ride. It is very difficult for those conducting market research to control this type of variable, or any of dozens of independent variables which can obscure a clear cause/effect relationship.

Nevertheless, it is not an impossible task to establish such relationships. To accomplish this, research must have both internal and external validity. Internal validity means that the specific item under investigation is actually responsible for the measured effect. To achieve internal validity, the research design should permit the researcher to definitively rule out alternative explanations. External validity refers to the ability to generalize from the specific circumstances of an experiment to other circumstances.

The accepted scientific technique for establishing both internal and external validity is to randomly select control and test groups; subject the test group to a specific activity; and then compare the behavior of the two groups. This type of "true" experiment is difficult to implement in the transit "field", due to the problems involved in selecting groups at random.

The use of non-randomly selected control and test groups ("quasi-experimental design") is an acceptable alternative. The key is to select as close-to-equivalent groups as possible without the advantage of random selection. For

example, selecting riders from similar routes is one commonly used technique. This device was utilized by San Diego to test the impact of CRIS (Computerized Rider Information System) technology. (See Sections 4.1.3 and 6.12.2.)

For more information on the development of research design, the reader is referred to "A Review of Transit Marketing Evaluation Practice" published by the Transportation Research Board.[6]

3.2.2 Public Opinion Surveys

Public opinion surveys were utilized by Washington, DC, and Orange County, California, to measure the quantitative benefits of telephone information. Several case study sites also utilized surveys to measure the impact of other marketing activities. The results of the Washington and Orange County surveys are described in Sections 4.6, 6.3.7 and 6.10.7.

Surveys can be targeted to 1) the general population, 2) riders on a transit vehicle, and 3) people who call telephone information. Surveys targeted to either the general population or transit riders are effective techniques for measuring the relative impact of telephone information versus other marketing strategies. They are not effective at measuring the quantitative benefits of telephone information. Since most people in a given area will never call telephone information, a random population survey will be poorly targeted to identify the benefits of this one specific activity. On-board surveys will exclude people who call telephone information but do not ride the bus. The focus of this report will, therefore, be on surveys of telephone information users.

Caller surveys are more difficult to conduct than on-board surveys. Telephone numbers must be acquired (an intrusion on privacy) and call-backs made to determine what actions people took or plan to take as a result of the call. People are more willing to participate under these conditions than might be imagined. In conducting a survey of this type, Orange County and Washington have obtained participation rates in excess of 60%. The number of cases required to obtain a statistically significant survey result, with a small margin of error, is not large. Orange County surveyed 376 people to obtain 226 participants, while Washington surveyed 890 callers and obtained 602 interviews.

The following types of questions will enable a transit authority to correlate the use of telephone information and transit ridership:

- Have you ever used the bus (or mass transit, etc.) prior to your telephone call? If so, how frequently do you ride?
- As a result of making this telephone call, did you ride the bus?
- Do you plan to ride the bus in the future? If so, how frequently?

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[6] Transportation Research Board (TRB), "A Review of Transit Marketing Evaluation Practice," May, 1982.

- If you had been unable to obtain this information by making a telephone call (either because you did not know this number or because this service did not exist), what would you have done? (Suggested answers: not take the trip, take the trip by other means, refer to a schedule, go to a bus stop and ask for assistance).

- How frequently do you make use of telephone information?

These questions will permit an estimate of the number of immediate and future rides generated by a telephone call. Extrapolating from the survey sample to the total number of calls handled by the authority, it is possible to estimate the total ridership generation potential of telephone information. Utilizing an average fare, this figure can be translated into revenue gain and compared to the cost of providing telephone information.

In estimating total ridership impact, one can assume that each call generates one immediate trip, or postulate that a single call has a more long-lasting impact and could generate several trips. While attempting to move beyond the one trip to one call relationship is speculative, it holds the potential for providing more accurate results in the long-term. One must take care, however, to determine how many calls over time are necessary for multi-trip generation. For example, a caller may make six calls in a month and take twelve trips.

The use of all survey respondents in the calculation will probably result in an overestimation of ridership impact. Frequent usage of telephone information almost certainly dulls its impact over time. This factor can be handled in one of several ways:

- First-time callers only could be surveyed on the basis that they represent the greatest potential for the generation of new trips. Orange County surveyed only first-time callers. In order to translate this ridership impact into revenue gain, it is necessary to know what percentage of all callers are represented by first-time callers. Then, the responses of the survey sample can be extrapolated to all first-time callers and translated into revenue.

- All riders could be surveyed, but asked what they would have done if telephone information was not available. Again, the element of reassurance comes into play. People who lack confidence in their ability to read schedules (such as the elderly) call telephone information to double-check their understanding. Others call to "double-check" prior to heading out to the bus stop. These people would ride the bus anyway, so while telephone information may reduce their anxiety (a potentially worthwhile goal in itself), it should not be credited with generating new trips. It is only those people who responded to the question by stating that they would not take the trip or would travel by other means who represent new trip generation. This technique was utilized by Washington.

- All riders could be surveyed, but asked for their frequency of calling. Frequent callers, who usually call to seek reassurance, could be factored out of the equation as being unlikely generators of new trips.

Surveys can also be utilized to generate a variety of demographic information on callers. This information can be utilized by the transit authority in targeting future marketing activities. Examples include not only background on the caller (i.e., age, auto ownership, sex, income, etc.) but also such information as the type of trip (commuter, off-peak), the information sought (specific schedules, itinerary), and how the phone number was obtained.

3.3 QUALITATIVE ASPECTS OF THE PROVISION OF TELEPHONE INFORMATION

Three qualitative factors are included in our discussion of telephone information. They are as follows:

- Marketing Philosophy
- Institutional and Labor Arrangements
- Future Direction

Each is discussed below.

3.3.1 Marketing Philosophy

Marketing philosophy provides insight into how transit authority officials involved in telephone information view its role in comparison with other marketing activities. It also can provide insight into the perceived qualitative benefits of telephone information.

Qualitative benefits can accrue to both the transit authority itself and to society in general. For example, the provision of easily accessible and accurate information can enhance the general public image of the transit authority. While not translating directly into revenue gain, a positive public image can facilitate the acquisition of sufficient financial resources (either through public subsidy or fares) for the transit authority to provide quality service.

Telephone information can generate qualitative benefits for specific individuals within society or for society as a whole. For example, information about transit service can result in increased mobility for individuals dependent on public transit for getting around. Examples of general societal benefits include the reduction of traffic congestion and energy consumption, or an improvement in air quality brought about by the diversion of auto riders to transit.

3.3.2 Institutional and Labor Arrangements

Institutional arrangements concern where the telephone information function is located in a specific organization. For example, the use of telephone information as a marketing tool can be impacted by locating this activity within the Marketing Department, as opposed to a Public Information/Relations Department.

Labor issues emerged as a major focus of this study at many case sites. Specific issues include the following:

- Wage rates
- Unionization
- The use of part-time employees
- The use of former bus drivers as agents

These issues seriously impact the productivity and cost-effectiveness of telephone information service.

3.3.3 Future Directions

While the focus of this report is clearly on the actual experiences of transit authorities in the telephone information field, we have also taken a brief look at the direction in which the industry is headed. The greatest interest was displayed in expanding on the ATIS technologies of CRIS and automated data retrieval to further reduce the labor intensiveness of telephone information by providing direct electronic interaction between the consumer and a data bank.

4.0 ISSUE ANALYSIS

Section 4.0 presents an issue-by-issue analysis across all of the case studies. It has been organized around the following seven critical issues:

- The Impact of Technology
- Marketing Philosophy
- Service Efficiency
- Supply/Demand Ratio
- Institutional and Labor Arrangements
- The Benefits of Telephone Information
- Future Directions

4.1 THE IMPACT OF TECHNOLOGY

The following technologies were evaluated in the conduct of the study: 1) automated and microfiche data retrieval; 2) automatic call distributor (ACD) equipment with management information system (MIS) capability; and 3) computerized rider information systems (CRIS). The experiences and views of the case study sites regarding each are described below.

4.1.1 Methods of Data Retrieval

Among the case study sites, three used automated data retrieval and three used microfiche retrieval. In addition, two authorities had experimented with and abandoned microfiche retrieval.

4.1.1.1 Automated Data Retrieval

Washington, Los Angeles and St. Paul utilize systems of automated data retrieval. All three systems perform the standard data management and retrieval functions traditionally handled by microfiche and manual hard copy systems. In other words, instead of storing data in books or microfiche, it is stored in the memory of a computer and retrieved by means of a CRT screen. In addition, the Washington system (known as AIDS - Automated Information Directory Service) and the Los Angeles system (known as CCIS - Computerized Customer Information System) also function as trip planners. Through the use of software algorithms, the computer, as opposed to an agent, can plan a trip itinerary for the caller. The St. Paul system, a cathode ray tube system, does not perform this function.

While the Washington and Los Angeles systems perform similar functions, there were several major differences in their implementation:

- AIDS was implemented throughout the entire Washington service area while CCIS was implemented as an experiment in only a small part of the Los Angeles service area. Los Angeles is now preparing to implement CCIS area-wide.

- Washington utilizes a dedicated minicomputer while Los Angeles' telephone information center shares time with other departments of the transit authority on a mainframe computer.

- Los Angeles officials view automated data retrieval primarily as a means of improving the productivity of agents, while Washington and St. Paul officials emphasize its ability to improve the accuracy of information.

- Implementation Problems

All three authorities faced similar problems in the implementation of automated data retrieval. These problems included 1) the development of a consistent data base, 2) digitizing the data base into a computer-readable format, and 3) upgrading the work environment to support the computer equipment.

At both Washington and Los Angeles, routing information was handled by a variety of departments. Problems involved obtaining the cooperation of these departments and standardizing their data bases. Most of the data was kept in hard copy form. St. Paul is still experiencing problems with the programming of the "bus stop" function. Presently, agents must scroll through many stops on long routes to access the right one. All three systems were initially programmed by outside contractors but data base updating is now performed internally. In addition to programming the transit route network, creating a computerized description of service areas as large and complex as Washington and Los Angeles proved to be tremendously time-consuming tasks. Expectations that automated data bases existed and could be applied to this effort were not met.

The sophisticated computer equipment needed to support automated retrieval requires high-quality air conditioning and often internal re-wiring. Washington utilized the occasion of AIDS implementation to move telephone information into spacious new quarters with carpeting and modular furniture. The installation of new air conditioning in a small portion of the building proved to be difficult and caused implementation delays. Los Angeles did not change its basic work environment for the CCIS experiment but is now redesigning the work place to coincide with total CCIS implementation.

The use of different types of computer systems caused different problems for both Washington and Los Angeles. Washington has in the course of a couple of years exceeded the efficient processing capacity of its minicomputer and is now in the process of upgrading its computer capacity. At Los Angeles, the time-sharing concept resulted in processing slowdowns caused by large batch processing jobs such as payroll. This problem was resolved through better time-coordination among departments.

Los Angeles, as the first authority to implement automated data retrieval, experienced serious problems with agent acceptance. A lack of coordination and communication among departments, and between departments and the outside contractor, impacted the acceptance of the project by supervisors and agents. Agents were trained for a short time period by the outside contractor, heightening fears that CCIS represented a threat to their job security.

Both Washington and St. Paul learned from Los Angeles' early problems. At both authorities, agents were involved from the start in the development of the system and were trained internally in its use. Los Angeles eventually

overcame its problems by training agents internally, appointing a supervisor as the full-time CCIS manager, and permitting agents to volunteer for CCIS training in return for desirable day-time shifts. At St. Paul, initial resistance by senior agents, who felt manual retrieval was faster, has been overcome. Agents at all three authorities are now universally supportive of the technology.

- Goals and Performance

Both Washington and St. Paul officials emphasize the ability of automated retrieval to provide more accurate, up-to-date and consistent answers to questions. This is accomplished by providing agents with a single, correct answer to difficult questions, instead of having each agent figure out their own answers. In addition, updating a computerized data base is significantly easier than either hard copy or microfiche updating. Thus, the data base can be more easily kept current.

While these authorities may have initially believed that automated retrieval by itself would lead to agent productivity improvements, this is no longer considered likely. St. Paul has already installed new ACD equipment in the search for improved agent productivity, and Washington will do so shortly. Both authorities still require agents to memorize the details of the transit route network and Washington requires agents to answer questions manually or from memory whenever possible. There has been no reduction in the standard training regimen. Agent performance at both authorities as measured by calls handled/hour is at the low-end of the scale among authorities studied (low to mid 20's/agent).

Los Angeles, on the other hand, has decided to expand CCIS to its full transit network precisely to improve agent productivity. By expanding to full-system, Los Angeles hopes to implement new work rules and a single, higher productivity standard. Management had been prevented from implementing a higher standard only for CCIS agents under its union contract. Los Angeles has already installed MIS capable ACD equipment to better monitor agent performance. Los Angeles intends to reduce training time by half from 8 weeks to 4 weeks and to no longer require agents to memorize details of the transit network.

Given the lower knowledge levels which will be required of agents, Los Angeles hopes to hire part-time agents. The hard copy data base will be eliminated (except for supervisors) and the system will operate basically 100% on automated retrieval. Los Angeles officials believe that these actions will save $417,000 annually, funds which can be used to further enhance the capacity and efficiency of telephone information.

- Costs

The annual operating and capital costs attributable to automated data retrieval at each authority are shown in Figure 4-1.

Transit Authority	Revenue Vehicles	Annual Operating Cost	Total Capital Cost
Los Angeles	2,905	$90,000	$3,775,000
Washington	2,061	$78,000	$ 984,000
St. Paul	1,299	$50,800	NA

FIGURE 4-1. COSTS OF AUTOMATED DATA RETRIEVAL

Operating costs reflect primarily the costs of maintaining and updating computer hardware and software. At Los Angeles, the initial CCIS test in a small part of the service area cost approximately $175,000. The balance reflects full system implementation. Of that amount, $100,000 represents the cost of room conversion. The remaining $3.5 million is not disaggregated. At Washington, $174,000 was spent on room preparation; $350,000 on hardware; $160,000 on software; and $300,000 on data base management and development. The difference in capital cost between Washington and Los Angeles can be attributed to inflation (Los Angeles is just now beginning the process while Washington completed it in the late 1970's), and the vast size of Los Angeles (both the transit network and service area).

- The Views of Others

Officials at several of the authorities visited expressed strong views regarding the potential benefits of automated data retrieval. Seattle officials believe that automated retrieval is "no faster" than the manual method currently utilized. Their primary technological interest is in CRIS (see below). However, they do see a role for automated retrieval if the Seattle data base outgrows a single hard-copy binder, as is likely in the near future. Seattle is similar in size to St. Paul and is the largest authority visited still utilizing manual data retrieval.

Officials at Miami, San Diego, and Albany are interested in pursuing automated data retrieval, primarily as a support tool to assist agents in providing consistent and accurate information. Officials at Orange County (which utilizes microfiche) feel that since the only advantage of automated retrieval is more accuracy but not more productivity, it is an unneeded "luxury" given the simplicity and stability of the Orange County route network.

In general, a consensus seems to have developed that automated retrieval, by itself, will not improve agent productivity, but if used properly, will enable the agent to provide more accurate, up-to-date information. Even at Los Angeles, it is not clear that CCIS by itself will improve productivity. Rather, by going to full system, it will enable Los Angeles to raise work standards and monitor those standards with ACD equipment. While CCIS has demonstrated short-term productivity improvements, it has not been possible to sustain the higher levels without ACD equipment to monitor agent performance.

4.1.1.2 Microfiche Data Retrieval

Chicago, Orange County and Portland utilize microfiche data retrieval systems. Chicago was the largest transit authority studied while Orange County and Portland are mid-size authorities. In addition to these authorities presently employing microfiche retrieval, Washington and Miami had experimented with and abandoned microfiche retrieval during the 1970's. Miami returned to a manual system while Washington automated.

Microfiche as a technology for data retrieval appeared to peak during the mid to late 1970's, when all five of the above authorities experimented with it. Microfiche was adopted as a superior method of data management and retrieval to the traditional hard copy system. The problems associated with microfiche appear almost universal:

- The machinery tends to break down under heavy usage.
- It is expensive and time-consuming to update the data base.
- The system is ineffective for answering itinerary-type questions, particularly those requiring a transfer.

Despite these drawbacks, the officials of the three authorities still utilizing microfiche have a generally positive attitude toward it. Almost no one else interviewed shared these positive views.

Both Chicago and Orange County utilize "keyboard" microfiche machines. The agent simply pushes a combination of keys and the machine automatically finds a specific route. Portland utilizes the more traditional "scroll-type" machine where the agent presses a button to move the fiche, but must essentially locate a specific route by trial and error. The Portland supervisors prefer this type of machine and claim that it is faster than the keyboard type. However, Portland's agents are former bus drivers who may have had poor keyboard skills.

Chicago and Orange County officials (but not Portland) both reported high incidences of mechanical failure. At Chicago, this situation has improved since the operation of their telephone center was contracted out to a private operator who has instituted new maintenance procedures. At Orange County, keys have been wearing out under a much heavier than intended usage. Total annual machine maintenance costs are $3,400 at Chicago and $8,000 at Orange County.

All three authorities experienced updating problems. Generally, major seasonal updates would be planned but individual route changes often would require agents to utilize paper updates until new microfiche had been prepared. Chicago makes 400 changes annually at a cost of $14,168 while Orange County spends about $1,100. Portland supervisors expressed a preference for manual systems due to the updating problem.

Officials at all three authorities did not perceive any problems resulting from microfiche's trip planning limitations. All three maintain back-up hard-copy data bases for this purpose. The authorities had typically high rates of itinerary calls.

Orange County was the only authority which had documented productivity improvements due to microfiche (this documentation is 6 years old). Orange County reported a 33% improvement in agent productivity with call handling levels increasing from 21 to 28/agent/hour and transaction time declining from 145 to 105 seconds. Agent productivity at Portland was 29 calls/hour while at Chicago the figure was 35. Only the Chicago figure is above-average, but there are a variety of factors at work in Chicago (see Sections 4.1.2 and 4.5.2).

Officials at Washington and Miami considered the disadvantages of microfiche to be overwhelming. Both authorities have much more dynamic route structures than do the three authorities still using microfiche, making the updating problem critical. Miami also experienced mechanical failures and slower retrieval rates than with the manual system. Seattle officials also feel that microfiche is no faster than manual retrieval. San Diego and Washington officials believe that microfiche is ineffective for itinerary planning. No authority not presently using microfiche expressed an interest in adopting it.

4.1.2 Automatic-Call-Distributor (ACD) Equipment

ACD, or call-sequencing, equipment has been available for twenty years. It was popularized by the airlines which needed a method for handling reservation/information calls in an orderly sequence during the boom years of the late 1960's. It is only the most recent generation of such equipment which, however, provides a management information system (MIS) capability. In addition to call sequencing, this equipment can perform the following functions:

- Provide up-to-the-minute performance monitoring of individual agents through hard copy print-outs and "live" action on CRT screens monitored by supervisors.

- Provide system-wide data disaggregated by time period on call volumes, busy rates, lost call rates, etc., enabling management to better allocate resources and meet peak period demand.

Of the technologies discussed, the benefits of MIS capable ACD equipment was the most universally perceived and desired. Four authorities have converted in the last couple of years and six more are planning conversions. Of the four authorities which have converted (Chicago, Los Angeles, St. Paul and Milwaukee), all have documented productivity improvements.

The clearest demonstration (with the fewest independent variables) of the benefits of ACD equipment is Milwaukee. Milwaukee officials report a reduction in calls lost from hold from 11.3% to 6.4%; a reduction in length of time on hold from 5 to 10 minutes to 40 seconds; and an increase in agent call handling levels from 22.6/hour to 41/hour. All of these levels are now among the best observed. Milwaukee accomplished these changes while reducing total staff by 2 full-time positions. The only other change to coincide with the ACD equipment was an increase in trunk lines from 10 to 13. The primary benefit of this change would be in reducing call busy rates (enabling more people to get into the system) and not in improving actual call handling.

Milwaukee officials believe that their enhanced ability to monitor agent performance and improved call sequencing are the reasons for these improvements. They stress that agents must be "available" to answer calls more frequently now, rather than just sitting at their desk. A similar concept is endorsed by Los Angeles officials. At Los Angeles, agent productivity has increased from 27 calls/hour to 30; length of time on hold has been reduced from 4:00-5:00 minutes to 1:44; and percent of calls lost from hold has been reduced from 39% to 11%.

At Chicago, agent productivity has increased from 30-33 calls/hour to 35, and percent of calls lost from hold has decreased from 30-40% to 5%. However, the installation of ACD equipment at Chicago coincided with a major change in the operation of their telephone information center (see Section 4.5.2), and thus these results must be viewed cautiously.

While St. Paul officials hoped to improve the quality of telephone information with new ACD equipment, the end result has been to maintain the same level of quality at a significantly reduced staffing level. St. Paul has been able to reduce its total agent staff from 40 to 33 without suffering service degradation. Clearly, the remaining agents are more productive, although this improved productivity has not resulted in an improved service quality as at the other three authorities.

4.1.3 Computerized Rider Information Systems (CRIS)

CRIS provides route-specific schedule and status reports by means of a computer-generated voice response. The CRIS system can be accessed by dialing a route-specific telephone number from home or, in some cases, from transit stops. CRIS is designed to improve the traditional delivery of telephone information by removing a specific segment of calls from normal channels. CRIS can also eliminate busy signals (by providing a separate number for each route) and reduce the uncertainty of riding transit through the provision of up-to-the-minute route status reports. CRIS can in theory generate new off-peak ridership particularly where low frequency service and poor weather conditions combine to discourage people from "going out and waiting for a bus."

San Diego utilized the controlled experiment approach described in Section 3.0 to conduct a 6-month CRIS test in conjunction with the CRIS contractor Teleride Corporation. San Diego is a sunbelt city with relatively low levels of transit ridership. Five typical routes were chosen as CRIS test routes, and three similar routes were chosen as control routes. The control routes were subjected to traditional marketing campaigns. The test was to be considered a success if the CRIS routes increased ridership by at least 3% more than the control routes. While both sets of routes did better than all other routes as a whole, the control routes outperformed the CRIS routes by 4.1%.

While San Diego officials are now skeptical of the ability of CRIS to increase ridership, they do believe it could be useful in diverting calls from the traditional telephone center, and providing MIS data on call volumes by time and location. They also hope to utilize CRIS to provide real time status

reports to agents who could then relay this information to callers, rather than providing it directly to callers by updating the CRIS messages when, for example, a bus is running late.

The outcome of this test must be interpreted cautiously given that San Diego has an extremely benevolent climate (waiting for a late bus is not unpleasant). In addition, a series of disagreements between San Diego and Teleride officials, resulting in mid-course changes in the test, make this a less than perfect controlled experiment. Officials in Seattle and Albany (with considerably more severe climates than San Diego) remain highly interested in CRIS as a means of attracting upscale ridership through more reliable and consistent service.

4.2 MARKETING PHILOSOPHY

This section discusses the role of telephone information at the case study sites, its perceived qualitative benefits, the extent to which the sites promote the telephone numbers, and the marketing techniques most frequently utilized.

4.2.1 The Role of Telephone Information

All of the authorities visited, with the exception of one, consider telephone information to be an essential public service which they are obligated to provide at relatively high levels, regardless of measurements of cost-effectiveness. The one exception is Portland.

Portland officials take the position that it is primarily the user's responsibility to obtain sufficient information for riding transit. In implementing this philosophy, Portland has eliminated 11 full-time agent positions and reduced the number of trunk lines from 20 to 12. They now provide "live agent" service only during weekday business hours. The bulk of calls (70%) have been diverted to the Call-A-Bus (CAB) system. CAB provides pre-recorded information on a route specific basis. Like a CRIS system, each route has a separate telephone number. Unlike CRIS, information is provided by a pre-recorded taped message rather than a computer-generated response. There is no updating capability for the provision of real time information. In order to obtain information on more than one route (to transfer, for example), a caller would need to call more than one number.

Portland officials believe that this system enables them to channel the "frequent caller" constantly seeking reassurance out of the regular telephone system, while still meeting their needs. This new system is expected to save Portland $1,055,597 in personnel costs over five years. Few complaints have been received regarding the new system, even though the lost call level (on live agent calls) has increased from 10-18% to 26.4%.

All of the other authorities visited, in one form or another, consider it to be their responsibility to provide "live" information to all who desire it. The degree of enthusiasm under which authorities embrace this necessity varies widely. Officials in Chicago, Los Angeles, Seattle, St. Paul, Albany and Allentown embrace this responsibility with some reluctance. They perceive that politically they have to do it, and they hope to do it as cost-

effectively as possible, providing no more service than is necessary. They are vitally concerned with the labor intensivity of telephone information and are searching for methods (either management or technology oriented) in which quality service can be provided while capping labor costs.

The remaining authorities (Washington, Miami, Milwaukee, San Antonio, Orange County, Louisville, San Diego, and South Bend), view telephone information as more of a positive force. Washington and Orange County officials actively encourage their agents to act as "sales agents" and attempt to "close the sale" with callers (i.e. persuade them to ride transit). It also should be noted that they are the only two authorities which have conducted market research on the benefits of telephone information. Authorities with dynamic populations and route structures such as Miami, San Antonio, and San Diego feel a particular responsibility to newcomers to the system. As Miami's Director of Marketing states: "We have to educate the newcomers each year". Most of these authorities feel that schedules alone are not an effective informational tool for most people. As was expressed by both the Miami and Milwaukee Marketing Directors, Americans are oriented toward electronic information, either telephone or television, and for most people there is no adequate substitute.

Figure 4-2 displays in descending order the percentage of each authority's operating budget spent on telephone information. As can be seen, the average is 0.6%, and the range is from 0.2% to 1.4%. The correlation between philosophical attitude toward telephone information and the budget share spent on telephone information is highly inexact, primarily due to labor costs. Portland, not surprisingly, is tied for last. However, San Antonio has considerably more enthusiasm for providing telephone information than St. Paul, but much lower labor costs. Louisville's pre-eminent position seems to be an accurate reflection of its support for telephone information, as its labor costs are low. The high cost of telephone information to authorities like Seattle and St. Paul helps to explain their interest in controlling labor expenses.

Marketing philosophy provides insight into the perceived qualitative benefits of telephone information by those closest to it. The emphasis is clearly on the public relations benefits which accrue to the transit authority, and the enhanced mobility of the transit dependent. Secondary benefits of increased ridership (such as improved air quality and reductions in traffic congestion) were never mentioned. Most officials view telephone information as essential to maintaining positive community attitudes toward the authority. In sunbelt communities with short transit histories, officials see telephone information as a way of introducing the agency and its services to the public. Also, given long service headways in these authorities, a premium is placed on knowing when the next bus will arrive. Many officials perceive that certain segments of the population have difficulty understanding less expensive informational sources (such as schedules), and therefore telephone information plays an essential public service role in enhancing mobility.

4.2.2 Promoting the Telephone Information Number

The interest of authorities in promoting the telephone number (and thus encouraging higher call volumes) is related to their enthusiasm for telephone

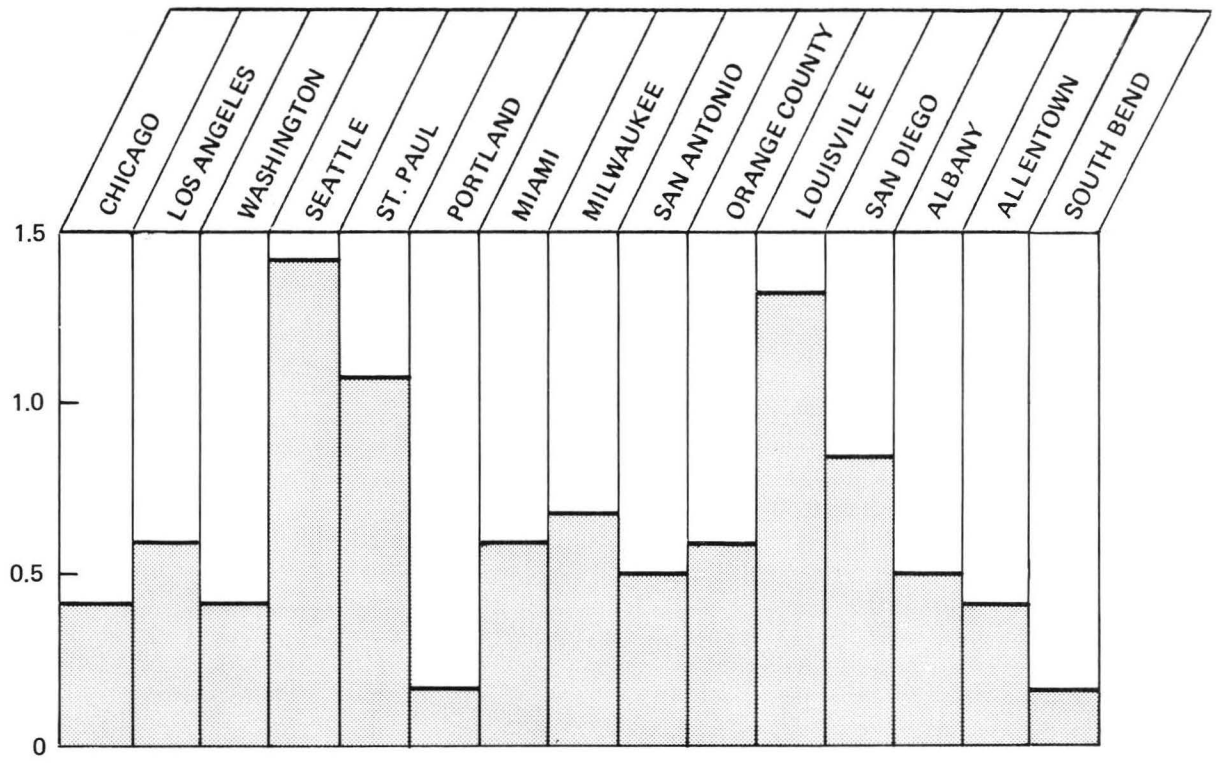


FIGURE 4-2. PERCENTAGE OF OPERATING BUDGET DEVOTED TO TELEPHONE INFORMATION

information. The telephone number is most actively promoted by Miami, San Antonio, Orange County, San Diego, and South Bend. With the exception of the latter, these are all sunbelt cities with fluid populations. These authorities include the telephone number on ALL marketing material.

Most of the other authorities include the telephone number on some marketing material. Chicago places it on schedules and signs. Washington places it in print advertisements and schedules. Seattle took the number off of everything but was forced by public pressure to put it back on schedules and signs (where it is not prominently displayed). Milwaukee places it on all printed material, but radio ads simply say "call MCT" and television ads do not mention calling at all. Allentown includes the number in printed material. Portland tries to focus attention on the Call-A-Bus (CAB) numbers, but not the "live" number.

Washington officials, despite a highly positive view of telephone information, are low-key in their promotion of the number. They feel that too much promotion could overload the system, unless provisions are made to increase the supply of service. Miami, on the other hand, is planning a major promotion of the telephone number when their new ACD equipment becomes operational.

4.2.3 Other Marketing Activities

The other marketing activities engaged in by the case study sites generally fall into one of four categories:

- Schedule Distribution
- Informational Signage
- Community Relations
- Media Advertising

Figure 4-3 displays the percentage of each authority's operating budget devoted to telephone information, schedules and informational signs, media, and all marketing functions. Data on community relations is incomplete. Data for Milwaukee and Chicago was incomplete and thus not included on this chart.

As is shown, all authorities except Portland and Allentown devote a larger budget share to telephone information than to at least one other marketing function. Both Portland and Allentown have de-emphasized telephone information. Six authorities (Washington, Los Angeles, Seattle, St. Paul, Louisville, and San Diego) spend more on telephone information than on either schedules or media.

The non-schedule oriented authorities tend to believe that people cannot understand schedules and that it is difficult to keep schedules (or signs) updated. This view was expressed by officials at Washington, Miami, Milwaukee, Orange County, San Diego, and South Bend. On the other hand, officials in Seattle, St. Paul, Portland, Albany and Allentown are schedule oriented. Seattle and Portland have embarked on major informational signage programs as well. The philosophical emphasis on schedules or telephone information is not necessarily reflective of the relative budget shares

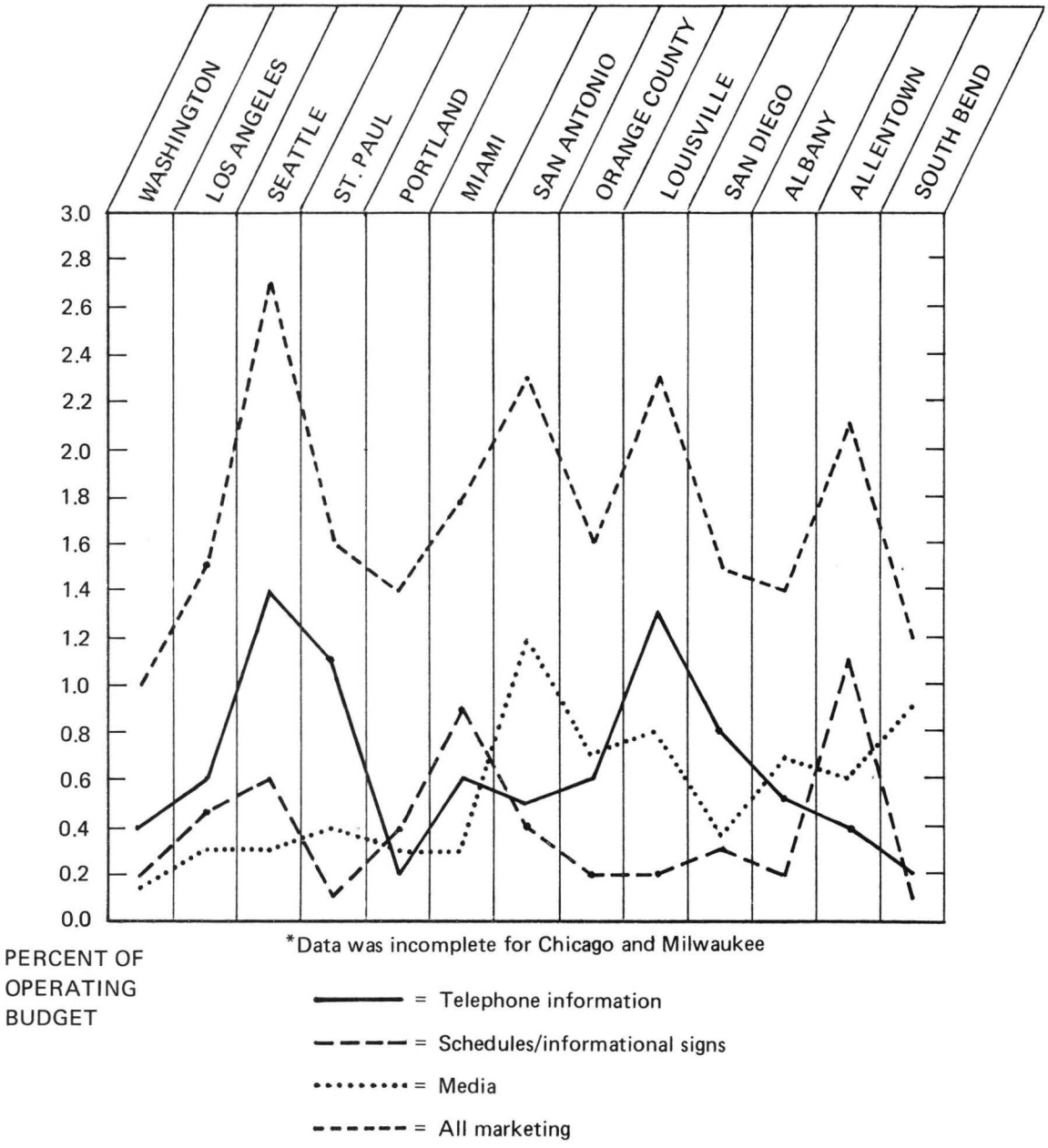


FIGURE 4-3. PERCENTAGE OF OPERATING BUDGET DEVOTED TO SELECTED MARKETING ACTIVITIES

devoted to each activity. Labor costs play a major role in this anomaly. For example, St. Paul and Seattle spend more on telephone information than schedules despite marketing philosophy. Both have high labor costs.

Print and radio are the primary forms of media advertising. Only three authorities (Milwaukee, San Antonio and Seattle), report heavy utilization of paid television advertising. Most authorities consider the impact of television to be too diffuse to be cost-effective. San Antonio is by far the most aggressive of the authorities in media advertising, while Chicago does none. The average authority devotes 1.7% of its budget to marketing activities, ranging from 1.0% at Washington to 2.7% at Seattle.

4.3 SERVICE EFFICIENCY

This section evaluates three efficiency measurements: 1) hold performance; 2) call busy levels; and 3) agent productivity. Each concept is explained in detail in Section 3.0.

4.3.1 Hold Performance

The most common measurements of the efficiency of telephone information revolve around the "hold" phenomenon. In other words, what happens to callers once they get into the system? The literature indicated that caller on hold rates of 80-90% are common in the transit industry. Only a few of the case studies had such high levels. Figure 4-4 displays the performance of the case study sites for three measurements of "hold": 1) percentage of calls which go to hold; 2) length of time on hold; and 3) percentage of calls lost from hold. The ranking of each authority relative to the other case study sites is included for each category. Number (1) indicates the "best" (most efficient) performance.

On average, an individual calling telephone information will have a better than even chance (57.75%) of being placed on hold, where they will wait slightly less than two minutes (1:50). Slightly over 10% (11.1%) of these callers will hang up prior to having their calls serviced.

Individual authorities vary greatly. Part of this variance is undoubtedly due to the method by which this data is collected. Some authorities, such as those with new ACD equipment, obtain hourly print-outs with data of this type and know exactly what is happening in their systems. Others attempt to collect and analyze this data periodically. Some collected it for the first time for this report.

Certain trends are apparent. First, it should be noted that all calls at Louisville and Seattle automatically go to hold, thus this figure is misleading. Several authorities appear to have definite problems handling present call volumes. Miami, which is awaiting the installation of new ACD equipment, ranks last, or next to last in the three categories. Portland, which has deliberately reduced its live service, has the highest percentage of calls lost from hold, but a surprisingly low percentage of calls actually going to hold.

Transit Authority	Percentage of Calls on Hold	Rank Among Case Studies	Time on Hold (Min:Sec)	Rank Among Case Studies	Lost From Hold	Rank Among Case Studies
Chicago	N/A	N/A	0:30-1:00	6*	5%	2
Los Angeles	75%	7*	1:44	10	11%	9
Washington	75%	7*	4:45	12	8%	5
Seattle	89%	10	0:45	5	9%	7
St. Paul	50%	5	2:30	11	10%	8
Portland	5%	1	1:00-1:30	9	26.4%	12
Miami	85-90%	11	4:00-7:00	14	15-25%	11
Milwaukee	36.5%	4	0:40	4	6.4%	3
San Antonio	N/A	N/A	0:30	2*	7.3%	4
Orange County	25%	3	5:00	13	N/A	N/A
Louisville	90%	12	0:08	1	N/A	N/A
San Diego	80-85%	9	1:00	8	8.4%	6
Albany	15-20%	2	N/A	N/A	20%	10
Allentown	N/A	N/A	0:30-1:00	6*	N/A	N/A
South Bend	60%	6	0:30	2*	2%	1
AVERAGE	57.75%		1:50		11.1%	

N/A = Data Not Available
* = Tie

FIGURE 4-4. "HOLD" PERFORMANCE

The impact of ACD equipment is most visible in the "lost from hold" category. Witness the change in ranking of the four authorities which have installed new ACD equipment, as shown in Figure 4-5.

Authority	Previous Lost from Hold %	Current Lost from Hold %	Previous Rank Among Case Studies*	Current Rank Among Case Studies*
Chicago	30-40%	5%	12	2
Los Angeles	39%	11%	11	9
Milwaukee	11.3%	6.4%	7	3
St. Paul	10%	10%	6	8

*Rankings are out of 12 authorities which supplied data.

FIGURE 4-5. IMPROVEMENT IN CALLS LOST FROM HOLD DUE TO ACD EQUIPMENT

While St. Paul's performance has not changed (they have slipped in ranking due to the advancement of the other three authorities), they are employing 17% fewer agents.

No patterns are apparent in regard to type of data retrieval utilized.

4.3.2 Call Busy Volumes

Figure 4-6 displays busy signal volumes for the nine authorities which had this data available. This information can be obtained by having the telephone company perform a "ring busy" study. It can also be estimated from the amount of time in which all trunks are busy. Based on this limited sampling, the average caller of transit telephone information has a 15.7% chance of receiving a busy signal. According to the literature, private industry which relies heavily on telephone information, such as the airlines, considers a level of 1-2% acceptable. The four largest authorities surveyed (Chicago, Los Angeles, Washington, Seattle) plus San Diego have significantly higher busy levels than the other authorities. San Diego and Chicago officials both perceive that they have capacity problems. Officials at the other authorities did not express dissatisfaction with these levels.

4.3.3 Agent Efficiency Measurements

Figure 4-7 displays calls serviced/agent/hour and average call transaction time. Again, the diligence utilized by authorities in collecting this data varies greatly and can impact the accuracy of the results. The literature suggests agent performance levels of 20-40 calls/hour. We found that the average agent handles 30.9 calls/hour, with a range of between 20 and 41. The average transaction time is 1:50.

San Diego	50%
Chicago	40%
Washington	18%
Los Angeles	13%
Seattle	11%
Milwaukee	4%
Albany	3%
Orange County	1-2%
Portland*	1%
Miami	N/A
San Antonio	N/A
St. Paul	N/A
Louisville	N/A
South Bend	N/A
Allentown	N/A
AVERAGE	15.7%

*Live agent calls only.

N/A = Not Available.

FIGURE 4-6. CALL BUSY VOLUMES

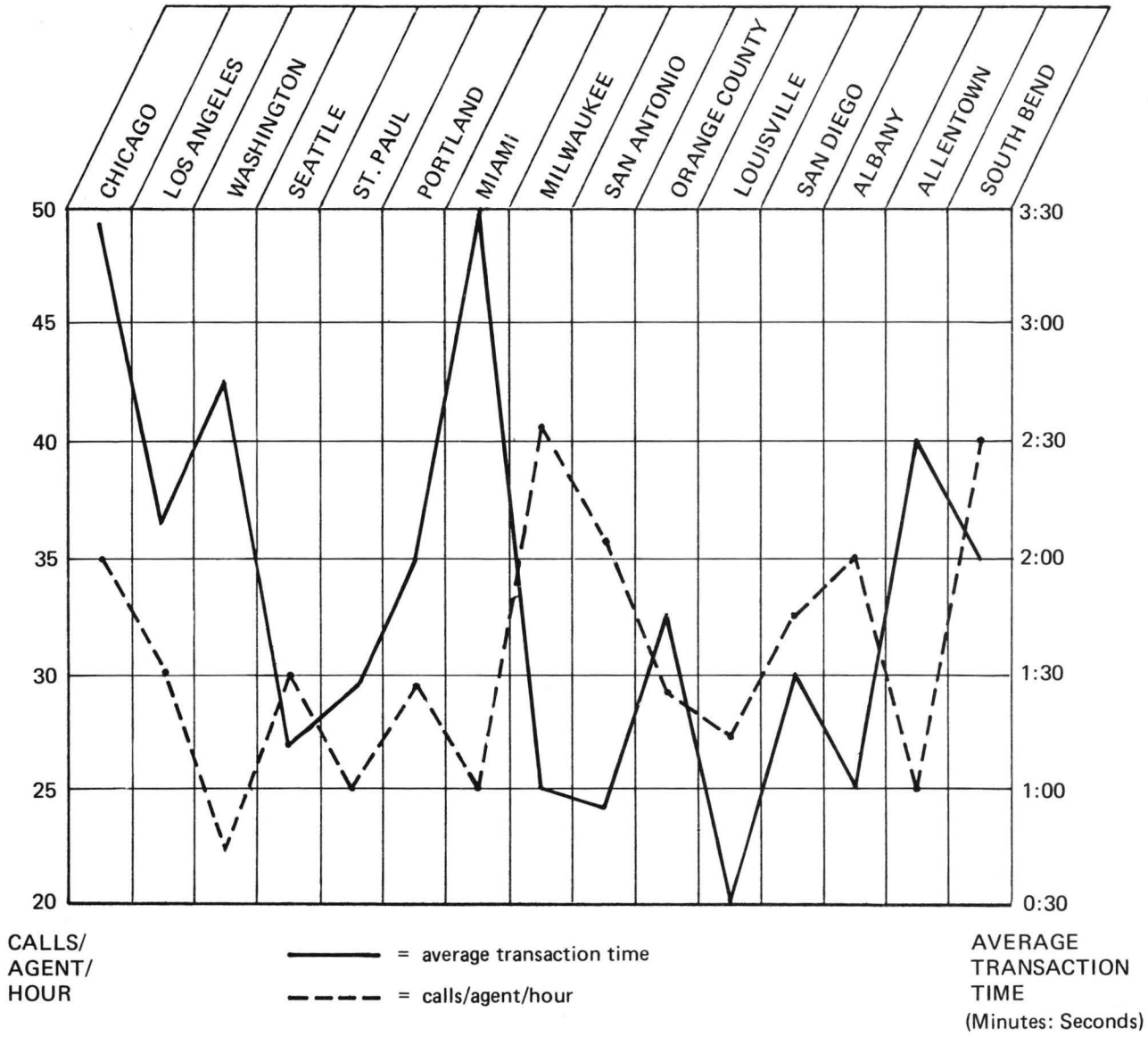


FIGURE 4-7. AGENT EFFICIENCY

One would expect that authorities with high call volumes per agent would have short transaction times, and those with low call volumes would have long transaction times. Figure 4-7 measures both calls/agent/hour and average transaction time. For the hypothesis to be true, the lines for each authority should either pull close together at a medium-point (indicating an average performance in both categories) or pull apart toward the opposite extremes. This is generally what happens with the exception of Chicago and St. Paul. Chicago ranks high in both categories, indicating excellent agent productivity. St. Paul ranks low in both categories. If agents are not handling a large number of calls nor spending a long time period on each call, the only explanation is that there is considerable unproductive use of time. Labor productivity is a major issue at St. Paul.

The impact of ACD equipment on calls/agent/hour is demonstrated in Figure 4-8 which shows the four authorities which have installed new equipment. Number (1) is the "best" (most efficient) performance.

Transit Authority	Previous Calls/ Agent/ Hour	Current Calls/ Agent/ Hour	Previous Rank Among Case Studies	Current Rank Among Case Studies
Milwaukee	22.6	41	14	1
Chicago	30-33	35	5	4*
Los Angeles	27	30	10	7*
St. Paul	25	25	11*	12*

*Tie

FIGURE 4-8. IMPACT OF ACD EQUIPMENT ON AGENT EFFICIENCY

The ability of ACD equipment to monitor agent performance (and enforce a higher standard) is clearly evident. St. Paul, while not documenting an improvement, is handling the same number of calls with 17% fewer agents. On the other hand, no pattern is apparent with the use of automated and microfiche data retrieval systems.

Transit authority size and marketing philosophy are also significant factors in agent performance. It is only logical to expect that larger authorities have more complex calls which should take longer. The three authorities with the most revenue vehicles (Chicago, Los Angeles and Washington) rank second, fifth and third respectively (see Figure 4-7) in length of transaction time. Miami's first place ranking can be explained by the unique demographics of its service area with high percentages of newcomers, tourists and elderly who know little about the transit network.

Marketing philosophy clearly also has an impact. Both Washington and Miami stress quality over quantity in dispensing information. Their low call

handling levels and high transaction times reflect this philosophy. On the other hand, Milwaukee and San Antonio stress keeping calls short and handling a large number.

A final factor which should be kept in mind is that both Chicago and Milwaukee have changed to new ACD equipment within the past year. It cannot be determined at this point whether the high call levels/agent reported by these authorities will withstand the test of time, although recent data made available by Milwaukee shows no performance decline in 1983.

4.4 SUPPLY/DEMAND RATIO

This section examines the capacity of the telephone center as measured by number of agents, calls actually serviced, and trunk lines. These factors can perhaps offer further explanation for the patterns observed in Section 4.3. The raw data on which these ratios are based appear in the individual case study sections (Section 6.0).

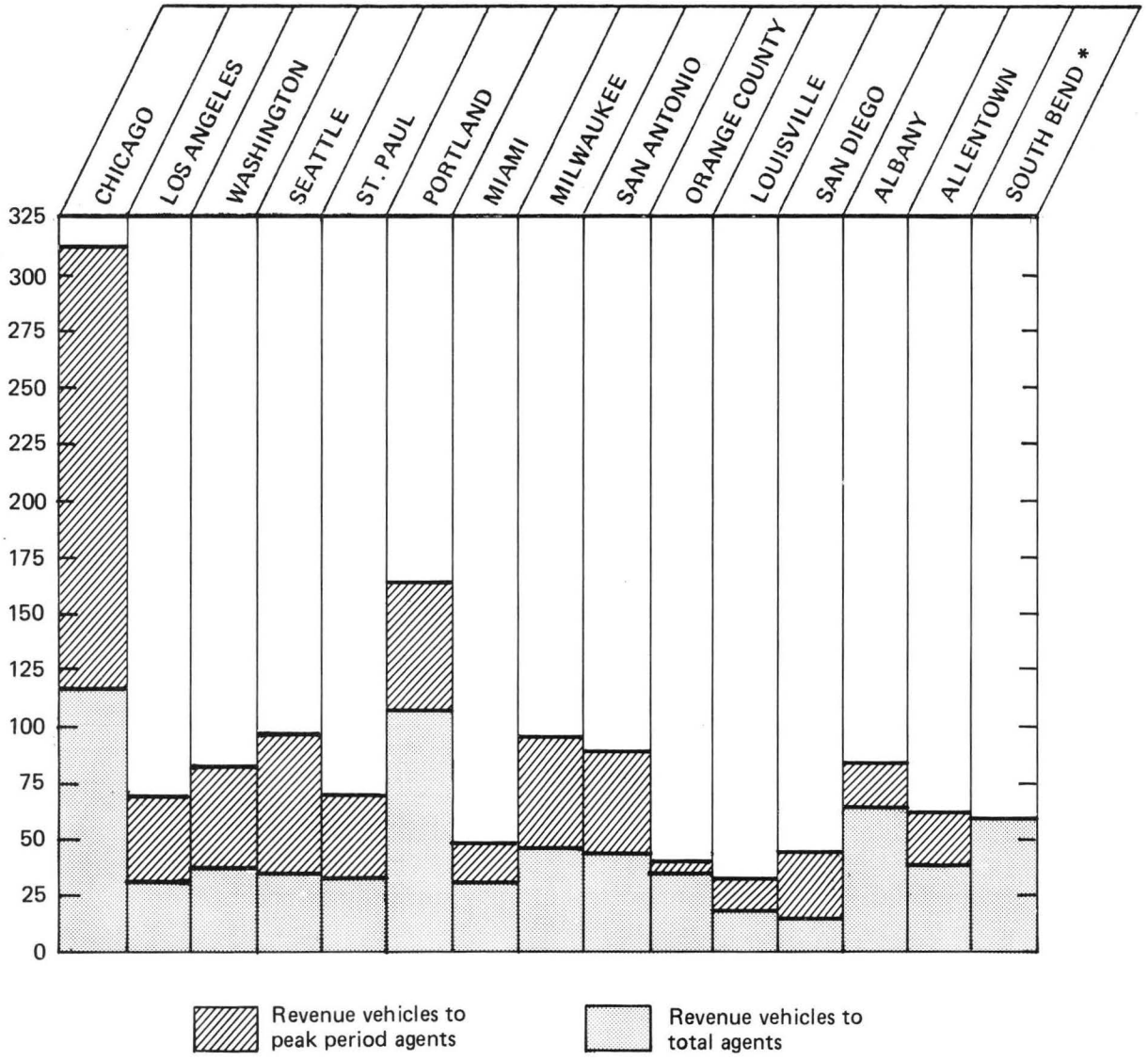
4.4.1 Number of Agents

Figure 4-9 displays the ratio of revenue vehicles to total and peak period agents. The average authority has 46.9 revenue vehicles/total agents and 89.6 revenue vehicles to peak period agents. The strongest relationship appears in the "total agent" category. Of the top six authorities, all but St. Paul are "sunbelt" cities with generally short transit traditions and low levels of transit knowledge among the populace. St. Paul's high ranking in this category is further indication of its relatively poor agent productivity.

The three smallest authorities surveyed (Albany, Allentown and South Bend) appear able to cope with a relatively low number of total agents. However, because they generally provide shorter hours of service (South Bend and Albany provide the fewest next to Portland), their peak period ratios are more typical of all authorities. Seattle, which provides 24-hour/day service, ranks seventh in total agents, but only thirteenth in peak period agents. On the other hand, Orange County which uses part-time agents, ranks second in peak period agents but only sixth in total agents (each part-time agent is counted as half an agent).

Portland and Chicago rank next-to-last and last respectively in both categories. Portland has, of course, deliberately cut back on its number of "live" agents. Chicago does appear to have overload problems as indicated by its call busy level. However, of all the cities studied, Chicago has by far the longest, most stable history of transit service and the most transit-oriented population. It is not unreasonable to believe that real demand for telephone information in the Chicago area is less than in other cities studied.

Examining the bar graph in Figure 4-9, there does appear to be a fairly strong relationship between revenue vehicles and number of agents, as suggested in the literature. This relationship is strongest in the total agent category. Nine of the 15 authorities are clustered in the range of 29.7 to 44.1 revenue vehicles to total agents. San Diego and Louisville, two sunbelt cities with heavy demand for telephone information have considerably lower ratios. South



*South Bend has one agent on duty during peak and non-peak periods

FIGURE 4-9. RATIO OF REVENUE VEHICLES TO AGENTS

Bend and Albany, two relatively small cities, have higher ratios. Chicago and Portland, with unique historical and institutional situations, have much higher ratios.

4.4.2 Calls Serviced

Figure 4-10 measures capacity by comparing service area population and annual passenger trips to calls serviced. The average authority requires 1.9 people and 74.0 passenger trips to generate a single call. The literature estimates a trip/call range of 33-100. We found a range of 15-341, although only two authorities (Chicago and Los Angeles) exceeded the 100 level. Size and geography appear to be far more significant than equipment or philosophy in determining calls serviced levels. Four of the five authorities with the fewest trips per call are sunbelt cities with low levels of transit knowledge. The fifth, South Bend, does emphasize the use of telephone information.

This provides some support for the hypothesis that in sunbelt cities, a relatively low number of trips produces a large number of calls due to low levels of transit knowledge and tradition in the community. On the other hand, a comparison of total population to calls does not exhibit a similar tendency since most people in these communities neither ride nor call transit.

This phenomenon also appears in the three small authorities which have low trips/capita levels as well. In other words, people who ride call at high levels but most people don't ride or call. These findings are displayed in Figure 4-11. Number (1) denotes the fewest trips or people needed to generate a call. It should be noted that South Bend promotes the use of telephone information far more than do the other small authorities, accounting for its higher call volumes.

It is not surprising to find (as also shown in Figure 4-11) that the three largest authorities studied (Chicago, Los Angeles, Washington) require the most trips to generate a call, but rank lower in total population to calls. One suspects that they simply provide so much transit service (they have 3 of the 4 highest trips/capita ratings) that they are inevitably going to have more trips/call than smaller authorities.

Portland ranks close to the average when all calls are considered. However, if only live agent calls are counted, Portland requires the most people to generate a call and is behind only Chicago in trips/call. It is impossible to determine at this point whether callers of Portland's Call-A-Bus (CAB) system are receiving adequate information. If they are, then Portland is servicing an average number of callers, in one way or another. If they are not, then Portland is providing adequate information to a small number of callers relative to most other authorities, and may risk having some dissatisfied callers drop out of the system entirely.

Louisville's pre-eminent position in both categories is consistent with other indicators discussed previously. Louisville clearly emphasizes telephone information more than most authorities.

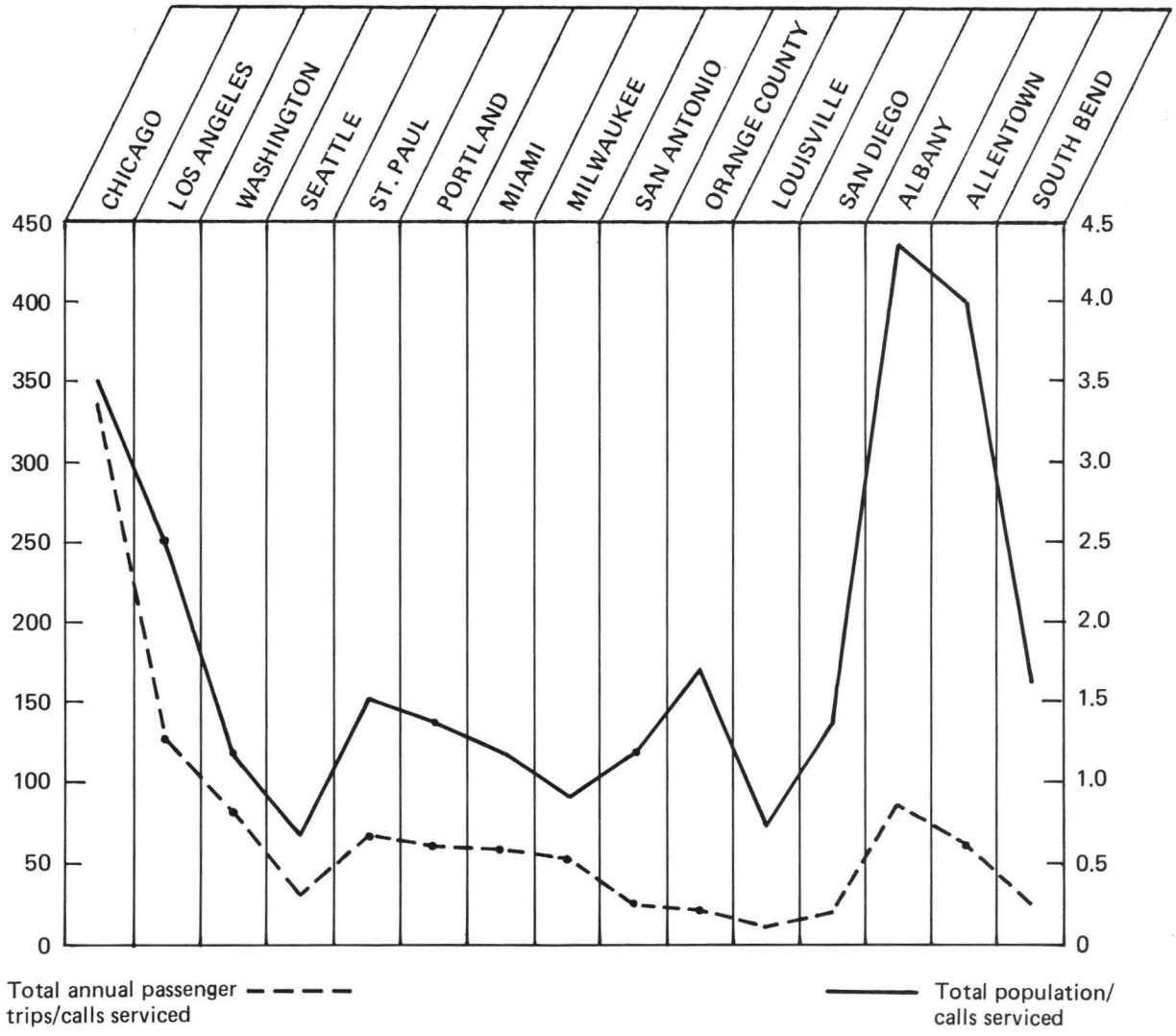


FIGURE 4-10. CALLS SERVICED

Authority	Rank in Population/ Call Among Case Studies	Rank in Trips/Call Among Case Studies
Louisville (sunbelt)	1*	1
San Diego (sunbelt)	7	2
Orange County (sunbelt)	11	3*
South Bend (small)	10	3*
San Antonio (sunbelt)	4*	5
Allentown (small)	14	8*
Albany (small)	15	12
Chicago (large)	13	15
Los Angeles (large)	12	14
Washington (large)	4*	13

*tie

FIGURE 4-11. PER TRIP VS. PER CAPITA CALL RANKINGS

4.4.3 Trunk Lines

The final measurement of capacity used is trunk lines/capita. This ratio (shown in Figure 4-12) is expressed as a percentage of the authority with the best ratio of trunk lines/population among those studied, in this case Washington. Washington, therefore, has "100%". The "call busy" ranking of each authority relative to the others is also provided. There does not appear to be a direct relationship between call busy rates and number of trunk lines. For example, Washington, Seattle and San Diego all have high call busy rates and among the best ratios of trunks/capita. However, the variety of capacity problems previously discussed in regard to Chicago and Miami are reflected in poor trunks/capita ratios. Albany, which also has a poor trunk line/capita ratio, did not demonstrate capacity problems.

4.5 INSTITUTIONAL AND LABOR ISSUES

This section discusses the organization of marketing activities at the case study sites, and labor relations issues.

4.5.1 Institutional Structure

Two basic institutional models were observed in the organization of marketing functions. Model-I treats telephone information as a marketing activity and integrates it into the Marketing Department. Model-II treats telephone information as a separate public service activity and separates it from what are considered "true" marketing activities. Chicago and Los Angeles were the only authorities which had clearly adopted Model II. Reflecting this organizational structure, officials of their respective telephone information centers did not emphasize the marketing potential of the service. Albany had a unique institutional structure discussed in detail in Section 6.13.5.

4.5.2 Labor Relations

Labor relations emerged during the course of this study as a major issue at many authorities. Telephone information is a highly labor-intensive service. Labor costs are really the significant cost element in the provision of telephone information service. With the exception of Louisville, Allentown and South Bend, all authorities had taken or were planning actions to control labor costs and/or improve labor productivity.

Los Angeles, Chicago, Milwaukee and St. Paul had installed ACD equipment to better monitor agent performance. Six other authorities plan to do the same in the future. Los Angeles, Orange County, San Diego, Portland and Albany have reduced their hours of operation in recent years. Only Seattle and Chicago still provide 24 hour/day service. San Diego and Seattle are both interested in CRIS technology to divert calls from the "live" system.

The most dramatic actions have been taken in Chicago and Portland. Chicago was the only authority to contract out the operation of its telephone service to a private operation. Chicago's unionized agents (primarily former bus drivers and other employees) were replaced with non-unionized, entry-level personnel earning $3 less per hour. Chicago officials are enthusiastic about

Authority	Percentage of Highest Authority	"Call Busy" Rank Among Case Studies*
Washington	100%	7
Seattle	96%	5
Louisville	95%	N/A
San Diego	91%	9
South Bend	82%	N/A
Los Angeles	75%	6
Milwaukee	74%	4
Allentown	73%	N/A
St. Paul	71%	N/A
Orange County	71%	2
San Antonio	68%	N/A
Portland	60%	1
Miami	55%	N/A
Albany	36%	3
Chicago	19%	8

*Rankings are out of 9 authorities.

FIGURE 4-12. TRUNK LINES/CAPITA

this change which is expected to save $500,000 annually. Efficiency measurements have risen since the change, but this improvement cannot be separated from the installation of new ACD equipment at the same time.

Portland replaced most of its agents with pre-recorded, route-specific informational tapes, known as Call-A-Bus (CAB). Portland officials expect CAB to save $1,015,597 in operating costs over five years. Seventy (70%) percent of all calls now go to the CAB system. Although the lost call rate on live agent calls has increased, complaints have been few.

Three issues which frequently emerge are the use of part-time agents, the impact of unionization, and the use of entry-level personnel or former bus drivers and other long-time transit authority employees as agents. Each is discussed below.

4.5.2.1 Part-Time Agents

Eight authorities use part-time employees. Of these, 3 (Allentown, San Antonio and Orange County) use predominantly part-time employees. Several other authorities hope to hire part-timers in the future. The principal advantage of part-timers is more efficient and cost-effective staff utilization and peak period coverage. The principal disadvantages are the perceptions that part-timers cannot maintain sufficiently high performance levels and have high turn-over rates. None of the authorities utilizing part-timers expressed problems in these areas. In some cases, union rules prohibit the hiring of part-timers.

4.5.2.2 Unionization

Five authorities (Chicago, San Antonio, Orange County, Louisville and South Bend) are now non-unionized. The most frequent criticisms of unionization were the prohibition against hiring part-timers, the inability to evaluate productivity levels due to rigid work rules, and the inability to discipline and/or dismiss ineffective agents. The latter was a principal reason in Chicago's decision to contract out its service.

It appeared to us that difficulties remained in union-management relations in St. Paul, which did poorly on most efficiency measurements. Neither automated data retrieval nor ACD equipment has been able to completely overcome labor-related problems. A major problem at St. Paul is that agents get to "pick" their assignments much as bus drivers do and continually switch back and forth between regular route and demand-responsive telephone information, becoming proficient at neither.

Officials at Washington and San Diego spoke generally favorably on the impact of unionization. They felt that it provided a means for standardizing labor-management interaction.

4.5.2.3 Type of Agent

The trend in the transit industry is definitely away from the use of former bus drivers as telephone agents. They are poorly suited by temperament to the task and cost too much. Only Milwaukee, St. Paul and Portland use significant

numbers of former drivers. Both Milwaukee and St. Paul officials hope to phase out this practice. While Portland officials express satisfaction with agent performance, they have replaced most of their agents with pre-recorded announcements for cost reasons. In the past few years, Chicago and Los Angeles have ended the practice of utilizing former bus drivers.

4.5.2.4 Impact of Labor Costs

Figure 4-13 indicates starting wage rates and cost/call of telephone information. These costs do not include telephone equipment or service, or fixed facility costs. The average starting telephone information agent earns $6.82 (approximately $14,186 annually). The average cost/call is $0.50. While service levels, agent productivity, and local cost of living can impact the cost/call, Figure 4-13 displays some relationship between wage rates and cost.

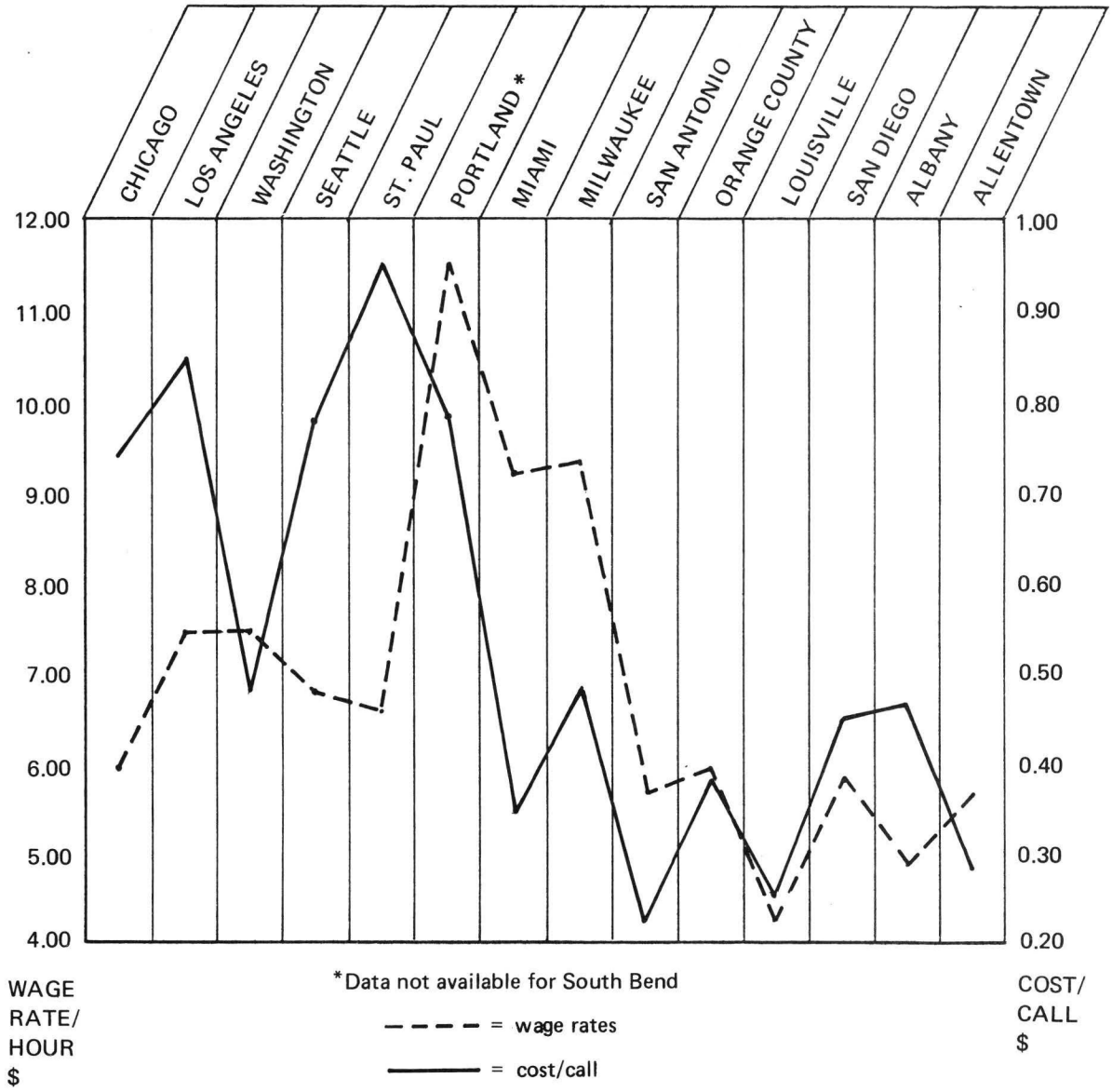
The smaller authorities and mid-size sunbelt authorities have lower wage rates and costs/call than the other authorities. There does not appear to be any correlation between wage rates and productivity. San Antonio and Louisville, with the lowest wage rates and costs/call, have among the best service efficiency and supply/demand ratios. Note that the figures shown for Portland represent the costs of agent-answered calls only. If Portland's CAB system was included, the average cost/call for all calls would be only $0.27, lower than any other authority except Louisville and San Antonio.

4.6 THE BENEFITS OF TELEPHONE INFORMATION

Two authorities, Washington and Orange County, conducted surveys on the impact of telephone information. Specifically, they attempted to determine whether or not callers actually utilized the information they obtained from telephone information to ride public transit. Both authorities attempted to collect this information by obtaining callers' names and phone numbers and then calling them back. In Washington's case, call-backs were made completely at random. In Orange County's case, only first-time callers were included in the survey.

The basic finding of both surveys was that people who call telephone information do in fact utilize that information to ride transit. At Washington, 82% of callers indicated that they had in fact taken the specific trip about which they called for information. Among Orange County's first-time callers, the figure was 81% (87% among prior bus riders and 78% among non-riders). Washington went a step further (as suggested in our methodology) and asked how many of the 82% who did ride transit would not have used transit if telephone information had not been available. Sixty-seven (67%) answered that they would not have taken the trip, perhaps the clearest indication of the true ridership generation impact of telephone information.

On the basis of these findings, Washington calculated the cost/benefit ratio of telephone information and found a total net benefit of $520,000. This benefit is based on the one-time impact (one trip) of a single call. This figure was devised from an estimate that telephone information costs WMATA $620 per 1000 calls and generated revenue of $858 per 1000 calls. The difference of $238 per 1000 calls represents an annual return of 38% on the initial investment of $620/1,000 calls.



*If CAB calls are included, Portland's average cost/call is only $0.27

FIGURE 4-13. WAGE RATES AND COST/CALL

Orange County was not able to make a calculation of this type since they did not know what percentage of all callers were represented by first-time callers. Therefore, they could not extrapolate the results of their sample to the full population. While they knew what percentage of the sample rode transit, they could not translate that percentage into the number of all callers who rode transit. Washington was able to do this by surveying all callers at random. Orange County could do it in the future by determining what percentage of all callers are represented by first time callers.

Both Washington and Orange County found fairly high anticipated frequency of ridership among respondents. Washington callers intended to repeat the same trip 12 times/month. Fifty-two (52%) percent of Orange County callers who were previous non-riders expected to ride at least once/week, while most previous riders expected to increase their ridership frequency.

It is likely, as suggested in our methodology, that in reality each call generates on average more than one trip. Since frequency of calling was not determined in these surveys, the exact number of trips generated per call cannot be determined. For example, Washington found that 40% of the callers had taken the same trip the previous month, but still found it necessary to call for information. Nevertheless, it seems likely that over time, Washington underestimated the benefit of telephone information since it assumed a 1:1 relationship between calling and riding. The determination of the true relationship would be an appropriate topic for future research. Washington officials are skeptical of this methodology, feeling that anything beyond the one call to one trip analysis is too speculative.

Washington and Orange County, as well as Seattle, have obtained demographic information on callers. Both Washington and Orange County found a large percentage of callers to be self-described "transit dependents," but not permanently so. At Washington, 80% of callers did not have an automobile available at the time of the call, but 56% did have an automobile available at other times. This finding indicated to Washington officials that telephone information provides access to the discretionary travel market, re-emphasizing the importance of the"salesperson" role. Similarly, Orange County found that only 13% of self-described transit dependents did not have an automobile in the household.

Washington found that, as theorized, 56% of trips taken by callers were off-peak, compared to 37% of all passenger trips. Washington also found that whereas 67% of callers had lived in the Metro area for over five years, 31% had lived at their present addresses for under one year.

Orange County found the demographics of callers to be similar to those of all riders. Similar research at Seattle found that while 23% of riders are over 55 years of age, only 8% of callers are. This is a surprising finding given the widespread perception that telephone information is heavily utilized by the elderly.

Several authorities have conducted research on which sources of transit information people use most frequently. Washington found that by a margin of 56% to 44%, people prefer schedules to telephone information but that 21%

could not name a single location for finding schedule information. This finding has caused Washington officials to consider placing greater emphasis on schedule distribution.

Seattle found that whereas only 24% of respondents utilized telephone information, 86-90% utilized informational signs and schedules (both of which Seattle emphasizes). Portland found that 39% of respondents used the Transit Fact Book as opposed to 25% who used the Call-A-Bus system. Albany found that 39.9% of respondents obtained information from schedules, as opposed to 20.4% from the telephone. All three of these authorities are predominantly schedule-oriented in philosophy.

4.7 FUTURE DIRECTIONS

This section provides a brief overview of new technological directions being pursued by some of the case study sites.

Washington and Los Angeles are both interested in developing spin-off applications for their automated data retrieval systems. Los Angeles hopes to contract CCIS service to small bus companies in the area as a revenue-generation activity. They also want to generate driver routings through CCIS, and use CCIS as a word processor to generate mailing labels for schedule distribution. Los Angeles also hopes to reprogram the CCIS routing algorithm to employ caller characteristics (i.e. elderly) and route load-factors in determining the best routings. Washington is actively involved in placing remote AIDS terminals at area college student unions. They also want to use the AIDS data collection capability to assist the Planning Department in evaluating the cost-effectiveness of existing or proposed routes, and to assist the Financial Department in allocating costs among Washington's many jurisdictions.

Los Angeles, Portland and San Diego are all interested in the potential of computer-generated voice response add-on to an automated retrieval system. The automated data retrieval system would trigger a computerized voice response, bypassing the agent completely. If a caller was not satisfied with the computerized response, they could remain on-line for a certain period of time until the call was automatically re-routed to a live agent.

Portland has among the most ambitious technological plans. Building on the transit mall concept, they are planning to develop a 2-way interactive telecommunications network which will tie together 18 transit centers, 26 light rail stations, the Transit Mall, the downtown customer service center and the computer and dispatch offices. Total capital cost is estimated at $1,446,000 with annual advertising revenue projected at $300-700,000. Portland is also in the process of selling advertising on its Call-A-Bus system.

In addition to its CCIS spin-off, Los Angeles is in the process of replacing its trunk lines with microwaves beamed to a roof top antenna, and tying together all transit authority computer functions (including CCIS) into a single network (TRANSMIS I and II). Albany has already received a grant for the UMTA CRIS Project, and Seattle is interested in developing a CRIS capability.

5.0 CORRELATING THE QUALITY OF TELEPHONE INFORMATION AND EXTERNAL BENEFITS: A PRIVATE SECTOR METHODOLOGY

The methodologies utilized by Washington and Orange County and described in Section 4.6 attempted to relate the mere act of calling telephone information with the generation of ridership (external benefits) for the transit authority. These methodologies did not attempt to relate the quality of the telephone information experience to future ridership. In this section, we present two methodologies developed in the private sector to quantify the relationship of the quality of telephone information to product patronage. While none of the case study sites included in this report had utilized these methodologies, we believe that with certain modifications discussed below, they are applicable to the public transit industry.

Technical Assistance Research Programs, Inc. (TARP) has conducted considerable research for major corporations on the patronage impact of inquiry handling[1]. Recently published research performed for a major soft drink company has considerable applicability to the transit industry, with one major caveat.

Soft drinks (and similar products) exist in a highly competitive industry of interchangeable products. There are only two major competitors to public transit: the automobile and not traveling at all. It is very easy to switch from one brand of soft drink to another. Switching from public transit to the automobile, on the other hand, is a major life decision. This crucial distinction will be considered in the discussion of the following methodology for applying TARP's private sector research to the transit industry.

TARP's research focuses on the impact of the quality of telephone information on callers themselves (Section 5.1 below), and then examines the impact on others in society who did not actually have a firsthand experience with telephone information (Section 5.2 below).

5.1 MEASURING THE IMPACT OF THE QUALITY OF TELEPHONE INFORMATION ON THE CALLER

In its study, TARP found the following results among those who called the soft drink company's telephone inquiry line:

- 17% of those who received a satisfactory response increased their purchase of the brand.
- 12.5% of those who received an unsatisfactory response terminated their purchases of the brand.
- 12.5% of those who received an unsatisfactory response purchased less of the brand.

TARP only examined the adequacy of the response in a substantive sense. In the case of transit telephone information, the total "experience" should be considered. In addition to the adequacy of the response, this would include the following:

[1]TARP, "Measuring The Grapevine-Consumer Response and Word-of-Mouth," October, 1981.

- Courtesy of the response
- Number of attempts necessary to get through
- Amount of time on hold

The answer could be perfectly satisfactory but if one has to call ten times and spend twenty minutes on hold, the experience as a whole would probably be considered unsatisfactory.

It is unlikely that people would change their mode of travel in response to an unsatisfactory telephone experience as easily as those in the TARP survey changed brands. Therefore, a transit authority should generate its own data. Survey respondents could be asked whether the experience (based on the above listed factors) was satisfactory or unsatisfactory, and what impact it had on their frequency of ridership. Alternately, the survey team could grade the experience based on predetermined criteria (i.e. length of "hold", etc.).

The ridership impact should first be calculated separately for those callers receiving "satisfactory" or "unsatisfactory" experiences. The "satisfactory" callers should be divided into "previous transit riders" and "non-transit riders". The survey should determine the future ridership frequency of each group (frequency projected over a month is recommended). The anticipated ridership frequency of the non-users will represent by itself a net gain in ridership for the transit authority. Of course, some non-users will remain non-users and this "zero" frequency increase must be balanced against the anticipated increase of those who become users. The anticipated ridership frequency of previous users must be compared to their reported existing ridership frequency to determine the net change.

In the case of callers who had an unsatisfactory experience, only previous riders need be included in the calculation. Presumably, the non-riders will remain non-riders or if they become riders it will be <u>in spite of</u> telephone information, not because of it.

One final step should be taken for each group. The frequency of calling should be determined and compared to the net change in ridership. For example, if non-users who had a "satisfactory" experience began riding 10 times/month but continued calling at the rate of 8 times/month, the ratio of trips generated to calls made was 10 to 8, or 1.25. Thus, each call in reality generated 1.25 trips.

Once all the calculations have been made for those receiving "satisfactory" and "unsatisfactory" experiences and a net ridership impact for each calculated, the two results should be combined to determine the total net impact of the quality of telephone information. In other words, trips generated by satisfactory experiences will be balanced out by those lost due to unsatisfactory experiences. It is not inconceivable that in the case of severely overtaxed telephone information systems, the bottom line could be negative. Through consumer alienation, telephone information could actually cost the transit authority riders and revenue. Such a finding would certainly provide a cost/benefit rationale for improving the service efficiency or supply/demand ratio of the telephone information system.

This calculation is displayed in Figure 5-1, utilizing hypothetical data. The impact of a satisfactory telephone experience is calculated in Part A for previous transit riders (lines 1-6) and non-riders (lines 7-11). The results are combined in line 12. Part B calculates the impact of an unsatisfactory experience on transit riders only. The results are combined in Part C to determine the net impact of the quality of telephone information. The result in this example is an increase in ridership of 96 trips/month. This result is based on the average impact of a single call for each caller. In lines A-5, A-10, and B-4, the reported increase in ridership frequency is divided by the calling frequency to determine the impact of a single call on a single rider. If this had not been done, the ridership impact would have been exaggerated, since it would not have taken into account that multiple trips are usually generated by multiple calls, rather than just a single call.

Several additional calculations can be performed on the result. It can be extrapolated to an annual increase in ridership among the survey sample. While anticipated ridership frequencies may decrease over time, so hopefully will calling frequencies, thus maintaining a similar ratio of trips generated to calls made. This result can then be extrapolated from the survey sample to the universe of all callers, determining the total ridership impact of telephone information. Finally, the result can be translated into a revenue gain (or loss) by multiplying net change in ridership by the average fare. This figure can in turn be compared to the cost of providing telephone information, creating a true cost/benefit analysis. These results can assist the transit authority in determining the value of further investments designed to improve the quality of telephone information.

5.2 MEASURING THE IMPACT OF THE QUALITY OF TELEPHONE INFORMATION ON SOCIETY

In its soft drink study, TARP carried the analysis described in Section 5.1 a step further. It examined the impact of the quality of the telephone experience on not only the actual caller, but also on people to whom the caller might relate the experience. This phenomenon is referred to as word-of-mouth (WM). Word-of-mouth can be positive (PWM) or negative (NWM). TARP discovered the following regarding word-of-mouth[2].

- Word-of-mouth has more impact than media advertising on a person's actual decision to purchase a product.
- If a telephone inquiry is satisfactorily resolved, the caller is likely to tell 3-4 (average 3.5) people about the experience.
- If an inquiry is not satisfactorily resolved, the caller is likely to tell 4-5 (average 4.5) people about the experience. (NOTE the greater inclination of people to talk about negative experiences.)

[2]TARP, "Measuring the Grapevine".

A.	Survey Respondents Reporting a Satisfactory Telephone Experience	
1.	Number of Respondents =	120
2.	Number of Respondents who use transit =	96
3.	Anticipated Increase in Ridership Frequency of Line 2 =	2 trips/ month
4.	Average Number of Calls of Line 2 =	1.5/ month
5.	Net Impact of Each Call (Line 3/Line 4) =	1.33 trips/ month
6.	Total monthly trip generation/call by transit users (Line 2 x Line 5) =	128 trips
7.	Number of Respondents who do not use transit =	24
8.	Anticipated Average Ridership Frequency of Line 7 =	4 trips/ month
9.	Average Number of Calls of Line 7 =	3/ month
10.	Net Impact of Each Call (Line 8/Line 9) =	1.33 trips/ month
11.	Total monthly trip generation/call by non-transit users (Line 7 x Line 10) =	32 trips
12.	Total monthly trips/call generated by all respondents (Line 6 + Line 11) =	160 trips
B.	Survey Respondents Reporting an Unsatisfactory Telephone Experience (Transit Users Only)	
1.	Number of Respondents =	32
2.	Anticipated Decrease in Ridership Frequency of Line 1 =	4 trips/ month
3.	Average Number of Calls of Line 1 =	2/ month
4.	Net Impact of Each Call (Line 2/Line 3) =	2 trips/ month
5.	Total decrease in monthly trips/ call (Line 1 x Line 4) =	64 trips/ month
C.	Combine the Results of Parts A and B	
1.	Total trips generated/call by respondents receiving a satisfactory experience (Part A, Line 12) =	160 trips/ month
2.	Total decrease in trips/call by respondents receiving an unsatisfactory experience (Part B, Line 5) =	64 trips/ month
3.	Net impact of the quality of telephone information (Line 1 - Line 2) =	96 trips/ month

FIGURE 5-1.
CALCULATING THE IMPACT OF THE QUALITY OF TELEPHONE INFORMATION ON CALLERS

This information can be utilized in one of two ways. Since it is not known for certain what recipients of word-of-mouth information do with it, this finding can be used simply to develop a relative impact ratio. The formula for this calculation is as follows[3]:

$$\frac{PWM}{(2)NWM} = \text{Relative Impact Ratio}$$

where:

PWM = Total number of survey respondents receiving positive word-of-mouth
NWM = Total number of survey respondents receiving negative word-of-mouth

Note that NWM is doubled. This reflects the supposition that not only is NWM distributed more widely than PWM, but that it is twice as likely to have an impact on the people hearing it. The end product is a ratio of patrons gained to patrons lost. For the record, the soft drink company's ratio was 7.18, meaning that it theoretically gained 7.18 consumers through PWM for every one consumer it lost through NWM.

The question still remains what recipients of word-of-mouth do with the information and the total impact on ridership for a transit authority. The TARP study did not suggest a methodology for this calculation. The following methodology has been developed for this report.

For the purpose of this calculation, it is assumed that individuals who had a satisfactory telephone information experience will spread positive word-of-mouth (PWM), and those with an unsatisfactory experience will spread negative word-of-mouth (NWM). The number of PWM recipients can be extrapolated from the number of survey respondents who had satisfactory experiences by multiplying by the standard PWM factor of 3.5 (as determined in the TARP study). The answer should be divided into transit users and non-users based on the standard local modal split. It can be assumed that recipients of PWM have the same characteristics as the general population, and not the characteristics of telephone information callers.

It can then be assumed that transit users who received PWM will increase ridership at the same frequency as actual callers who are users. It is more complex to determine the impact of PWM on non-users. These non-users have not actually called telephone information, thereby demonstrating an interest in using transit. So as not to overstate the impact of PWM on these individuals, their number should be reduced to include only those non-users who are potential transit users. Most local planning agencies collect data of this type.

A similar calculation can be made to determine trip loss caused by negative word-of-mouth. The number of NWM recipients can be extrapolated from the number of survey respondents who had unsatisfactory experiences by multiplying by the standard NWM factor of 4.5. This result should be doubled to reflect the greater impact of negative word-of-mouth. The resulting answer is divided

[3]TARP, "Measuring the Grapevine".

into transit users and non-users as before. In the case of NWM, non-users can be safely ignored because they will in all likelihood remain non-users. It should be assumed that transit users who receive NWM will decrease ridership frequency at the same rate as users who actually called telephone information and had an unsatisfactory experience.

The impact of PWM and NWM can then be combined to determine the net impact of all word-of-mouth. This calculation is displayed in Figure 5-2, utilizing the hypothetical data introduced in Figure 5-1.

The impact of PWM is determined for transit users in lines A 1-9 and for non-users in lines A 10-16. The results are combined in line 17. The impact of NWM is determined for transit users only in Part B. The results of Parts A and B are combined in Part C to determine the net impact of word-of-mouth. As in Figure 5-1, the increase in ridership frequency is balanced by the calling frequency of the original caller.

These results can be extrapolated to annual ridership impact and revenue impact as in Figure 5-1. The results can also be combined with the results of Figure 5-1 to calculate the total impact of the quality of telephone information on callers and recipients of word-of-mouth.

The advantage of this methodology as compared to just considering the impact for callers is that the impact of telephone information is extended beyond people with firsthand experience to include those with secondhand experience. As the TARP study indicates, it is realistic to assume that such an impact exists. (One might even hypothesize that given the relative importance of transit compared to soft drink in people's lives, word-of-mouth distribution could be even greater. Rather than utilizing the TARP estimate, a transit authority could determine its own word-of-mouth impact by including this question in a survey.)

The disadvantage is that it is not certain that the recipients of secondhand information will respond to the same degree as do the recipients of firsthand information. There is probably some drop-off. This problem can be handled in a number of ways:

- The resulting figure could be treated as the maximum potential impact, with the actual impact probably being less.
- The number of word-of-mouth recipients who actually change their behavior could be arbitrarily reduced by, say, 25%.
- Word-of-mouth recipients could actually be surveyed (rather than estimating their behavior) by obtaining names and phone numbers from actual callers. This information might prove difficult to obtain.
- It could be assumed that the impact of PWM and NWM, though exaggerated, balances out so that the actual net impact is realistic.
- It could be assumed that any overstatement of impact (i.e., change in travel behavior) is balanced by the possible understatement of the extent to which word-of-mouth information regarding transit is distributed.

A.	**Impact of Positive Word-of-Mouth**	
1.	Number of Survey Respondents Reporting a Satisfactory Telephone Experience (Figure 5-1, Line A-1) =	**120**
2.	Multiply Line 1 by Distribution Rate of PWM =	x **3.5**
3.	Number of PWM Recipients (Line 1 x Line 2) =	**420**
4.	Multiply Line 3 by the Local Transit Market Share =	x **25%**
5.	Number of PWM Recipients who are Transit Users (Line 3 x Line 4) =	**105**
6.	Anticipated Increase in Ridership Frequency of Line 5 =	**2** trips/month
7.	Average Number of Calls of Line 1 =	**1.5/** month
8.	Net Impact of Each Call (Line 6/Line 7) =	**1.33** trips/month
9.	Total monthly trip generation/call by PWM Recipients who use Transit (Line 5 x Line 8) =	**158** trips/ month
10.	Number of PWM Recipients who are Non-Transit Users (Line 3 - Line 5) =	**315**
11.	Multiply Line 10 by % of Non-Users who are Potential Users =	**33%**
12.	PWM Recipients who are Non-Users but Potential Users (Line 11 x Line 12) =	**105**
13.	Anticipated Ridership Frequency of Line 13 =	**4** trips/month
14.	Average Number of Calls of Line 1 =	**1.5/** month
15.	Net Impact of Each Call (Line 13/Line 14) =	**2.67** trips/month
16.	Total Monthly trip generation/call by PWM Recipients who do not use Transit (Line 12 x Line 15) =	**280** trips/ month
17.	Total monthly trips generated by all PWM Recipients (Line 9 + Line 16) =	**438** trips/ month
B.	**Impact of Negative Word-of-Mouth**	
1.	Number of Survey Respondents Reporting an Unsatisfactory Telephone Experience (Figure 5-1, Line B-1) =	**32**
2.	Multiply Line 1 by Distribution Rate of NWM =	x **4.5**
3.	Multiply Line 1 by "2" to Reflect Greater Impact of NWM =	x **2**
4.	Weighted Number of NWM Recipients =	**288**
5.	Multiply Line 4 by the Local Transit Market Share =	x **25%**
6.	Number of NWM Recipients Who are Transit Users =	**72**
7.	Anticipated Decrease in Ridership Frequency of Line 6 =	**4** trips/month
8.	Average Number of Calls of Line 1 =	**2/** month
9.	Net Impact of Each Call (Line 7/Line 8) =	**2** trips/month
10.	Total Monthly Decrease in trips/call by NWM Recipients who use Transit (Line 6 x Line 9) =	**144** trips/ month
C.	**Combine Results of Parts A and B**	
1.	Total Trips Generated by Recipients of PWM (Part A, Line 17) =	**438** trips/ month
2.	Total Decrease in Trips by Recipients of NWM (Part B, Line 10) =	**144** trips/ month
3.	Net Impact of Word-of-Mouth (Line 1 - Line 2) =	**294** trips/month

FIGURE 5-2. CALCULATING THE IMPACT OF WORD-OF-MOUTH ON TRANSIT RIDERSHIP

We hope that transit authorities interested in documenting the costs and benefits of telephone information will employ one of these (or similar) methodologies in the future. By relating the quality of telephone information (the efficiency of the process) to the outcome (external benefits to the transit authority such as revenue gains), future investment decisions can be based on quantifiable experiences.

6.0 CASE STUDY DESCRIPTIONS

This section provides an in-depth review of each case study site. Sites are presented in descending order of number of revenue vehicles. Each case study description is organized as follows:

- Introduction - why this case study?
- Transit authority and service area background
- Special circumstances (where applicable)
- Marketing philosophy
- Operating statistics (including Service Efficiency Measurements and Supply/Demand Ratios)
- Institutional and labor arrangements
- Marketing and telephone information costs
- Market research (where applicable to telephone information)
- Future directions
- Summary - Unique features of the case study in relation to other sites

Not all of the information was available at or relevant to each case study site. See Figure 2-5 for a summary of available information by Case Study.

6.1 (CHICAGO AREA) REGIONAL TRANSPORTATION AUTHORITY (RTA)

Chicago (RTA) was selected as a case study because it is one of the few large transit authorities to utilize microfiche data retrieval. However, the case study actually focused on the recent decision of Chicago to take over all public transit telephone information in the Chicago area (including that formerly provided by the Chicago Transit Authority-CTA) and to contract that service out to a private vendor. This decision was unique among the case study sites many of which, however, were grappling with issues of labor costs and productivity in a highly labor-intensive field. The implications of this decision were clearly the primary area of focus among Chicago officials who participated in this study.

6.1.1 Background

Chicago (RTA) is unique among the organizations studied in that it is not (for the most part) an operating agency but rather a multi-modal regional governing body. The bulk of public transportation service in the Chicago area is provided by the Chicago Transit Authority (CTA). Last year CTA carried 617,934,948 passengers on 2,275 buses and 1,200 rapid transit cars. While Chicago (RTA) does perform certain regional coordination functions in regard to CTA (of which telephone information is now an example), CTA is in most regards an independent agency.

The RTA is more directly involved in the operation of suburban bus service and commuter rail service. It has traditionally contracted out the operation of each to private operators. Recently however, the RTA has formed a railroad corporate subsidiary to more directly manage the operation of certain lines. Under RTA auspices, 63,214,430 passengers were carried last year on 899 commuter rail cars and 697 suburban buses.

Next to New York City, the Chicago area is probably the most transit-oriented urban center in the nation. The modal split to the 14 square mile "Chicago Central Area" is 46.1% transit compared to 42.8% automobile. The modal split to the CBD is 70% transit to 30% automobile. The ratio of passenger trips to population (service intensity) is by far the highest in the Chicago area of all the authorities studied. For the 7,000,000 people of the entire RTA area there are 97.3 trips/person annually. For the 4,000,000 people of the CTA district (basically the City of Chicago), the ratio is 154.4 trips/person. Chicago and Los Angeles were the largest authorities visited in terms of service area population. The Chicago bus fleet (including CTA and suburban buses) is similar in size to the fleet of Los Angeles. Chicago, of course, has major rapid transit and commuter rail components as well.

6.1.2 The Reorganization of Telephone Information at Chicago (RTA)

Until March, 1983, CTA provided all telephone information service for Chicago area public transit in-house under contract to RTA. At that time, the RTA contracted out all transit telephone information to the firm of Very Important Personnel, Inc. (VIP). VIP is essentially a temporary employment agency which provides fill-in support staff to private corporations. VIP has provided a variety of outgoing telephone activities (such as surveys and telemarketing campaigns) to private businesses and government agencies.

Chicago (RTA) has entered into a five-year contract with VIP for the operation of its telephone information service. It was clear from our discussion with the President of VIP, Ms. Joanne Clark, that a contract of shorter duration would have been viewed by VIP as a highly risky investment. The annual contract is for a firm-fixed price of $1,498,000. Under the terms of the contract, VIP is responsible for all phases of the operation of the telephone information center except for the actual cost (operating and capital) of the telephone equipment itself. This expense is paid for separately by the RTA.

The decision to contract out was made for both cost and quality reasons. Chicago officials estimate that by contracting out they will reduce the cost of telephone information by $500,000 annually. This cost savings is due almost entirely to the change from unionized CTA agents (primarily ex-drivers and ticket agents) earning $9.00/hour to non-unionized entry level clerks earning $6.00/hour. RTA officials also felt that the CTA agents were often "unfriendly" and "difficult to discipline or fire" due to union regulations, and that this situation would be rectified through the employment of private sector agents.

Mr. Hubert Messe, Manager of Communications, is optimistic about the outcome of this program. He pointed to the anticipated savings in labor costs and a dramatic improvement in the call capture rate (see Section 6.1.4). The improvement in the call capture rate cannot, however, be attributed solely to the decision to contract out since a new ACD system (see below) was also installed at the same time. In our view, the key to the success of this decision is the ability of a private contractor to more tightly control employee performance than is possible for a government agency.

While it is too early to draw definitive conclusions on the results of this experiment, a number of observations can be made. First, the transition period was extremely difficult. Cost savings for the first two months were not as high as anticipated. New agents were rushed into service with low knowledge levels. While caller complaints about agent rudeness essentially stopped, complaints about inaccurate information and calls taking too long soared.

Chicago recognizes that mistakes were made because the process was rushed. CTA personnel were initially used as trainers and showed signs of resentment for losing this service. Microfiche data and microfiche data retrieval machines were damaged during the last weeks of operation at CTA. By the time the machines arrived at VIP, most were in need of repair.

In retrospect, it is somewhat surprising that Chicago did not experience even more serious labor problems in implementing this decision, since it involved the transfer of CTA jobs. It does appear that Chicago ameliorated the potential for labor difficulty by finding other positions for its employees. A few even accepted transfer to VIP at the lower salary. Nevertheless, it is a commentary on the strength of management's hand in labor relations today that this change could be effected with as little trouble as occurred.

As will be discussed in Section 6.1.4, Chicago officials believe that the change to a private contractor has produced significant productivity gains. In addition to the simultaneous change to new ACD equipment, another factor

must be considered in any long-term evaluation of the impact of this change. Until the transition, Chicago was one of only four authorities studied (Portland, St. Paul and Milwaukee being the others) to employ large numbers of former bus drivers (and employees from other jobs as well) as telephone information agents. In general, the trend in telephone information has been away from the employment of former bus drivers.

Thus, in evaluating productivity and morale improvements brought about by this change, one must take care in understanding the system which preceded it. Most of the case study sites utilize entry-level "clerk" agents who are public sector, unionized employees rather than private sector non-unionized employees. Many of these sites also claim to have the same type of high morale, esprit de corps, and productive work behavior which VIP claims for its employees. Thus, it is unclear at this juncture whether the key factor in improving productivity is private non-unionized vs. public unionized employees or ex-bus drivers and other long-term employees vs. entry-level agents trained as telephone information agents from the beginning of their careers with the transit authority.

6.1.3 Marketing Philosophy

Telephone information is considered to be an essential public service. In fact Chicago, as is often the case with the older urban authorities, does relatively little in the way of organized marketing beyond telephone information. Budgetary constraints in the past several years have greatly reduced traditional marketing activities. The RTA has done no media advertising (and has had no media budget) for several years. A new route map has not been produced since 1978. Advertisements in suburban newspapers, which were considered quite effective, have been terminated. The telephone information number is prominently displayed on RTA bus stop signs and on schedules. RTA abandoned route informational signs two years ago due to continual schedule changes.

RTA now concentrates on developing new avenues of free publicity. An outreach program to shopping centers and junior colleges has resulted in the placement of advertising slicks into shopping center flyers and junior college bulletins and newsletters. Upon request, the RTA will provide camera-ready customized ads for insertion into flyers and bulletins. Shopping centers permit RTA informational signs to be posted in stores and other areas where RTA schedules and timetables are on display. All informational brochures and timetables are continually updated.

Current marketing campaigns concentrate on information regarding new services and the sale of monthly bus tickets. Specific informational campaigns involve personal calls to town officials, press releases, flyers, and PSA's on cable television. Area affairs representatives make personal calls on businesses throughout the region. They distribute informational brochures and try to persuade businesses to serve as outlets for the sale of monthly tickets.

There is no marketing coordination between the RTA and the CTA other than the telephone information center. CTA prints a new route map bi-annually, but does little formal marketing or schedule distribution given a stable route

structure and frequent headways. Many CTA bus stop signs provide schedule information. CTA signs also include the telephone information number but in many cases it is barely readable from any distance.

While Chicago appears to do less formal marketing than many of the newer "sunbelt" transit authorities visited, it should be noted that the need for this type of "outreach" marketing is also less. Public transit, in basically the form in which it exists today, has been a transportation option for Chicago area residents for decades. It is hard to see how transit's share of the modal split to the downtown area could be significantly improved upon, or market share in general altered substantially.

6.1.4 Operating Statistics

Figure 6-1 displays the statistical measurements for Chicago's telephone information service. Chicago and Seattle were the only authorities visited which still provide live telephone information service, 24 hours/day, 7 days/week. The need to provide continual coverage accounts for the wide discrepancy between peak period agents (16) and total agents employed (43).

Two productivity measurements show improvement under the new system. Percent of calls lost from hold has decreased from 30-40% to 5%, while calls handled/agent/hour has increased slightly from the range of 30-33 to 35. Performance in both of these criteria is among the best observed. It is impossible to definitively attribute this improvement to (1) the use of a private contractor, (2) the use of entry-level agents in lieu of former bus drivers, or (3) new ACD equipment which permits on-line agent monitoring by CRT and produces hourly performance print-outs.

Chicago utilizes keyboard-type microfiche machines to retrieve data. Figure 6-2 on the following page shows a typical microfiche screen display (not Chicago). The agent enters a code number on a keyboard and the machine automatically scrolls through the data base until it finds the requested route. It takes four seconds to switch fiches. Chicago officials are supportive of the microfiche technology. A frequent criticism of this technology is that it is not effective for handling itinerary calls. This is not considered a problem at Chicago where roughly 65% of calls are of the itinerary nature (slightly lower than in Los Angeles and Washington). Manual maps are utilized in conjunction with the microfiche to plan itineraries.

The major criticisms of the microfiche among Chicago officials are related to the frequency of machine breakdowns and the updating process. The machines are 8-10 years old and, until the recent move to VIP, were subject to frequent breakdowns. Chicago officials feel that maintenance at VIP is greatly improved over that at CTA and this problem has been ameliorated.

The updating problem is commonly referred to, particularly by the transit authorities with dynamic route structures, as another major drawback to microfiche. Chicago makes an estimated 400 changes annually. These changes are made in the microfiche on a case-by-case basis by a consultant. It is not unusual for paper updates to be utilized by agents when sufficient lead time has not been provided by the Planning Department to permit microfiche updating in time for the route change.

A.	OPERATING FACTS:	
	Total Number of Agents	43
	Agents on Line at Peak Hours	16
	Hours of Operation	24 hrs/day
	Number of Trunk Lines	24
	Calls Serviced/Year	2,001,220
	Percent of Itinerary Calls	65%
B.	PROCESS EFFECTIVENESS	
	Percent of Calls to Hold	N/A
	Length of Time on Hold	0:30 - 0:60
	Percent Lost from Hold	5% (new) - 30-40% (old)
	Percent Receiving Busy Signal	40%
	Calls Serviced/Agent/Hour	35 (new) - 30-33 (old)
	Average Transaction Time	3:25
C.	SUPPLY/DEMAND RATIOS	
	Vehicles/Total Agents	117.9
	Vehicles/Peak Agents	316.9
	Passenger Trips/Calls Handled	341
	Population/Calls Handled	3.5
	Trunk Lines/Population	19%

FIGURE 6-1. CHICAGO OPERATING STATISTICS

FIGURE 6-2. TYPICAL MICROFICHE SCREEN DISPLAY

The calls handled/agent/hour standard of 35 appears to be pushing the maximum of what is possible over a sustained period of time. Unlike the other case study sites, Chicago agents are almost all new to their jobs. While they may have been at it long enough to learn the "trade", the newness and excitement of the work may not have yet worn off. It remains to be seen whether this performance level can be maintained over the long run.

6.1.5 Institutional and Labor Arrangements

The labor arrangements of Chicago are discussed in-depth in Section 6.1.2. Agents are trained for 12 days, including 1-2 days spent riding the transit network. They then receive a 10-day apprenticeship under the supervision of an experienced operator. The emphasis in the training period is on learning the transit network with approximately 1 - 2 days spent on communication skills. A small number of part-time employees were utilized under both the old and new systems. Chicago now has the lowest starting wage among the medium-large northern industrial cities visited.

In addition to contracting out telephone information, Chicago reorganized internally as well. Telephone information was moved out of the Advertising Department into a new Communications Division. The telephone information and marketing functions are now separated, as shown in Figure 6-3.

6.1.6 Cost of Operations

Chicago's expenses for telephone information (not including telephone lines and equipment) is the cost of the VIP contract, $1,498,000. This represents 0.4% of the total RTA budget. No budget breakdown was available for other marketing expenses. Figure 6-4 displays a cost breakdown for telephone information.

6.1.7 Summary

While Chicago appears to have improved its call handling considerably, there are indications that they are not adequately meeting the total demand for service. Chicago has among the highest population/calls serviced ratios (3.5), surpassed only by the much smaller authorities of Albany and Allentown. This ratio is 40% higher than Los Angeles' ratio and twice as high as Washington's, the other large authorities examined. In addition, Chicago has the highest ratios of vehicles to total agents (117.9) and vehicles to peak period agents (316.9), even surpassing that of Portland which has replaced most agents with pre-recorded announcements. Chicago has only 19% of the trunk line capacity to population ratio of Washington (and the lowest ratio of all 15 authorities) despite having just increased capacity from 20 to 24 lines. Mary Brouch, Section Manager of Consumer Information, realizes that further expansion is necessary.

The best evidence that Chicago's limited capacity is constricting demand is the 40% call busy rate. This figure is exceeded only by San Diego among authorities which collect this data. San Diego also admits to being overtaxed. Chicago was not aware of its call busy rate until the installation of the new ACD equipment, so no "before" and "after" comparison is possible. (Chicago officials hope that a new call busy survey to be conducted shortly

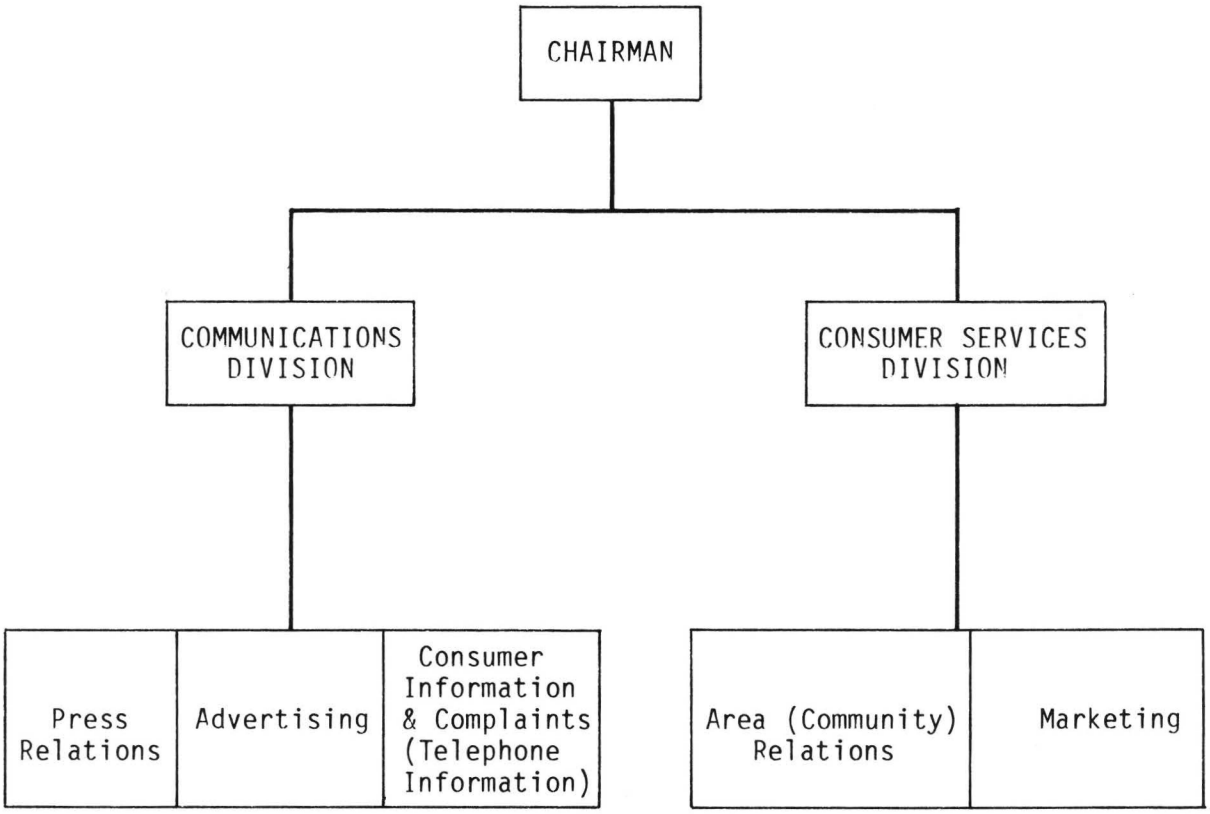


FIGURE 6-3. CHICAGO (RTA) INSTITUTIONAL STRUCTURE

CATEGORY	CAPITAL (NEW ACD)	OPERATING
VIP Contract	-	$1,498,000
Agents		789,360
Agent Training		20,000 (est.)
Microfiche Machine Maintenance		3,384
Data Base Updating - Microfiche		14,168
Miscellaneous		691,068
New ACD Equipment	$30,000	-
TOTAL	$30,000	$1,498,000
COST/CALL		$0.75/Call

FIGURE 6-4. COST OF TELEPHONE INFORMATION - Chicago (RTA)

will indicate some improvement.) One must concede that given a stable population and transit network, and its long history of heavy transit usage, the Chicago area probably does generate less real demand for telephone information than do cities such as Washington and Los Angeles.

The percentage of the RTA budget devoted to telephone information (0.4%) is slightly below average, but similar to Washington's. Despite the recent reduction in labor costs, Chicago's cost/call rate of $0.75 is exceeded by only three other transit authorities.

6.2 SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT (SCRTD), LOS ANGELES

The focus of the case study at Los Angeles (SCRTD) was on its computerized data management and retrieval system known as the Computerized Customer Information System (CCIS). CCIS enables Los Angeles' agents to obtain computer-generated responses to questions ranging from the simplest schedule inquiry to complex itinerary planning. The implementation of automated data retrieval technology at Los Angeles is characterized by the following factors:

- CCIS was implemented in only a portion of the Los Angeles service area.
- CCIS shares time on a mainframe computer with other Los Angeles transit departments.
- CCIS was implemented at Los Angeles primarily to improve agent productivity and reduce training costs.

6.2.1 Background

SCRTD services a metropolitan area population of approximately 7,100,000 people in the greater Los Angeles area. This is roughly the same as the population serviced by the RTA/CTA combination in Chicago. Los Angeles operates a fleet of 2,905 revenue vehicles, all buses, and last year provided 376,000,000 passenger trips. A heavy rail system is in the planning stages and has received a federal funding commitment.

Except for its size, Los Angeles has little in common with the large transit authorities operating in the densely populated urban areas of the Northeast. Its share of all trips is only 4%. (Market share of commuter trips was unavailable.) Travel patterns in Los Angeles do not focus on the traditional downtown CBD, but are rather incredibly diffuse and complex. SCRTD's service area extends up to 90 miles north and south and 50 miles east and west in the Los Angeles Metropolitan area. Within that area, over 200 bus routes service 185 different communities. Nevertheless, Los Angeles has the fourth highest ratio of trips to population (53.7) among the authorities visited, surpassed only by Chicago, Washington and Milwaukee.

In addition to its geographical complexity, the Los Angeles area does not have the same tradition of transit usage and awareness as exists in the older urban areas. Los Angeles officials describe the populace as "transit ignorant", a situation compounded by the tremendous distances people regularly travel and the resultant lack of geographical awareness about their destination points.

6.2.2 Automated Data Retrieval at Los Angeles

There is not a long history at Los Angeles of enthusiasm for transit information services. The main emphasis has traditionally been on providing essential information as efficiently as possible. CCIS originated as a joint project of the Telephone Information and Data Processing Departments. The latter had been approached by the firm of System Development Corporation (SDC). SDC had developed a computer-based data retrieval system copyrighted as PARIS (Passenger Routing Information System) for the nearby Santa Monica Municipal Bus Lines.

Los Angeles initiated a test project utilizing their existing mainframe UNIVAC computer. The service area selected for the test was the 300 square mile San Fernando Valley region north of downtown Los Angeles. All calls from the valley enter the Los Angeles Telephone Information Center via dedicated trunk lines, permitting segregation of test area calls for data analysis purposes. The Valley has experienced a tremendous growth in ridership and routes (8 to 35) during the past five years. However, while containing one-fifth of the Los Angeles service area, it still contains only one-tenth of the ridership. Callers are characterized as "extremely transit ignorant".

Los Angeles experienced a variety of problems in the implementation of CCIS:

- Lack of interdepartmental cooperation made it difficult to develop the data base and keep it updated.
- Digitizing the data base for input into the computer proved to be a laborious and time-consuming process.
- The development of software for route-finding algorithms was difficult given the size and complexity of the transit network.
- Insufficient coordination and communication among the involved departments, and between the departments and the contractor, affected the receptivity of agents to CCIS.
- The decision to share computer time resulted in processing slowdowns when the Data Processing Department ran large batch processing jobs.

The problem of agent receptivity proved to be particularly serious. The agents were initially trained in CCIS for only 8 hours by the outside contractor, SDC. This apparently reinforced the agents' perception that CCIS and SDC were going to take their place. Agent resistance was eventually overcome through the appointment of a telephone supervisor as the full-time CCIS Program Manager, training agents internally, and permitting agents to volunteer for CCIS training in return for daytime shifts. All agents are now of their own choice CCIS trained.

The problem of interdepartmental coordination also proved to be serious. Bus routes were handled by the Planning Department while bus stops were the responsibility of the Stops and Zones Department. Most data was kept in the form of hard copy. The development of a CCIS Working Committee among all involved departments has helped to resolve this issue.

The time-sharing problem has largely been resolved by scheduling other large data processing jobs during time periods of low call volumes.

At this writing, Los Angeles is preparing to implement CCIS system-wide. The goal of this expansion is to improve agent productivity. While computer-generated responses are considered to be more accurate than manual responses, this feature of CCIS is considered by Doug Anderson, Los Angeles' Systems Coordinator, to be more of a desirable by-product, rather than the central goal of automated data retrieval technology.

Productivity will be improved (and costs reduced) in the following ways under the full CCIS system:

- It is proposed that a new productivity standard (calls/agent/hour) be implemented for all agents. Present union regulations prohibit different standards for different agents (depending on whether or not they are using CCIS).
- The training period will be cut in half from 8 weeks to 4 weeks and the memorization of transit information by agents no longer required.
- The manual data base will be eliminated except for supervisors. This will eliminate the need to pay union wages for data base updating, an expensive item given the fluidity of the Los Angeles route structure.
- Part-time agents may be hired, pending union negotiations. Given the training and memorization required under the manual system, Los Angeles officials felt it was not cost-effective to train part-time workers who tend to have high turnover rates and to achieve low levels of efficiency. Given a fully automated system, these considerations are no longer considered valid.

Figure 6-5 illustrates the cost savings anticipated by Los Angeles from a full CCIS system. The "total dollars saved" figure of $417,000 is more properly thought of as "cost avoidance". Through the efficiencies introduced by CCIS, Los Angeles will be able to handle more calls, more effectively, at the present budget levels. Similarly, the tremendous reduction in paper work realized by automating the data base updating procedure will reduce the clerical workload on supervisors, enabling them to spend more time actually supervising, hence increasing the productivity of the service.

It should be noted that the improved productivity standard is equally attributable to the implementation of MIS ACD equipment as to CCIS (see Section 6.2.4). By going to the full CCIS system, Los Angeles will be able to implement a new uniform productivity standard based on performance with CCIS. The ACD equipment will enable this standard to be monitored and enforced. Figure 6-6 illustrates a close-up of a typical Los Angeles CCIS screen display. Figure 6-7 shows a complete agent work station.

The decision to completely eliminate the manual data base from the day-to-day functioning of the agents requires some explanation. First, the use of a large mainframe computer enables Los Angeles to maintain a fully computerized back-up system, eliminating the need for manual back-up. Second, it is Los Angeles' philosophy to remove exceedingly complex questions from the normal agent processing flow and have a supervisor handle such calls. This philosophy is compared to "clearing an accident off the freeway so that everyone else can move quickly". Thus, there will be no attempt to train agents to handle calls of this nature. Thus, agents will be able to handle a larger volume of more typical calls.

During the implementation of CCIS, Wilson-Hill conducted controlled experiments and observed agent performance on both CCIS and manual systems. The controlled experiment found CCIS to be the fastest mode among all agents except novices. Observations of agent behavior found projected call levels of 28 to 32 calls/agent/hour, while actual agent performance measured over time did not exceed the then standard Los Angeles rate of 20 calls/agent/hour.

It is the belief of Doug Anderson, the System Coordinator, that the difference between potential and actual performance is due to human nature. The agents

CCIS VS. MANUAL INFORMATION DISSEMINATION		
	MANUAL	CCIS
Productivity	27 CPH 2.9 Mil Calls	30 CPH 3.7 Mil Calls
Training Time	8 Weeks 8,000 Man/hrs $50,000	4 Weeks 4,000 Man/hrs $25,000 Saved +85,000 Calls
Paper Work	15,000 Man/hrs $176,000	2,000 Man/hrs $146,000 Saved
Map Work	3,000 Man/hrs $30,000	0 $30,000 Saved +75,000 Calls
Reinstruction	1600 Man/hrs $16,000	0 $16,000 Saved +40,000 Calls
Part Time Work	Not Possible	$200,000 Saved @ 25% of Staff
TOTAL MAN/HRS SAVED	21,600 Annually	
TOTAL DOLLARS SAVED	$417,000 Annually	
ADDITIONAL CALLS	*.8 Mil Annually *1.3 - 3.3 Mil with Voice Response	

*To accommodate .8 million additional calls manually would require an additional 25 agents at an annual cost of $675,000.

The proposed cost for a full system CCIS is $3.5 million with 60% appropriated for software and 40% for hardware.

FIGURE 6-5. COMPUTERIZED CUSTOMER INFORMATION SYSTEM (CCIS) COMPARISONS AND BENEFITS

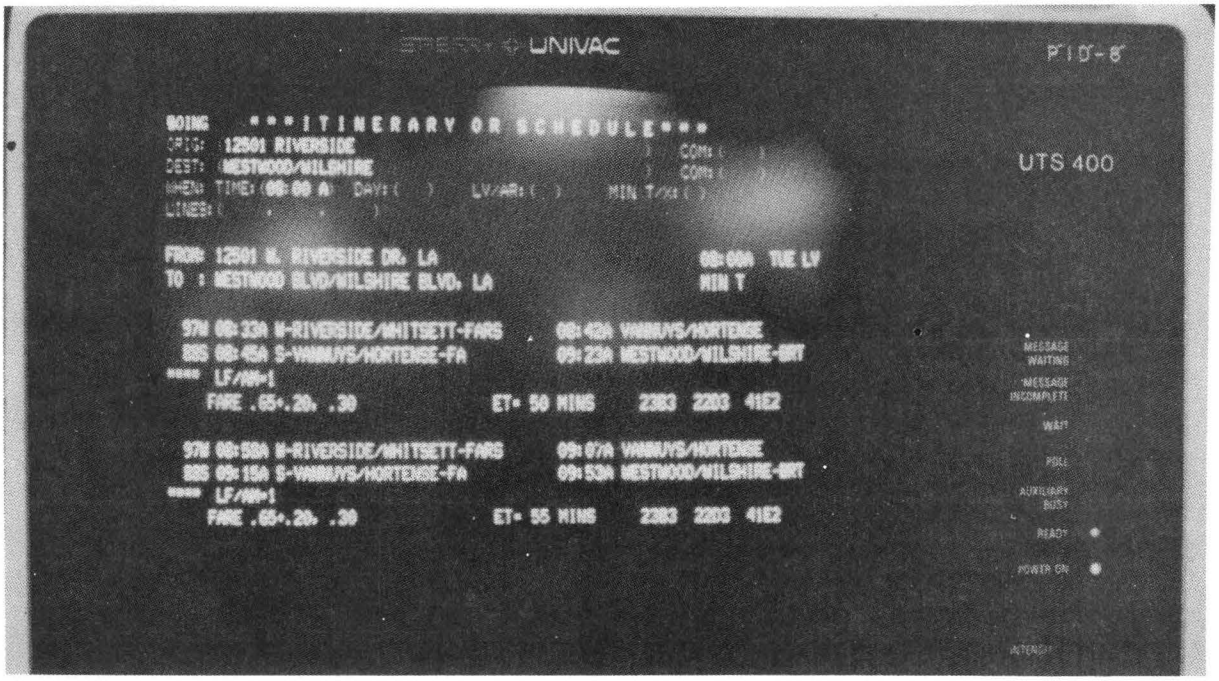


FIGURE 6-6. CCIS SCREEN DISPLAY

FIGURE 6-7. CCIS WORK STATION

have essentially utilized CCIS to pursue their own goals, and not the goals of the authority. Thus, instead of handling more calls/hour, the agents utilize the enhanced data retrieval capability of CCIS to handle the same number of calls/hour as before and provide themselves with additional informal downtime.

Los Angeles intends to combat this perceived phenomenon in two ways. By going to the full CCIS system, they will be able to initiate new work rules for all agents. They hope to achieve a 30 call/agent/hour performance. In addition, new ACD equipment will enhance their ability to monitor agent performance. Individual agents will no longer be able to stop calls from feeding through. Enhanced monitoring will permit the institution of very specific work rules, such as: an agent may spend no more than 12 minutes/day away from their station (except for formal breaks).

6.2.3 Marketing Philosophy

As mentioned, telephone information is viewed as a necessary public service given the nature of the area and the lack of transit knowledge among the population. The goal is to provide the service as efficiently as possible and to provide service up to the point where it continues to be cost-effective.

The telephone information number is not heavily publicized. It appears in paid advertisements in the yellow pages and on schedules. The Marketing Department utilizes its own telephone number in advertising campaigns to test the results. Los Angeles advertises most heavily in the print media and does some radio advertisement as well. Television is utilized only for special events. Informational signage is utilized only at 1-2% of the heaviest transfer points. Signage is thought to be ineffective due to vandalism and the need for constant updating.

6.2.4 Operating Statistics

Figure 6-8 outlines the statistical measurements for the Los Angeles system. As can be seen, the implementation of new ACD equipment in January, 1982 has resulted in dramatic improvements in two performance indicators. Percent of calls lost from hold has been reduced from 39% to 11%, and average waiting time on hold has been reduced from 4-5 minutes to under 2 minutes. Los Angeles officials attribute these changes to the enhanced monitoring of agents permitted with the new equipment; the development of documentation required by union regulations to retain or dismiss ineffective agents; and better staff utilization due to better data on peak loading.

Los Angeles, like many authorities visited, has in recent years cut back from 24 hour/day service. It is the strong feeling of the Los Angeles staff that late night call volumes do not permit the provision of cost-effective service given the need to have back-up operators available and a supervisor on duty. They currently provide 18 hour service, seven days a week. For a short time period, they had gone to 12 hour service (6-6) on weekends but found that this caused shift overlap problems. (They had to offer full 8-hour shifts since part-time work was not permitted.)

A.	OPERATING FACTS:	
	Total Number of Agents	90
	Agents on Line at Peak Hours	40
	Hours of Operation	6:00 A.M. - Midnight
	Number of Trunk Lines	96
	Calls Serviced/Year	2,900,000
	Percent of Itinerary Calls	85%
B.	PROCESS EFFECTIVENESS	
	Percent of Calls to Hold	75%
	Length of Time on Hold	4:00-5:00 (old) - 1:44 (new)
	Percent Lost from Hold	39% (old) - 11% (new)
	Percent Receiving Busy Signal	13%
	Calls Serviced/Agent/Hour	27 (old) - 30 (new)
	Average Transaction Time	2:12
C.	SUPPLY/DEMAND RATIOS	
	Vehicles/Total Agents	32.3
	Vehicles/Peak Agents	72.6
	Passenger Trips/Calls Handled	130
	Population/Calls Handled	2.5
	Trunk Lines/Population	75%

FIGURE 6-8. LOS ANGELES OPERATING STATISTICS

6.2.5 Institutional and Labor Arrangements

Figure 6-9 displays the institutional arrangement of Los Angeles' public relations/information functions. As can be seen, telephone information is separated from other marketing functions. Coordination and communication between telephone information and marketing appears to be limited.

Los Angeles telephone agents are unionized, however, management's ability to effectively administer the work place appears to be strong. The work rule permitting only one productivity standard has made it difficult to take full advantage of the potential of CCIS. Starting salary is $7.66/hour, approximately $16,000/year.

Agents are presently trained for 8 weeks. When CCIS is fully implemented, training will be reduced to 4 weeks and the memorization of transit information eliminated. Los Angeles hopes to hire part-time agents as a result of labor negotiations.

6.2.6 Cost of Operations

Figure 6-10 summarizes the cost of providing various marketing functions at Los Angeles, and the percentage which each function represents of the total Los Angeles budget. Figure 6-11 illustrates the cost of telephone information in more detail. As can be seen, Los Angeles spent $300,000 to purchase new ACD equipment. It is estimated that this purchase will result in annual leasing cost savings of $76,000. At this rate, (with no discounting for inflation), the equipment will pay for itself in approximately 4 years. This calculation also makes no allowance for any productivity improvements brought about by the change.

As indicated by the asterisks (*), CCIS costs Los Angeles approximately $90,000 in annual operating costs. The capital cost of full CCIS implementation is estimated as $3.5 million. As indicated previously in Figure 6-5, full CCIS implementation is expected to save $417,000 in annual operating costs, thus enabling Los Angeles to augment and enhance informational service in other ways. At that rate, the system will pay for itself in a little over 8 years.

The cost of CCIS implementation does not include the cost ($100,000) of room conversion including enhanced air conditioning and new furniture. These changes will be made anyway in conjunction with the new ACD equipment. Los Angeles will not use modular furniture. They feel that it creates supervisory problems, in that it is difficult to visually monitor agents, and takes up too much space to add additional positions in the future.

6.2.7 Future Directions

At full system, Los Angeles plans the following spin-off uses of CCIS:

- Provide tie-ins to small city bus companies particularly during the off-peak period when it is inefficient for those companies to provide telephone information. Los Angeles hopes to make a profit on time charges and may consider stationing remote terminals at some of these facilities.

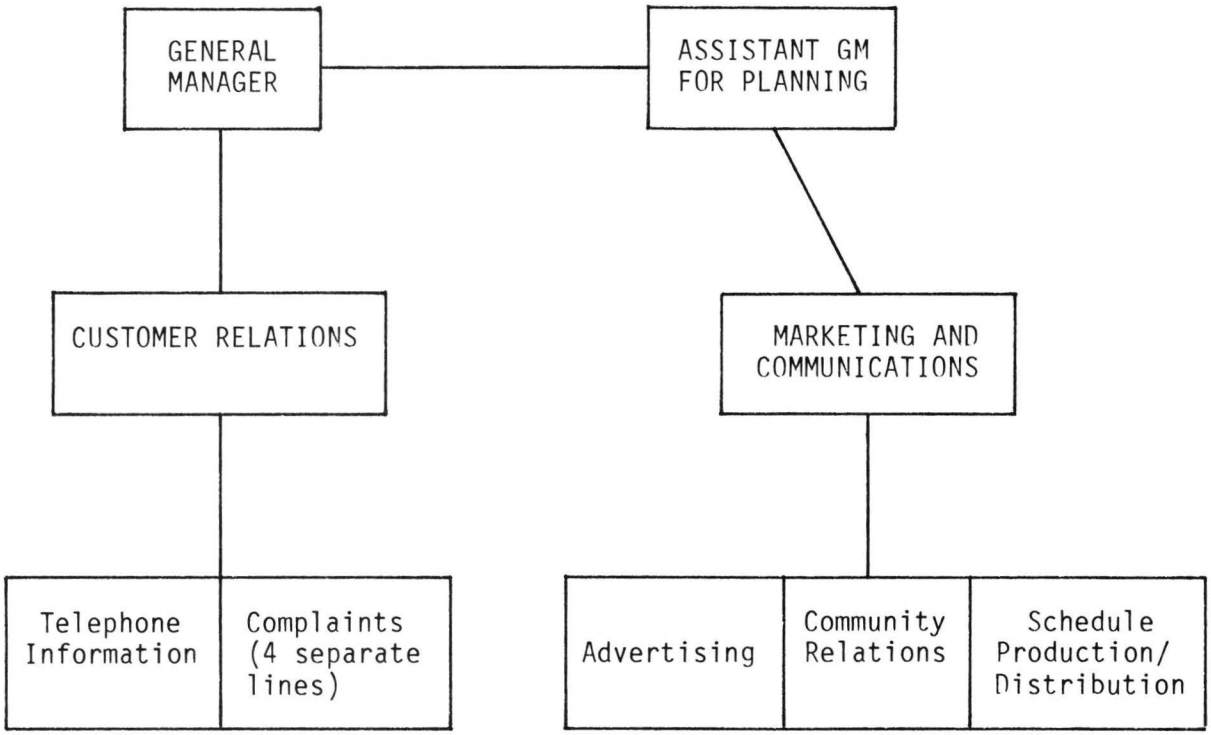


FIGURE 6-9. LOS ANGELES INSTITUTIONAL FRAMEWORK

	Annual Budget	% of Total Operating Budget
	$410,610,000	-
Media	1,188,000	0.3%
Schedules	1,950,000	0.5%
Community Relations	336,000	0.1%
Telephone Information	2,416,574	0.6%
TOTAL	$ 6,028,969	1.5%

FIGURE 6-10. COST OF MARKETING - LOS ANGELES

Category	Capital (CCIS, ACD)	Operating
Agents		$1,958,000
Agent Training		94,000
Equipment/Supplies		21,969
Data Base Updating		
CCIS		15,000*
Manual		176,000
Overhead - SDC Support for CIS		75,000*
Purchase of New ACD Equipment	$300,000	-
Initial CCIS Test	150-200,000	
Full CCIS Implementation	3,500,000	
Room Conversion	100,000	
TOTAL	$4,050,000-4,100,000	$2,416,574
COST/CALL		0.83

*CCIS operating costs - present partial system.

FIGURE 6-11. COST OF TELEPHONE INFORMATION - LOS ANGELES

- Generate detailed driver routings.
- Print-out labels for schedule requests and automatically send out updates.
- Utilize ridership characteristics (i.e., elderly, handicapped) as a factor in route selection.
- Utilize route load factor as an element (unknown to the caller) in route selection, enabling Los Angeles to more efficiently spread peak load ridership among a number of routes.

Los Angeles is also undertaking two major capital projects which will impact telephone information: 1) trunk lines are being replaced with microwave beams to a roof-top antenna at the Los Angeles facility, and 2) the TRANSMIS I & II projects will result in the total computerized integration of all SCRTD departments.

Finally, Los Angeles is investigating the feasibility of implementing a computerized voice response system generated from CCIS answers. Agent interaction would be completely eliminated on simple requests. Their major concerns involve obtaining the proper voice inflection, and devising a system that will "kick back" calls to an agent if the caller is not satisfied with the response.

6.2.8 Summary

Los Angeles' philosophy of utilizing CCIS to improve agent productivity is different in emphasis from the goals of both Washington (Section 6.3) and St. Paul (Section 6.5) in regard to automated data retrieval. Both of those authorities emphasize the improved quality of answers generated by automated retrieval. The implementation of automated data retrieval at Los Angeles also differed from the Washington implementation in that (1) only part of the service area was included, (2) time was shared with other departments on a mainframe computer rather than utilizing a dedicated minicomputer, and (3) agents were initially trained by an outside consultant.

Los Angeles operates by far the largest telephone center examined. Their 90 agents and 96 trunk lines are almost double the figures for the next largest authority, Washington. Given the size of the authority, its ratios of vehicles to agents are fairly typical of all authorities covered, but the ratio of passenger trips/calls serviced (130) is higher than any other authority except Chicago. Due to the tremendous volume of trips provided, the three largest authorities have the three highest ratios of trips/call serviced. Despite the new ACD equipment, Los Angeles still loses a relatively high 11% of calls from hold.

Los Angeles has the second highest cost/call ratio of the authorities studied. The larger metropolitan areas generally have higher wage scales. In addition, the lack of transit knowledge in the community (as evidenced by the high percentage (85%) of itinerary calls), can be a factor in increasing per call costs.

6.3 WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY (WMATA)

Washington's (WMATA) telephone information service is characterized by the use of an automated data retrieval system. At WMATA, this system is known as Automated Information Directory System (AIDS). AIDS performs basically the same functions for Washington as CCIS does for Los Angeles. The implementation of automated data retrieval technology at Washington is characterized by the following features:

- The entire Washington service area has been included in AIDS from the beginning of the project.
- AIDS utilizes minicomputer hardware dedicated to this single function.
- While Washington officials originally perceived AIDS as a means of improving agent productivity, the most significant impact has actually been on the quality of telephone information.

Philosophically, Washington officials express a strong commitment to the use of telephone information as a sales tool. According to Michael Noonchester, Assistant Director of Marketing, the goal of each telephone call received into the center is to "close the sale".

The study of telephone information at Washington was greatly enhanced by a joint research effort undertaken by DYNATREND and Washington's Office of Marketing-Consumer Research Section. This effort involved successful call-backs to 602 callers of Washington's telephone information service. The purpose of the call-backs was to determine whether callers actually rode transit as a result of their call, as well as to obtain a variety of background and demographic information on callers. This effort was financed jointly by Washington and DYNATREND, and an evaluation of the results was published by Washington in a report entitled "Evaluation of WMATA Telephone Information Service", (June, 1983). This report is discussed in Section 6.3.7.

6.3.1 Background

Washington services a metropolitan population of 2,743,695 in the District of Columbia and surrounding Virginia and Maryland counties. Last year, it provided 182,500,000 passenger trips on 2,061 revenue vehicles, both rapid transit and bus. Washington has the second highest ratio of trips/capita (66.5) among the authorities studied.

The gradual opening of the Metrorail system since 1976 has resulted in a highly fluid route structure, since bus routes must be adjusted to new rail openings. Washington presently operates four rail lines covering 42.37 miles. In addition to a dynamic route structure, Washington services a fluid population base as well. It is estimated that the metropolitan area experiences a 20-30% population turn-over including people moving into and out of the area, or within the area.

6.3.2 Automated Data Retrieval at Washington (WMATA)

Since its formation in 1973, Washington officials have demonstrated strong support for the automation of transit information services (ATIS). During the

late 1970's, Washington's Office of Marketing and Data Processing, in cooperation with the METREK Division of the Mitre Corporation in McLean, Virginia, utilized a $435,000 UMTA Research and Development Grant in combination with a $675,000 UMTA capital grant to initiate an ATIS project.

A competitive bid process led to the choice of Kappa Systems, Inc. as system design contractor. Washington experienced similar problems in the implementation of AIDS as did Los Angeles with CCIS. In addition, problems with the upgrading of the air conditioning system in the new telephone center environment caused implementation delays. Washington's Marketing Department purchased word processing equipment and trained the Scheduling Department personnel in the computerization of this data base in order to create and maintain a standard, automated data base.

Washington officials included agents and supervisors in the planning and debugging of AIDS, and conducted all training themselves. This approach resulted in a positive attitude among the agents toward AIDS from the beginning.

The use of a minicomputer instead of a time-sharing arrangement on a mainframe eliminated the problem of competing uses experienced by Los Angeles. However, the initial computer capacity has proven inadequate for Washington's constantly expanding data base and is in the process of being upgraded. Washington exceeded its 10-year AIDS growth estimate in 1-1/2 years. The main impact of the insufficient capacity is a degradation of processing speed.

Initially in undertaking the AIDS project, Washington officials hoped to improve the productivity of the operation through reductions in call lengths and increases in calls handled/agent/hour. As the project has progressed, more significant benefits have been realized in improving the quality of telephone information (i.e., providing more consistent, accurate information). As a result, Washington officials now place greater emphasis on this goal.

Wilson-Hill, in its evaluation of AIDS, conducted a "before" and "after" comparison of agent productivity at Washington. It found that through the selective use of AIDS for the more difficult itinerary calls, overall call time duration could be reduced. However, the study also reported that agents who utilized AIDS for all calls were less productive than those who utilized it selectively. Therefore, Washington intends to maintain its manual data base, and to encourage agents <u>not</u> to become completely dependent on AIDS.

The Wilson-Hill study also pointed out that the potential for reductions in agent training time through automated retrieval might not be attainable in reality. A test was conducted with four new agent hires. Instead of Washington's standard 5-week training program, they were given a 2-week course which included only the most basic information regarding the details of the transit network. The agents were not able to utilize AIDS in a sufficiently productive manner with this limited training. Thus, Washington continues to train agents in the complete details of the transit network and to require memorization of data.

Further details regarding the productivity and cost of the AIDS system are provided below.

6.3.3 Marketing Philosophy

According to Michael Noonchester, Assistant Director of the Office of Marketing, telephone information is viewed as a key marketing and sales tool. A great deal of specific information is required to utilize public transit and it therefore cannot simply be "purchased like a commodity" off-the-shelf with minimum information. This is particularly true given the high population turnover in Washington's service area and its dynamic route structure. Schedules/timetables and static street informational displays are considered a means of deferring some telephone calls, but ineffective as the sole source of information. Schedule information is thought to be particularly ineffective for itinerary planning, a major component of the informational needs at Washington where 76.9% of calls are itinerary in nature. One potential method for resolving this problem is through the distribution of maps, but given the changeable nature of Washington's route network it is thought to be too expensive to continually update maps. Maps also lack specific schedule information.

Despite its emphasis on telephone information, Washington does not heavily promote its telephone information number. The number is not included in electronic advertising, but is included in print media and schedules. There is a general perception that the "number sells itself" and that more direct promotion would result in "overload". Washington officials would promote the system to a greater extent if it became possible to increase capacity enough to handle the anticipated increase in demand.

6.3.4 Operating Statistics

Figure 6-12 outlines the statistical measurements for the Washington telephone information system. Consistent with the recent expectations of Washington personnel, AIDS has not resulted in clearly definable productivity improvements. Answer retrieval time is only 10-15 seconds by AIDS compared to one minute manually, but this capability has not yet been translated into improved productivity as measured by calls answered/agent/hour.

Washington's philosophy of telephone information clearly emphasizes quality over quantity of calls handled. At one time, agents were actually encouraged to slow down calls to improve the quality of information and enhance the "sales" aspect of the transaction. Agents use their names in the conversation, repeatedly ask the caller if they understand, and ask if the caller would like to be mailed a schedule. The goal is to leave the caller with a positive experience. Providing more complete information naturally results in some degradation of transaction time.

Short-term agent monitoring shows the potential for call handling standards of 35-40/hours. Washington officials agree with the officials of most of the other authorities visited that this "snapshot" performance cannot be sustained over time. Washington, like Los Angeles, does hope to utilize MIS ACD equipment to push call rates into the high 20's/agent/hour. The current level

A.	OPERATING FACTS:	
	Total Number of Agents	58
	Agents on Line at Peak Hours	26-27
	Hours of Operation	6:00 A.M. - 11:30 P.M
	Number of Trunk Lines	50
	Calls Serviced/Year	2,190,000
	Percent of Itinerary Calls	76.9%
B.	PROCESS EFFECTIVENESS	
	Percent of Calls to Hold	75%
	Length of Time on Hold	4:45
	Percent Lost from Hold	8%
	Percent Receiving Busy Signal	18%
	Calls Serviced/Agent/Hour	20-25
	Average Transaction Time	2:30 - 3:00
C.	SUPPLY/DEMAND RATIOS	
	Vehicles/Total Agents	35.6
	Vehicles/Peak Agents	77.8
	Passenger Trips/Calls Handled	83
	Population/Calls Handled	1.2
	Trunk Lines/Population	100%

FIGURE 6-12. WASHINGTON OPERATING STATISTICS

is a low 20-25. Washington officials still believe that AIDS provides the potential for productivity improvement, but that the enhanced agent monitoring capability of the ACD equipment is necessary to realize this potential.

Presently, call handling is thought to be about evenly split between reference to the computer for an answer and reference to either manual material or agent memory. An initial problem encountered with the introduction of AIDS involved the tendency of agents to rely on it for even simple questions, the answers to which they had long since committed to memory. As mentioned, Washington wants agents to develop intuition and memory use, and not to be completely reliant on the computer. To that end, agents initially work a 4-5 month apprenticeship period utilizing only manual data.

Washington experimented with microfiche data retrieval in 1974, but found it impractical due to the continuing schedule changes necessitated by the arrival of Metrorail, and its inability to efficiently handle complex routings involving transfers.

6.3.5 Institutional and Labor Arrangements

As shown in Figure 6-13, telephone information is combined with most marketing activity at Washington. This organizational framework appears to contribute to the perception of telephone information as a marketing tool. Marketing activity is undertaken in close conjunction with the telephone information center.

Telephone agents are essentially entry-level clerks with a starting salary of $7.66/hour or $16,000 annually. The agents are unionized. In general, management considers unionization a positive force in that clear rules can be negotiated for discipline and dismissal. Union rules do prevent bringing in other employees to assist during a real "crunch" period, as Washington would have to pay everyone at the highest "outside" salary rate. No part-time agents are employed.

In preparation for AIDS implementation, Washington changed the agent job description to emphasize keyboard skills. This avoided potential labor problems. Agents were also closely involved in the planning and debugging of AIDS. As mentioned, this involvement proved to be a key component in the generally positive acceptance of AIDS among both agents and supervisors.

Agents receive 5 weeks of training. Washington places considerable emphasis on the sales aspect of the job and other communication skills. A detailed manual entitled "Reaching Out to Riders" is used to support agent training.

6.3.6 Cost of Operations

Figure 6-14 summarizes the cost of providing various marketing functions at Washington, and the percentage which each function represents of the total Washington operating budget. Figure 6-15 illustrates the cost of telephone information and AIDS in particular in more detail. As is shown, AIDS implementation cost close to $1 million ($984,000) and results in annual operating costs (primarily for maintenance of the data processing system) of $78,000 or 7.6% of the total telephone information operating budget. Since

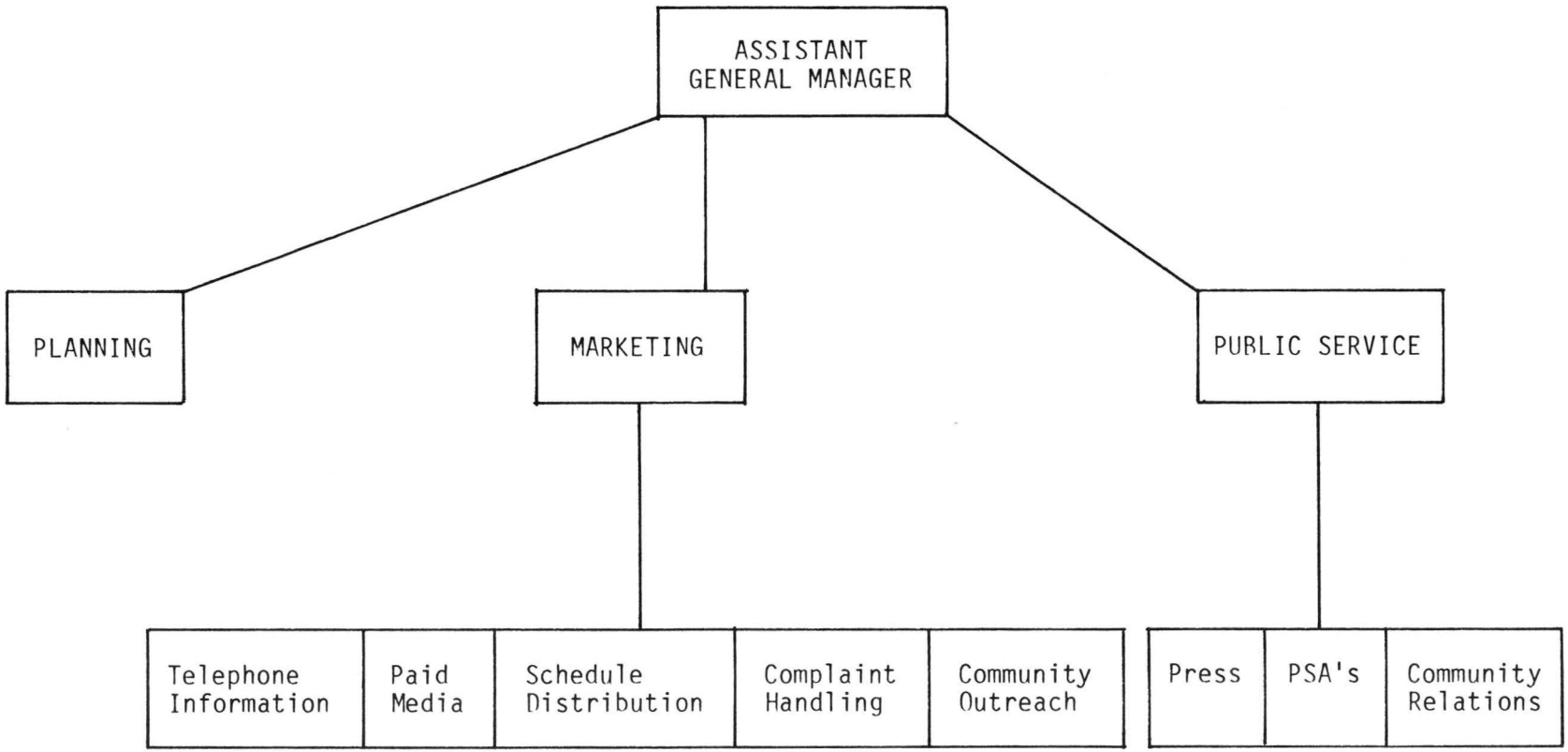


FIGURE 6-13. WASHINGTON MARKETING ORGANIZATION

	Annual Budget	% of Total Operating Budget
Total Operating Budget	$269,000,000	-
Media	450,000	0.2%
Schedules	445,000	0.2%
Public Relations	524,000	0.2%
Telephone Information	1,025,700	0.4%
TOTAL	$ 2,444,700	1.0%

FIGURE 6-14. COST OF MARKETING - WASHINGTON

Category	Capital (AIDS)	Operating
Agents	-	$ 747,000
Supervisors	-	157,000
Furniture	$ 24,000	-
Space Preparation	150,000	12,000
Agent Training	-	28,500
Data Base Management	300,000	-
Hardware-Data Processing	350,000	27,000*
Data Processing Operations	-	28,000*
System Software	-	3,000*
Applications Software	160,00	20,000*
Office Supplies and Materials	-	3,200
Miscellaneous	-	332,100
TOTAL	$984,000	$1,025,700
*AIDS Operating Costs	-	78,000
Average Cost/Call		$0.47

FIGURE 6-15. COST OF TELEPHONE INFORMATION - WASHINGTON

Washington continues to maintain a manual data base, these costs can be considered to be a pure "add-on" resulting from the use of AIDS (i.e., they do not replace or reduce other costs).

The $150,000 capital cost for space preparation requires some explanation. Two major physical changes were implemented at Washington's telephone information operation in conjunction with AIDS. First, a heavy duty air conditioning system was installed for the proper maintenance of the computer equipment. Second, a new area was set aside for the operation, and modular equipment purchased. The area occupied by Washington's telephone information center is by far the largest such area observed (6,228 square feet of which 5,600 square feet is in actual usage) as well as the area with the most pleasing ambience (uncrowded, carpeted, brightly colored, etc.). The size of this area and Washington's commitment to the development of a pleasant work environment is further evidence of the high priority attached to telephone information by Washington officials.

6.3.7 Market Research

Washington's market research was designed to quantify the benefits of telephone information in terms of revenue generation. Agents were instructed to obtain the names and phone numbers of callers during a designated time period. A market research firm was hired to contact these callers to determine whether or not they had actually utilized transit following their call. Six hundred two (602) successful interviews were conducted.

Eighty-two percent (82%) of callers indicated that they had in fact taken the specific trip about which they called for information. Of these, 67% stated that they would not have made the trip by public transit if they could not have obtained the information through a telephone call. This latter group can be said to be riders whose trips were directly attributable to telephone information.

Utilizing average fare figures, Washington calculated that rides generated by telephone information accounted for $858 in revenue for every 1,000 calls answered. Given a cost/1,000 calls of $620 (based on all cost factors) these riders generated a net gain of $238/1,000 calls. This represents a 38% return on investment. Extrapolating to the total of 2,190,000 calls handled in 1982, telephone information generated approximately $520,000 in net revenue.

It is important to realize that this "benefit" is based upon a 1:1 relationship between calls and rides. No attempt was made to determine how many rides might have been generated from a single call. Two pieces of data are relevant here. Washington's respondents intended to repeat the trip about which they called an average of 12 times/month. On the other hand, 40% of all the callers had taken the same trip the previous month, yet called anyway. Clearly, each call has the potential to generate more than one trip, but some amount of repeat calls must also be needed to accomplish multi-trip generation. For example, will 12 calls be necessary to generate the 12 trips/month, or will 6 suffice? If the latter, then each call would in effect generate two trips.

Several interesting pieces of demographic information emerged from the Washington study as well. The first concerned the extent to which users of telephone information are transit dependent. Eighty percent (80%) of respondents who took the trip following their call did not have an automobile available. However, of those, only 20% lived in a household with no automobile at all. On the contrary, 56% reported having an automobile available at certain times. Therefore, while they may have had to take transit at that particular time, their future usage was uncertain. Washington officials feel that this finding emphasizes the importance of the "sales" role of telephone information. As stated in their report: "Facilitating a positive transit experience has the potential for establishing a regular transit trip pattern among these later 'choice' callers."

A second finding of interest concerns the type of trip for which calls were made. While 37% of all Washington passenger trips occur in the off-peak, 56% of trips taken by telephone callers were off-peak. This finding is consistent with the conventional wisdom which holds that telephone information is most useful to the sporadic, off-peak rider as opposed to the daily commuter who in all likelihood knows the information required to make the trip.

A third finding concerns the relative merits of schedules and telephone information. By a margin of 56% to 44%, respondents preferred using schedules to calling telephone information. Fifty-six percent (56%) had used schedules in the past six months. Twenty-one (21%) could not identify a single location for obtaining schedules. This finding led Washington officials to conclude that a potential does exist for reducing frequent calling by improving the stocking of well-known schedule locations, and better publicizing others. Concerning the frequent caller issue, 43% of respondents had made the same trip the previous month. This would seem to indicate that a significant segment of callers continually call for information (or perhaps reassurance) rather than acquiring schedules or otherwise making provisions for the "permanent storage" of frequently needed information.

Finally, Washington obtained information on the length of residence of callers. Surprisingly, two-thirds of respondents (67%) had lived in the Metro area for over five years, compared to 14% who had lived there less than one year and 19% who had lived there 1-5 years. However, only one-third (37%) had lived at their present addresses for more than 5 years, while another one-third (31%) had lived there less than one year. This finding would support Washington's contention that telephone information provides a necessary service to a relatively transient population.

6.3.8 Future Directions

Washington is contemplating a number of spin-off applications of AIDS, as well as a major change in its telephone equipment. Washington will shortly acquire new ACD equipment to enhance its MIS capability and thereby improve agent performance through better monitoring. They also hope at some point in the future to add a computer-generated voice response system to inform callers how long they will be on hold.

A number of potential applications for AIDS are being considered. Already in the planning stages is the setting up of CRT terminals at college student unions which would be tied in with AIDS. They would like to do something similar with employers in the region.

Several internal uses of AIDS are possible. By merging census data with the AIDS geographic data base, the Planning Department hopes to develop a systematic procedure for assessing the effectiveness of the route structure and the demand for proposed new routes. AIDS could also be utilized to assist the Financial Department in developing a revenue and cost allocation procedure based on ridership, route mileage and other relevant factors. Cost allocation is a major issue in the multi-jurisdictional Washington service area.

6.3.9 Summary

The implementation of automated data retrieval technology at Washington differed in several significant ways from the implementation at Los Angeles:

- The entire service area was incorporated into the system immediately.
- Dedicated computer hardware, rather than a time-sharing arrangement with the Data Processing Office, was utilized.
- The dedicated hardware was a minicomputer, rather than mainframe.
- Agents were trained in-house from the beginning and involved in the development of the system.
- The primary goal of the Washington officials became the improvement in the quality of telephone information, rather than in the improvement of the productivity (quantity of calls handled) of the telephone information agents.

As a result of these differences in approach, Washington avoided the problems of competing computer uses and agent rejection which initially hindered Los Angeles. However, the capacity of the minicomputer was quickly exceeded, resulting in the degradation of processing time. The impact of the Washington philosophy emphasizing the quality of information can be seen in the measurements of agent performance. Washington agents handle 20-25 calls/hour, the lowest volume reported. The call transaction time of 2:30-3:00 minutes is longer than all other authorities except Chicago and Miami.

Like the two other "large" authorities studied (Chicago and Los Angeles) Washington has a high ratio of passenger trips to calls serviced, despite the highest ratio of trunk lines to population among all authorities examined.

6.4 SEATTLE METRO

Seattle (Metro) was selected as a case study due to a different approach taken by Larry Coffman, Director of Marketing, at the 1979 Transit Information Workshop in Washington. As reported in the Workshop Summary, Mr. Coffman stated that the telephone center should be regarded as a 'back-up' and that "every effort should be made to convey information through printed or electronic sources". He went on to point out that in 1979 Seattle began to de-emphasize telephone information yet it experienced a 17.3% increase in ridership. This viewpoint was in sharp contrast to most of those expressed at the Workshop, and to most views encountered during the preliminary phase of this project. However, Seattle's views were endorsed by officials in Portland and Allentown and utilized to support their own positions in favor of de-emphasizing telephone information.

After completing this case study, it appears that Seattle's views have either moderated in the intervening years, or perhaps were over-emphasized in the report summary. They appear now to be more closely aligned with the mainstream positive attitude expressed toward telephone information than to the strong views in favor of de-emphasis expressed by Portland officials (see Section 6.6). The measurements utilized in this report to analyze telephone information capacity give no indication that it has been de-emphasized at Seattle relative to other transit authorities studied.

6.4.1 Background

Seattle (Metro) is well-integrated into the lifestyle of the Seattle metropolitan area. It provides 16% of all commuter trips and 5.2% of all trips throughout King County. It has the sixth highest "intensity" of service rating among the authorities visited, providing 48.5 trips/capita. Forty-three percent (43%) of households have riders and 30% of those 16 and older ride at least twice per month.

Seattle provided 63,574,063 passenger trips last year on 1,299 revenue vehicles. In addition to buses, it operates a short, newly renovated street car line along the waterfront. While not in the size class of Chicago, Washington and Los Angeles, Seattle (along with St. Paul) has nearly twice as many revenue vehicles as any other authority visited. The population of the service area is 1,309,800.

6.4.2 Marketing Philosophy

Seattle officials believe that traditional telephone information works least well when it is needed most - during some type of "status crisis" such as a weather emergency. They do not endorse the cut-back in "live" service which has taken place in nearby Portland. Nevertheless, unlike many authorities visited, they do not want to expand the system further. Rather, they want to put a lid on the labor intensity of telephone information and provide a better quality service. They believe that a computerized voice-response system (CRIS) is the way to accomplish this goal. The ability to provide real-time status reports (as well as lower labor costs) are the principal perceived advantages of CRIS systems (see Section 6.12 on San Diego's CRIS test). Mr. Coffman placed great emphasis on Metro's goal of capturing a greater share of

upper-income riders, for whom service reliability (more than price) is crucial. Seattle's climate, though temperate, is the rainiest in the United States, thus contributing to the need for updated status reporting.

Seattle pursues a wide variety of other marketing activities. They are one of the few authorities visited (along with San Antonio and Milwaukee) which emphasizes television advertising, concentrating on an "image" message. Like San Antonio, Seattle services a more isolated television market than do many authorities for which television ads would be directed at as many non-constituents as constituents. They engage in cooperative advertising ventures with corporate sponsors such as McDonalds, and are now looking to more up scale restaurants and department stores, consistent with their goal of capturing a greater share of upper-income riders.

Seattle also emphasizes schedule distribution and bus stop informational signage. 2700 out of 8000 bus stops have been signed. Information includes only bus numbers and starting times, not frequencies or departure times from specific locations. More detailed schedule information is provided at downtown locations.

Marketing of the telephone information number has been greatly de-emphasized in recent years. It is not utilized as a tag line on media advertisements except in cases of special promotions. The number used to be on all written materials and advertisements. During the energy crisis, the system was completely overloaded. In response, the number was taken off of everything. Following public resistance, the number was restored to schedules and signs, but not prominently displayed. The number is now called the "New Rider Number". This marketing effort has been so successful that when "old" riders call, they apologize and ask if it is "alright". (This is completely believable given a civic culture in which jay-walking is a major offense!)

6.4.3 Operating Statistics

Figure 6-16 displays the statistical measurements for Seattle's telephone information service. Seattle and Chicago are the only authorities visited which still provide 24 hrs/day "live" agent service. One agent works unsupervised from midnight to 6:00 a.m., and handles 'several hundred' calls. Seattle like Chicago, has a wide variance between total agents and peak period agents necessitated by the need to provide continual coverage.

Seattle is the only one of the five "large" authorities visited which utilizes manual data retrieval. The calls handled/agent/hour level of 30 is consistent with the authorities utilizing automated and microfiche retrieval methods. Ms. Mary Peterson, Chief of Telephone Information, considers manual retrieval to be faster than either microfiche or automation. She is concerned, however, that additional route expansion will necessitate a second ring binder of information. At that point, they will evaluate automated retrieval. She considers microfiche to be an "interim measure" not worth the expense. Presently, manual updating of the data base takes place three times annually.

6.4.4 Institutional and Labor Arrangements

With the exception of community relations, all Seattle marketing functions are located in a single Marketing Department.

A.	OPERATING FACTS:	
	Total Number of Agents	37
	Agents on Line at Peak Hours	13
	Hours of Operation	24/hours/day, 7 days/week
	Number of Trunk Lines	23
	Calls Serviced/Year	1,808,319
	Percent of Itinerary Calls	30%
B.	PROCESS EFFECTIVENESS	
	Percent of Calls to Hold	89%
	Length of Time on Hold	0:46
	Percent Lost from Hold	9%
	Percent Receiving Busy Signal	11%
	Calls Serviced/Agent/Hour	30
	Average Transaction Time	1:13
C.	SUPPLY/DEMAND RATIOS	
	Vehicles/Total Agents	35.1
	Vehicles/Peak Agents	99.9
	Passenger Trips/Calls Handled	35
	Population/Calls Handled	.07
	Trunk Lines/Population	96%

FIGURE 6-16. SEATTLE OPERATING STATISTICS

Telephone agents are unionized entry-level personnel. Salary ranges from $6.71 to $10.57/hour (approximately $13,956 to $21,986 annually). The department is highly stable. Fifty percent (50%) of the total of 37 agents have over 5 years of seniority. There are 3-4 new hires annually. Agents are initially hired as "temporaries" who work 2-3 days/week. They move up to full-time as positions become available. Eight of 37 agents are presently "temporaries". They are considered to be sufficiently proficient, although it should be noted that no memorization is required. The training period lasts 6-8 weeks. Communication skills are considered as important as knowledge of the route network. In fact, Seattle employs a full-time staff person to work with both bus drivers and agents on coping with the stress of "client" interaction.

6.4.5 Cost of Operations

Figure 6-17 displays the cost of Seattle's various marketing functions. Figure 6-18 displays in more detail the cost of telephone information.

6.4.6 Market Research

Seattle has conducted considerable market research on the impact of its marketing activities in general, but not specifically telephone information. A comparison of all riders to callers of telephone information shows some similarities and differences as indicated in Figure 6-19.

As shown, the major difference appears to be frequency of calling and riding among the elderly (over 55). While the elderly account for 23% of riders, they account for only 8% of callers. This is surprising given the belief among many (see Section 6.7 on Miami) that telephone information is particularly important to the elderly who find schedules difficult to understand and require the person-to-person contact of a telephone call.

Seattle has conducted two studies on marketing issues. One was included in the 1983 Marketing Plan entitled "Metro-It's Easy". The other was an entire study devoted to consumer research entitled "Attitude and Awareness Study". Figure 6-20 displays the use of various informational aids by Metro riders. Telephone information appears to be the least utilized among the major informational aids. The average user of telephone information made 2.1 calls/month.

6.4.7 Future Directions

As discussed in Section 6.4.2, Seattle is primarily interested in a CRIS implementation which will provide accurate, updated status report information.

6.4.8 Summary

Seattle's ratio of vehicles to peak period agents (99.9) is higher than all authorities except Chicago and Portland, but their ratio of vehicles to total agents (35.1) is average, indicating the need to spread coverage over a 24-hour period.

	Annual Budget	% of Total Operating Budget
Total Operating Budget	$100,140,000	-
Media	350,000	0.3%
Schedules/Signage	621,089	0.6%
Community Relations	406,934	0.4%
Telephone Information	1,367,159	1.4%
TOTAL MARKETING BUDGET	$ 2,745,182	2.7%

FIGURE 6-17. COST OF MARKETING - SEATTLE

Category	Cost
Agents	$1,038,625
Training	10,000
Maintenance/Updating of Data Base	20,000
Facilities and Equipment	8,878
Miscellaneous	292,656
TOTAL	$1,367,159
COST/CALL	$0.76

FIGURE 6-18. COST OF TELEPHONE INFORMATION - SEATTLE

	Callers	Riders
Under 25	31%	25%
Over 55	8%	23%
Income Less Than $15,000	39%	32%
Income Greater Than $40,000	14%	18%

FIGURE 6-19. COMPARISON OF CALLERS AND RIDERS - SEATTLE

Timetables	86%
Bus Stop Informational Signs	90%
Telephone Information	
Awareness	54%
Usage	24%
Advertising	74%

FIGURE 6-20. USE OF INFORMATIONAL AIDS-SEATTLE RIDERS

Seattle's population/calls serviced ratio is the lowest surveyed, which is surprising given that the Seattle service area does not appear to be characterized by the same level of "transit ignorance" found in the sunbelt cities, and calling is not promoted. Seattle is the only transit authority which indicated that a minority of calls (3%) were of the itinerary nature. This is consistent with a relatively short average transaction time (1:13).

Seattle devotes the highest percentage of its operating budget of any authority visited to schedules (.6%), telephone information (1.4%) and all marketing activities (2.7%).

6.5 METROPOLITAN TRANSIT COMMISSION (MTC), ST. PAUL

St. Paul (MTC) was selected as a case study because it utilizes both automated data retrieval and MIS ACD equipment. Unlike Los Angeles and Washington, St. Paul's automated data retrieval was not part of an UMTA R&D project and has not been extensively studied. Unlike the Washington and Los Angeles systems, St. Paul's system does not provide computerized trip planning itineraries.

During the conduct of the case study at St. Paul, it became apparent that labor issues now dominate technological issues. As stated by Robert LaShomb, Director of Planning, Development and Communication, St. Paul first tried to increase productivity through one technology (automated retrieval), then improved upon it with another technology (ACD equipment), but now realizes that improved management of employees is necessary to achieve full employee productivity potential.

6.5.1 Background

St. Paul provides service throughout a 7-county area including the "twin cities" of Minneapolis and St. Paul. Minnesota has a very strong tradition of public service, and St. Paul is the State Capitol. For example, to combat the severe winter cold, St. Paul has constructed the most extensive enclosed pedestrian skywalk system in the nation.

St. Paul operates 1,078 revenue vehicles and last year provided 75,500,000 passenger trips. The service area population is 1,800,000, the fourth largest among the authorities visited. St. Paul has the seventh highest "intensity" of service among the case studies, providing 42 trips/capita.

6.5.2 Automated Data Retrieval and ACD at St. Paul

St. Paul utilizes an automated cathode ray tube system known as CRTS. Unlike the Washington and Los Angeles systems, CRTS does not compute trip itineraries through software algorithms. Rather, each agent is presented with a menu of question-types: i.e., headways and schedules, fares, park and ride sites, status bulletins and other unusual information. The computer retrieves the answer for the agent. Thus, CRTS performs the data management and retrieval functions of hard copy and microfiche data bases, but not the trip planning function of CCIS and AIDS. Agents need to utilize their own knowledge to request appropriate schedules (or schedule combinations) from the computer in response to itinerary questions.

Since CRTS does not perform trip planning in the sense of CCIS and AIDS, agents maintain manual data bases. This also serves as a back-up in the event of computer failure. Agents utilize automated retrieval on a regular basis.

Originally, CRTS was programmed by a contractor, Skamp Computer. Data base updating is now performed by the telephone information supervisors. Headways are updated every 3-4 months during driver's picks, and bulletins are updated daily as needed. The supervisors are satisfied with the software except for the bus stop component. This information is difficult to access on lengthy routes, as the agents must scroll through many stops to access the right one. Efforts to reprogram this function have not met with great success.

Terminals were installed in May, 1981. One terminal was available prior to this date to familiarize the agents with its operation. Agents were involved in the process early-on and assured that they would not be penalized if they failed to quickly grasp the operation of the system. The more senior agents were the most resistant and initially performed better utilizing the manual data base than the CRTS. Now, all agents have positive attitudes toward CRTS. It takes approximately four to six hours to learn to operate CRTS. There has been no reduction in overall training time since agents are still required to learn the transit route network. The implementation of CRTS required room re-wiring and upgrading of the air conditioning system. The same facility and furniture continue to be utilized as before.

The main accomplishments of CRTS have been the dissemination of more consistent and accurate information (as perceived by Washington as well) and a reduction in updating time. The less frequent use of the hardcopy data base results in its being maintained in better condition, giving the entire environment a cleaner, neater look.

St. Paul officials are greatly concerned with the cost and productivity of telephone information. CRTS was not perceived as the complete solution to the productivity problem, and thus St. Paul installed an MIS ACD system. The major goals of the ACD implementation were to reduce the lost call rate and improve agent productivity through enhanced monitoring capability. Improvement in the lost call rate has not been documented. The new equipment has enabled St. Paul to reduce the total number of agents from 40 to 33 while still handling approximately the same number of calls without degrading the quality of service. This is clearly indicative of an improvement in agent productivity. The ACD equipment has enabled St. Paul to document, for the first time, actual individual agent performance statistics. Utilizing these statistics, management has introduced a performance incentive program for telephone agents (see Section 6.5.5).

6.5.3 Marketing Philosophy

According to Robert LaShomb, telephone information is considered to be an important, but not cost-effective, public relations tool. He points out that schedules could be distributed throughout the service area for a cost of $80-125,000, compared to the $1.1 million total annual cost of telephone information. Approximately one-half of St. Paul's total marketing budget is devoted to telephone information. Telephone information is labor-intensive, and employee salaries are tied to a C.O.L.A. (Cost of Living Adjustment) system. Unless productivity improvements can be made, telephone information will inevitably absorb any increases in the Marketing Department budget. Given inflation, the real amount of money available for other marketing activities will decline.

6.5.4 Operating Statistics

Figure 6-21 illustrates the statistical measurements for St. Paul's telephone information system. St. Paul is one of the few authorities with both a low calls/agent/hour performance (25) and a short average transaction time (1:38). This indicates the potential for further productivity improvement. If agents are not handling a large number of calls, nor spending a long time on each call, it would appear that a significant amount of "downtime" exists.

A.	OPERATING FACTS:	
	Total Number of Agents	33
	Agents on Line at Peak Hours	14-16
	Hours of Operation	6:00 A.M. - 11:00 P.M.; M/F 7:00 A.M. - 11:00 P.M.; Saturday & Sunday
	Number of Trunk Lines	26
	Calls Serviced/Year	1,169,580
	Percent of Itinerary Calls	60%
B.	PROCESS EFFECTIVENESS	
	Percent of Calls to Hold	50%
	Length of Time on Hold	2:30
	Percent Lost from Hold	10%
	Percent Receiving Busy Signal	N/A
	Calls Serviced/Agent/Hour	25
	Average Transaction Time	1:38
C.	SUPPLY/DEMAND RATIOS	
	Vehicles/Total Agents	32.5 (new) 26.8 (old)
	Vehicles/Peak Agents	72.0
	Passenger Trips/Calls Handled	64.5
	Population/Calls Handled	1.5
	Trunk Lines/Population	71%

FIGURE 6-21. ST. PAUL OPERATING STATISTICS

6.5.5 Institutional and Labor Arrangements

Mr. LaShomb feels that the biggest problem at St. Paul is labor productivity. Historically, labor unions have been extremely strong in Minnesota. Seniority rules are a major factor in required scheduled work picks, often making it difficult to have agents with specific skills in needed positions. As positions open up, agents get "picks" much as bus drivers do on routes. Often, agents will switch back and forth (for variety) between regular route telephone information, customer service, information booths and the demand-responsive center, forcing continual retraining of agents each year. Part-time employees are prohibited by the union, but management is considering including this issue in the next contract negotiation. Starting salary is $6.40 ($13,312 annually). Five of the 33 agents are ex-bus drivers. Mr. LaShomb would like to end this practice.

An incentive program has been undertaken to increase agent productivity. Agents compete as teams on a variety of productivity measures: break time (goal 16% or less); call time spent in data retrieval (goal 5% or less); in-talk time (goal 68% or more); transaction time (goal 72 seconds or less). Goals are determined from the previous year's statistics. Each month, the leading operator replaces the supervisor when needed, thus spending less time on calls. Each member of the winning team receives a $25 gift certificate, publicity picture and trophy. Mr. LaShomb feels that the incentive program is wearing thin and has not kept up with rising expectations. He feels that only salary bonuses could accomplish that. He would rather see the money spent on enhanced supervision.

To reduce costs, agents are allowed to leave early without pay if call volume is low. The need for 3-4 annual major schedule updates (plus many minor ones) places considerable pressure on agents to constantly check the data base. Initial training takes 6-8 weeks. Agents first learn to utilize the telephone system and then the CRTS. Courtesy is considered to be of prime importance, followed by knowledge of the route network. A special training course on courtesy is being initiated in the fall.

Mr. LaShomb feels that St. Paul has gone as far as it can in utilizing technology to improve agent productivity. Future gains in system productivity will be achieved through technology which requires no agents at all such as CRIS (Computerized Rider Information System) and cable television. Any further improvement in agent productivity can only be achieved through management techniques. He would like to reduce the paper work requirements on supervisors so that they can spend more time actually supervising. He is interested in the idea of an incentive program for supervisors. In addition, he would like to see a change in organizational practice which would result in telephone information supervisors being dedicated to that single function. Presently, they are also responsible for the downtown information booths (which are really ticket sales outlet) and the informational needs of the handicapped program. Mr. LaShomb also points out that the lack of major disincentives such as suspension (made difficult by the union) hinders management's ability to motivate the agents.

All marketing and planning functions are the responsibility of a single department at St. Paul.

6.5.6 Cost of Operations

Figure 6-22 indicates the cost of St. Paul's various marketing functions. The cost of telephone information reflects labor costs plus $50,000 to maintain the CRTS system annually.

6.5.7 Market Research

Market research has found that there is widespread frustration about being unable to get through to the telephone information number which had been advertised in the newspaper. The call busy rate was not available, but St. Paul officials see a need for more trunk lines. In general, people found it difficult to obtain information:

> "Many do not know where they can go for information and those that do express consternation at the difficulty of obtaining it. The information number is constantly busy (actual data is not available) and the drivers never have schedules when needed, (St. Paul spends a small percentage (.1%) of its budget on schedule distribution). Current advertising is not considered effective because the message is not credible. Participants felt that the best advertising campaign would be improved service, knowledge of which would spread by word of mouth."

Among the recommendations of the advertising agency is that additional telephone information agents be added as well as strategic downtown information booths.

6.5.8 Summary

St. Paul utilizes an automated data retrieval system which performs the data management and retrieval functions of the systems in Washington and Los Angeles, but does not compute trip itineraries. This system is utilized primarily to improve the quality of telephone information (as in Washington), rather than agent productivity.

The installation of new ACD equipment has enabled St. Paul to reduce the number of agents from 40 to 33, while still providing the same level of service. Unlike other authorities which have installed MIS ACD equipment (such as Milwaukee and Chicago), St. Paul has not documented specific improvement in productivity measurements such as lost call rates. Rather, they have been able to maintain pre-existing productivity levels with fewer agents. The reduction in total number of agents has raised St. Paul's vehicle/agent ratio from the third lowest (26.8) to a more typical level (32.5).

The percentage of St. Paul's budget spent for telephone information is the third highest among the authorities studied. St. Paul's cost/call of $0.94 is the highest observed, perhaps indicative of less than optimal labor productivity.

Category	Cost	% of Total Operating Budget
Total Operating Cost	$99,590,161	-
Media	380,000	.4%
Schedules	125,000	.1%
Community Relations	60,000	<.1%
Telephone Information	1,102,044	1.1%
TOTAL MARKETING COST	$1,667,044	1.6%
COST/CALL	$0.94	

FIGURE 6-22. COST OF MARKETING - ST. PAUL

6.6 TRI-COUNTY METROPOLITAN TRANSPORTATION DISTRICT OF OREGON (TRI-MET), PORTLAND

Portland (Tri-Met) is the public transit authority for the Portland, Oregon Metropolitan area. More than any other authority visited, Portland has made a decision to de-emphasize "live agent" telephone information. Robert Prowda, Director of Marketing, has taken the position that a large portion of telephone information services frequent callers constantly seeking basically the same information. He feels that this market segment can be removed from the mainstream of telephone information and handled in a more cost-effective method. The focus of the Portland case study is on how this segmentation is being accomplished through the use of pre-recorded, route specific messages.

6.6.1 Background

The Portland area is a transit-oriented community with a long history of support for public transportation. Portland operates 660 vehicles, a number which has doubled in the past 6 years. Construction of an 11-block transit mall, equipped with CRT informational displays, has made Tri-Met a major force in the community. Population in the area is relatively stable, although the severity of the recession in the Pacific Northwest has resulted in a small net out-migration.

Portland services a population of 1,090,192 and provided approximately 44,000,000 trips last year. Transit's market share is 4% of all trips but 35-40% of downtown trips during peak periods. Portland's service "intensity" of 40.3 trips/capita is just slightly less than St. Paul's.

6.6.2 The De-Emphasis of Telephone Information

Due to budgetary constraints, Portland needed to reduce the cost of its telephone information service. Survey results showed that 10% of callers made 65% of all calls. Portland's goal was to create a special product which would remove these individuals from the regular telephone system, and to target telephone information to new riders with no system knowledge.

This goal was pursued through the replacement of "live" telephone agents with pre-recorded tape messages for each of the 65 Portland routes. This system is known as Call-A-Bus (CAB). Since Portland's agents are mainly highly paid ex-drivers (see Section 6.6.5) this action resulted in substantial cost savings. The elimination of 11 agent positions saved $242,000 in annual operating costs.

Four agents now staff a traditional "live" telephone information service during business hours, while most calls (70%) go to the recordings, which operate 24 hours/day. A small office has been set aside to house the tape recorders, with a separate machine required for each tape. One telephone agent spends approximately half her time "maintaining" the tapes. This work involves doing updates twice annually, re-routings, and record-keeping (i.e. call rates/machine). Three "special" tape lines provide information on how to use the Call-A-Bus (CAB) tape system, fare information, and special update messages. These tapes have a "barge-in" feature which enables up to ten

callers to gain access to the same tape at the same time. The tape system affords callers "instant access" in that there is almost no holding or busy signals.

The CAB system provides schedule information on a route specific basis. It should not be confused with the type of CRIS system which provides updated status reports. All tapes are pre-recorded in-house by the CAB maintenance agent. CAB was initially considered a "band-aid" solution to a budgetary problem, but has now apparently become a permanent fixture. During its first month of operation, there were considerable complaints regarding the change. Now, after almost a year of operation, there are few complaints.

Portland first began cutting back the hours of telephone information service from 24 hours/day in FY 79-80. Daily call volumes declined from 5-6,000 to 3-4,000, yet ridership increased by 20% under the impact of the energy crisis. This experience convinced Portland officials that there is a tenuous connection at best between ridership levels and telephone information.

Ms. Lana Nelson, Manager of Customer Services, has prepared a brief position paper on this subject entitled "From Telephones to Self-Service Customer Information". In it, she estimates that the cost of traditional telephone information would increase from $460,000 to $1,459,920 by 1986. This assumption is based on an 8% annual inflation rate and a doubling of demand resulting partly from the advent of light-rail service. The CAB will result in net savings in personnel costs of $1,015,597 during this time period. The cost of CAB is described in Section 6.6.6. The paper concludes: "Tri-Met's long term answer to providing rider information will be self-serving information in the form of convenient, economic, recorded, electronic, and improved printed information. Self-service information is a more cost-effective means of providing customer information ..."

The first tape machines were of poor quality and required frequent maintenance. The second generation has proven better. Initial fairly short tapes were considered inadequately informative and have been replaced by longer messages, some running up to 90 seconds for complex routes.

Portland estimates that 80% of calls are itinerary in nature. Each tape is route-specific. To put together an itinerary involving a transfer would therefore require two calls and two tapes. Callers with no idea which "route" to call would have to call a live operator. As callers with absolutely no knowledge of the transit network, we must confess to being left behind by a tape message within five seconds. It is clearly a system aimed at individuals with a certain degree of familiarity with the route network. Figure 6-23 illustrates a simple route message while Figure 6-24 illustrates a more complex routing. Portland is currently preparing to sell advertising time on the recordings.

Portland did not undertake this program in a vacuum. Rather, to compensate for the reduced availability of "live" information, other forms of marketing were substantially increased. New informational bus stop signs have been located throughout the region. These signs include information on fare zones, routes, frequencies, and directions. A relatively stable route structure will

6-19-83

Tri-Met Line 26 33rd Avenue For Line 26 Holgate dial 231-3226.

Line 26 operates from NE 33rd & Lombard to Portland Mall. Weekday peak-hour service is provided to NE 33rd & Riverside Way.
It travels in zones 1 and 2.

Daytime service operates from 33rd & Lombard every 15 minutes weekdays, every 30 minutes Saturdays and hourly on Sundays.

Average travel time from 33rd & Lombard to 33rd & Fremont is 5 minutes, continuing to 33rd & Broadway in 4 minutes, 12th & Sandy in 7 minutes and Portland Mall in 6 minutes.

Weekday service from 33rd & Lombard begins at 5:37 am, followed by 6:00 and 6:23. From 6:36 until 7:52 am average frequency is every 10 minutes. From 8:05 am until 5:14 pm service is every 15 minutes, followed by 5:39, 5:59 and 6:19. From 6:44 until 8:44 service is every 30 minutes, followed by hourly service from 9:04 pm until 12:04 am.
From Portland Mall board the bus on SW 6th Avenue at any Purple Raindrop stop. Weekday service begins at 5:55 am, followed by 6:25. From 6:45 am until 5:00 pm average frequency is every 15 minutes, followed by 5:10, 5:20, 5:35, 5:50, 6:05 and 6:25. From 6:45 until 8:15 service is every 30 minutes, followed by 8:55 pm. Service is hourly from 9:32 pm until 12:32 am.

Saturday service from 33rd & Lombard begins at 5:32 am, followed by 6:00. From 6:28 am until 7:28 pm service is every 30 minutes, followed by hourly service from 8:03 pm until 12:04 am.
From Portland Mall service is every 30 minutes from 5:49 am until 8:49 pm. From 9:32 pm until 12:32 am service is hourly.

Sunday service from 33rd & Lombard is hourly from 6:04 am until 12:01 am. From Portland Mall service is hourly from 5:32 am until 12:32 am.

Tri-Met's Transportation Guide and Map can answer all your transit questions. Purchase the latest edition, good through next January, at our Customer Assistance Office, 522 SW Yamhill, or at any participating Far West Federal.

Thank you for riding Tri-Met.

FIGURE 6-23. SIMPLE RECORDED MESSAGE

6-19-83

Tri-Met Line 40 Halsey For Line 40 Capitol Hill, dial 231-3240.

Line 40 operates from 148th & Sacramento and 127 & Brazee to Portland Mall on weekdays and Saturdays. Sundays it operates from 82nd & Halsey to Portland Mall. It travel in zones 1, 2 and 3.

Daytime service from 148th & Sacramento and from 127th & Brazee operates approximately every hour weekdays and Saturdays. Sunday service operates hourly from 82nd & Halsey.

Average travel time from 148th & Sacramento, including the San Rafael loop, to 100th & Halsey is 12 minutes; from 127th & Brazee to 100th & Halsey in 12 minutes; continuing to 42nd & Broadway in 13 minutes, 9th & Weidler in 9 minutes and Portland Mall in 8 minutes.

Weekdays from 148th & Sacramento service begins at 6:05 am, followed by 6:36, 7:00, 7:24 and 7:51. Service is hourly from 8:36 am until 3:39 pm, followed by 4:29, 5:09, 6:09 and 6:59 pm. From 127th & Brazee weekday service begins at 5:41 am, followed by 6:20, 6:48, 7:09, 7:39 and 8:15 am. Service is hourly from 9:06 am until 12:06 pm. Buses in the afternoon reverse the loop and travel via Morris, 132nd and Brazee. Service is hourly from 12:46 until 3:50 pm, followed by 4:32, 5:02, 6:02, 6:58 pm. Service continues from 100th & Halsey at 8:09, 8:48 and 10:02 pm and from 82nd & Halsey at 9:04, 11:04pm and 12:04 am. From Portland Mall board the bus on SW 6th Avenue at any Blue Snowflake stop. Weekday service begins at 5:55 am, followed by 6:15 and 6:45. From 7:00 until 7:43 am average frequency is every 15 minutes, followed by 8:11, 8:45 and 9:11. From 9:36 am until 3:06 pm service is every 30 minutes. Average frequency from 3:27 until 5:52 is 15 minutes, followed by 6:17, 6:40, 7:03, 7:31, 8:01, 8:31 and 9:11 pm. From 9:32 pm until 12:32 am service is hourly. Daytime service alternates between 148th & Sacramento and 127th & Brazee. Not all evening buses travel beyond 82nd & Halsey; please check the bus window sign when boarding.

Saturday service from 148th & Sacramento begins at 6:20 am, followed by 7:17. Service is hourly from 8:07 am until 6:10 pm, followed by 7:15 pm. From 127th & Brazee service begins at 6:47 am, followed by hourly service from 7:37 am until 12:37 pm. Afternoon buses are hourly from 1:11 until 6:15 pm and travel via Morris, 132nd and Brazee. Service continues from 100th & Halsey at 8:01, 8:31, 9:01 and 10:01 pm and from 82nd & Halsey at 11:03 pm and 12:03 am. Saturday service from Portland Mall begins at 5:55 am, followed by 6:25, 6:55, 7:18, 7:42, 7:56 and 8:12. From 8:36 am until 8:05 pm service is every 30 minutes, followed by 8:25 and 8:55 pm. Service is hourly from 9:32 pm until 12:32 am.

Sunday service from 82nd & Halsey is hourly from 6:03 am until 12:03 am. From Portland Mall service is hourly from 6:32 am until 12:32 am.

This bus serves Woodland Park Hospital, Gateway, Hollywood and Lloyd Center.

Tri-Met's Transportation Guide and Map can answer all your transit questions. Purchase the latest edition, good through next January, at our Customer Assistance Office, 522 SW Yawmill, or at any participating Far West Federal.

Thank you for riding Tri-Met.

FIGURE 6-24. COMPLEX RECORDED MESSAGE

minimize future updating costs, while an educational campaign has been launched to combat vandalism. As discussed in the next section, Portland also undertakes a wide variety of other marketing activities.

6.6.3 Marketing Philosophy

Robert Prowda, Director of Marketing, takes strong exception to the position held by many of his counterparts (particularly those in non-transit oriented communities) that people require person-to-person contact to successfully utilize public transit. He believes, for example, that most people can be taught to read schedules, and views the bus stop signage program described above as a step in that direction. While he agrees that "good information is the key to marketing" and that "customer information is as important as the money that drives the buses", he believes that the key to successful marketing is the development of a strategy for "tailoring the product" to different market segments.

In addition to its signage program, Portland receives three pages of free advertisements in the yellow pages with maps, frequencies and telephone numbers for the recordings. They publish a "Bus Information Book" and do a large schedule distribution program. The transit mall provides a unique form of information. Thirty-two bus shelters are each equipped with six graphic panels displaying maps and routes. Eight trip-planning kiosks provide system-wide maps and menu-driven user-activated CRT screens which identify routes, destinations and relevant schedule data. The mall, described as the system's "heart", has been in operation since 1976. The mall is considered a key component of Portland's alternative "non-live" informational system.

6.6.4 Operating Statistics

Figure 6-25 illustrates the statistical measurements for Portland, both for "live" agents and the CAB system. Since converting to the CAB system, Portland's "lost call" percentage has increased from the range of 10-18% to the current 26.4%. This high lost call rate indicates that Portland has reduced the supply of live agent service beyond the reduction in demand for this service and its diversion to CAB.

Portland's agents utilize microfiche data retrieval. Unlike the keyboard machines utilized at Chicago and Orange County (see Section 6.10), Portland utilizes the more basic "scroll-type" machine. Instead of being able to automatically access a specific route by pressing a key, the agent must "guess" how far to scroll through the data base (moving backward and forward) until locating the specific route. Agent productivity (29 calls/hour) does not seem to be negatively impacted by this equipment. Supervisory personnel maintain that this procedure is faster than punching in a request on a keyboard. This could be due to agent training as Portland uses predominantly ex-drivers who are unlikely to have been trained in keyboard operation.

Microfiche has been used for 5-6 years. The supervisors still prefer manual data retrieval since it is easier to update. Updates are now made 3 or 4 times/year and the process sometimes falls behind route changes. There is no significant maintenance problems with the equipment.

A.	OPERATING FACTS:	
	Total Number of Agents	6
	Agents on Line at Peak Hours	4
	Hours of Operation	8:30-4:30; M-F agents
		24 hours/day, 7 days/week CAB
	Number of Trunk Lines	12
	Calls Serviced/Year	214,912 agents
		488,593 CAB
		703,505 Total
	Percent of Itinerary Calls	80%
B.	PROCESS EFFECTIVENESS	
	Percent of Calls to Hold	5% agents; 0% CAB
	Length of Time on Hold	1:30
	Percent Lost from Hold	26.4%
	Percent Receiving Busy Signal	1% agents; 0% CAB
	Calls Serviced/Agent/Hour	29
	Average Transaction Time	1:00-3:00 agents
		3:00 CAB
C.	SUPPLY/DEMAND RATIOS	
	Vehicles/Total Agents	110.0
	Vehicles/Peak Agents	165.0
	Passenger Trips/Calls Handled	207 agents
		90 CAB
		63 Total
	Population/Calls Handled	4.7 agents
		2.0 CAB
		1.4 Total
	Trunk Lines/Population	60%

FIGURE 6-25. PORTLAND OPERATING STATISTICS

6.6.5 Institutional and Labor Arrangements

All public information functions at Portland fall under a single Marketing Department.

As mentioned, Portland is one of the few authorities which still utilizes ex-drivers as agents. The agents continue to belong to the driver's union and are compensated at the same level. Not surprisingly, given the recent reduction in force, no agent has less than 8 years seniority. Starting salary is therefore irrelevant. The average hourly wage is $11.82, or approximately $24,585 annually. Salaries range up to $30,000. No negative comments were expressed about agent performance. Clearly, agent salary levels were a factor in the decision to convert to the CAB system. Given seniority levels, agent training is not an issue.

6.6.6 Cost of Operations

Figure 6-26 displays the costs of the various marketing functions at Portland, while Figure 6-27 displays the cost of telephone information (both live and recorded) in more detail.

The original cost of providing CAB service was equal to one-half an employee (utilized for tape updating), and the leasing cost of recording machines. The employee's time is basically devoted to maintaining the system. The cost of a pre-recorded call is only $0.06. This cost will be reduced even further after 3 years of operation when Portland will own the tape recorders and hence no longer pay leasing costs. However, the longevity of these machines under 24-hour usage is uncertain.

Only agents providing regular route telephone information are included in these calculations. Portland also provides demand-responsive reservation service and informational agents stationed in the downtown mall. The latter are included under customer relations in Figure 6-26.

6.6.7 Market Research

Portland has investigated the use of different informational sources among riders and non-riders. Figure 6-28 displays the findings. As can be seen, the transit fact book is most frequently utilized by riders, while the informational display in the telephone book is most frequently utilized by non-riders.

6.6.8 Future Directions

Portland, in keeping with its emphasis on self-service information, is planning to implement a two-way, interactive telecommunication network among 18 transit centers, 26 light rail stations, the Transit Mall, the downtown customer service center and the computer and dispatch offices. In conjunction with this project, Portland plans to provide computer voice synthesis responses to telephone calls, and to integrate the entire network with cable television to achieve inquiry and dynamic video display of transit information through home television. Total project cost is estimated at $1,446,000. It is hoped that annual advertising revenue of $300-700,000 can be generated once the system is operational.

	Annual Budget	% of Total Operating Budget
Total Operating Budget	$ 76,654,000	-
Media	265,000	0.3%
Schedules/Signage	308,000	0.4%
Community Relations/Research/ Downtown Agents	394,856	0.5%
Telephone Information	190,103	0.2%
TOTAL	$ 1,158,019	1.4%

FIGURE 6-26. COST OF MARKETING - PORTLAND

Category	Agents		CAB
Agents (6)	$159,921		$ 12,407
CAB Machines-Monthly Lease			12,987
DATA Base Updating & Maintenance			4,788
Sub-Total	$159,921		$ 30,182
Total		$190,103	
Cost/Call - All Calls		$0.27	
Cost/Call - Agent Calls		$0.74	
Cost/Call - CAB		$0.06	

FIGURE 6-27. COST OF TELEPHONE INFORMATION - PORTLAND

Source	Riders	Non-Riders
Telephone Book	27%	10%
Transit Fact Book	39%	8%
Downtown Information Agents	27%	4%
CAB	25%	7%

FIGURE 6-28. USE OF INFORMATIONAL SOURCES - PORTLAND

6.6.9 Summary

Portland has converted a large portion of its live telephone information service to a system of pre-recorded taped messages known as CAB (Call-A-Bus). Not surprisingly, the "live" service capacity measurements for Portland are very high. Ratios of vehicles to agents (both total and peak period) are higher than any other authority except Chicago. This is also true for trips/calls serviced by live agents, but trips to total calls serviced (agent and CAB) is closer to average (63). Similarly, the ratio of population to calls serviced by agents is the highest ratio observed (4.7) but the ratio for all calls (1.4) is closer to average. Trunk lines have been reduced from 20 to 12 as a result of this change. The current ratio of trunks to population is lower than all but three authorities (Chicago, Miami and Albany).

Lacking survey data, it cannot be stated definitively that the CAB system provides as effective a service as live agents. The "lost call" rate has increased significantly and is the highest observed (26.4%), indicating substantial unmet demand. The lack of complaints could mean that Portland is meeting people's informational needs in other ways (as Portland officials contend), or that a portion of the constituency has simply ceased attempting to obtain information. While Portland may have found a cost-effective way to meet the needs of frequent riders, one must be concerned about the impact of this system on future ridership growth. Given the complexity of the CAB message, and the high lost call rates, individuals with the greatest need for information (non-riders or infrequent riders) receive the poorest informational service from Portland. IF the needs of this market segment are not met, from where will ridership growth come?

Not surprisingly, Portland now devotes the lowest share of its budget (.2%) among authorities visited to telephone information.

6.7 MIAMI METRO TRANSIT AGENCY (METROBUS)

Miami (Metrobus) was selected as a case study for two reasons. First, during the preliminary screening of projects, Joseph Jakobsche, the Director of Planning, Marketing and Scheduling, delivered the most impassioned defense of telephone information among all the individuals contacted. Second, Miami was planning to immediately install new ACD equipment with MIS capability. To enable us to conduct a before/after study of the productivity impact of the equipment, Miami was selected as the initial case study and essentially served as a test-case for the case study methodology. Unfortunately, delays in the preparation of the new telephone information facility (in particular, air conditioning problems for the ACD computer components) have postponed implementation beyond the date of the preparation of this report.

6.7.1 Background

The Miami Metropolitan Area (Dade County) has a population mix unique in this country. As one of the earliest sunbelt meccas, it has a tremendous residential fluctuation, both into and out of the area and through a massive residential expansion into previously lightly populated areas to the West and Southwest of downtown Miami. In addition to permanent migration, it has a huge seasonal influx of tourists and "snowbirds." Snowbirds are people who live in (rather than just visit) Florida in the winter and live elsewhere in the summer. The composition of the tourist group in particular has shifted in recent years to include a large European, and specifically British, component. These European tourists are far more transit oriented than American tourists. A large proportion of all the population groups is elderly.

Miami's "permanent" population mix is volatile. Since 1960, Miami has been the heart of Cuban immigration and influence in the United States. This population was augmented in 1979 by a new wave of immigrants (the Mariel boat-lift). In recent years, French-speaking Haitian immigrants have added yet another element to the Spanish-speaking Cuban influence. While a decade-long experiment with legal bilingualism has been repealed, Miami is in fact a bilingual city.

Last year, Metrobus provided 77,745,000 trips on 608 revenue vehicles. The population of the service area is 1.5 million. As could be expected from its population mix, Miami is not characterized by the low transit usage levels of most sunbelt cities. Metrobus provides 51.8 trips/capita, the fifth highest level among the authorities studied. The combination of a rail opening in 1984 and general service expansion will result in the alteration of two-thirds of the Metrobus routes.

6.7.2 Marketing Philosophy

Miami's marketing philosophy, according to Mr. Jakobsche, is that "it is up to the authority" to provide information to its community. He contrasted this specifically with the Portland philosophy, which he characterized as being one of "it is up to the passenger" to acquire the necessary information to utilize transit. Mr. Jakobsche concedes that with the stable population of Portland, it may be feasible to take that position, but that it would not work in

Miami. He points out that the authority has a "new responsibility each year to educate/communicate with the newcomers." He also mentioned that the new communities in Dade County are typically isolated real estate developments which are difficult to reach through schedule distribution. He feels that the geography of the area, with long narrow beach communities connected to the mainland by causeways, is confusing and makes trip planning particularly difficult among the tourists, newcomers and elderly.

In Mr. Jakobsche's view, "information today is acquired electronically - either by television or telephone". He does not believe that most people can master printed schedules. Since television advertisement is prohibitively expensive ($20-60,000 to produce a 30-second spot and $50,000 to purchase a minute of prime time), that leaves the telephone as the principal means of communication. He points out that if Miami was to purchase prime television time, it would lose its access to public service announcements.

Miami presently emphasizes the telephone number in all its marketing material. When the new ACD equipment is operational, an advertising campaign will be undertaken to emphasize the "more efficient, better, etc." telephone system.

6.7.3 Operating Statistics

Figure 6-29 displays statistical measurements for Miami. Miami agents have a relatively low calls handled/hour rate of 25 utilizing manual data retrieval. Miami experimented with microfiche data retrieval for 6 months in 1979-1980. The experiment was considered a failure for the following reasons:

- It took "too long" for the agents to find the information and project it on the screen.
- Manual updating took 7-10 days and with the route network undergoing frequent changes, agents were not confident of the information and continually double-checked manually.
- Half the microfiche machines were usually jammed at any one time and maintenance was difficult.

Miami officials are interested in pursuing automated data retrieval. Schedules are already computerized (eliminating a major problem faced by Washington and Los Angeles) and a "path finder" algorithm is utilized to dispatch drivers to their route pick-up points by bus. Mr. Jakobsche feels that this existing software could be easily adapted to a fully automated data retrieval system.

Mr. Jakobsche and the telephone information supervisors feel that agents must still utilize their own judgement in conjunction with an automated system. Thus, they would use it more as a "support tool" in the Washington fashion than a complete replacement of the agent's interpretive role as Los Angeles hopes to do. They point out that certain client groups such as the elderly need special handling to avoid high crime areas, for example, and that a computer could never evaluate all such factors.

When it finally comes on line, the new ACD equipment is expected to accomplish the following goals:

A.	OPERATING FACTS:	
	Total Number of Agents	20-1/2
	Agents on Line at Peak Hours	13
	Hours of Operation	6:00 AM - 11:00 PM
	Number of Trunk Lines	15
	Calls Serviced/Year	1,277,500
	Percent of Itinerary Calls	55 - 60%
B.	PROCESS EFFECTIVENESS	
	Percent of Calls to Hold	85 - 90%
	Length of Time on Hold	4:00 - 7:00
	Percent Lost from Hold	15 - 25%
	Percent Receiving Busy Signal	N/A
	Calls Serviced/Agent/Hour	25
	Average Transaction Time	3:30
C.	SUPPLY/DEMAND RATIOS	
	Vehicles/Total Agents	29.7
	Vehicles/Peak Agents	46.8
	Passenger Trips/Calls Handled	61
	Population/Calls Handled	1.2
	Trunk Lines/Population	55%

FIGURE 6-29. MIAMI OPERATING STATISTICS

- Reduce waiting time on hold
- Improve staff morale due to fewer equipment breakdowns
- Provide MIS data to enhance agent monitoring and better allocate staffing levels.
- Meet the anticipated increase in call volume when the rail system opens.
- Allocate calls on a first-come, first-serve basis.

6.7.4 Institutional and Labor Arrangements

All public relations functions are handled by a single Planning, Marketing and Scheduling Department. All agents are unionized. One part-time agent is employed although they are authorized for four. Starting salary is $8.87/hour, approximately $18,450 per year. Agents receive two weeks of training.

6.7.5 Cost of Operations

Figure 6-30 displays the cost of various marketing activities of Miami. The accounts for "schedules" and community services are combined. The budget for telephone information basically reflects labor costs.

Miami is planning to relocate the telephone information center when its new ACD equipment is operational. The new room will have upgraded air conditioning for the ACD computer. Miami is also planning to spend $27,000 on modular furniture for their new telephone information room. In a report to the Assistant Transportation Coordinator for Operations, Mr. Jakobsche pointed out that the modular furniture will cost only $727 more than a new order of traditional desks and dividers, allows for the addition of new agent stations (likely with the arrival of rail), and can be reassembled in a different shaped room. He concludes by saying:

> "Open office furniture systems encourage higher productivity by conforming to the specific needs of the worker and helps control the cost of office space... All of this can result in a cost-effective electrical distribution system and often means a (cost) savings of 25% or more."

6.7.6 Summary

Miami appears at the present time to have significant capacity problems. Percent of calls to hold (85-90%), time on hold (4:00-7:00 minutes) and lost from hold (15-25%) figures are all at the upper end of the scale. Miami has the third lowest ratio of trunks lines to population, only Chicago and Albany have lower ratios. The average transaction time (3:30) is the longest among authorities surveyed, indicative of a large number of callers unfamiliar with the transit network. The trips per call ratio (61) is more typical of northern, transit-oriented cities than sunbelt cities. The ratio of vehicles/total agents (29.7) is lower than all but two authorities (Louisville and San Diego), so clearly the capacity problem is not due to the employment of a below-average number of agents.

Miami hopes to utilize its new ACD equipment both to improve the quality of service for existing callers and to handle a significant increase in the number of calls. It will be interesting to observe whether both goals can be successfully pursued.

	Annual Budget	% of Total Operating Budget
Total Operating Budget	$ 81,000,000	-
Media	250,000	0.3%
Schedules & Community Services	733,000	0.9%
Telephone Information	461,000	0.6%
TOTAL	$ 1,944,000	1.8%
Cost/Call	0.36	

FIGURE 6-30. COST OF MARKETING - MIAMI

6.8 MILWAUKEE COUNTY TRANSIT SYSTEM (MCT)

Milwaukee (MCT) provided the best documentation of the impact of MIS ACD equipment. Milwaukee installed its new telephone equipment in mid-1981, and has rigorously documented its impact on a variety of productivity measurements. A "before" and "after" comparison is presented below utilizing the years 1980 (the last complete year of the old equipment) and 1982 (the first complete year of the new equipment).

6.8.1 Background

Milwaukee Transit appears to be a popular and heavily utilized community institution. According to Joseph A. Caruso, Marketing Director, "Milwaukee has one of the highest per capita riding levels of all transit authorities in the United States, and we may actually have the highest riding level of any major all-bus system in America". Among authorities visited, Milwaukee had the third highest ratio of trips/capita (64.8) surpassed by only the large multi-modal systems of Washington and Chicago. Milwaukee has a relatively low peak-to-base ratio of 2-1, compared to 3-1 for many authorities its size. This is not due to lack of commuters, but rather to high off-peak ridership. Milwaukee even operates at 75% of peak capacity on weekends. Market research found that 40% of the population rode the bus in the past year. Seventy-four percent (74%) of respondents disagreed with the statement that "the bus is not a reliable way to get to where you want to go".

Milwaukee operates 595 revenue vehicles and provided 62,500,000 passenger trips last year. The population of its service area (Milwaukee County) is 965,000.

6.8.2 Marketing Philosophy

Telephone information is considered a key component in Milwaukee's marketing strategy. Mr. Caruso believes that "the concept of telephone information is imbedded in America, and is inherent in business marketing." He feels that since people inherently rely on the telephone to obtain information, and business is very conscious of the power of the telephone, that it becomes a "negative" not to provide adequate telephone information. Given this, agent availability (getting calls through and handled) is the key to the success of telephone information, and Milwaukee has devoted considerable effort to improving this availability.

Milwaukee places considerable emphasis on television advertising as well. Market research has found that 34% of respondents recalled seeing television ads, more than twice the percentage for the next most frequent category (ads on transit vehicles, 20%). The telephone number is not utilized in the television ads. Radio ads urge listeners to "Call MCT" but no number is given. All printed material contains the telephone number. Advertising is generally of the "public-image" variety.

6.8.3 Operating Statistics

Figure 6-31 documents the statistical measurement for the Milwaukee telephone information system. As can be observed, the new ACD equipment has produced

A.	OPERATING FACTS:	New ACD	Old ACD
	Total Number of Agents	13-1/2	15-1/2
	Agents on Line at Peak Hours	6	6
	Hours of Operation	5:00 AM - 1:00 AM; M-S 6:00 AM - Midnight; S	
	Number of Trunk Lines	13	10
	Calls Serviced/Year	1,124,135	724,038
	Percent of Itinerary Calls	N/A	N/A
B.	PROCESS EFFECTIVENESS		
	Percent of Calls to Hold	36.5%	N/A
	Length of Time on Hold	0:40	5:00 - 10:00
	Percent Lost from Hold	6.4%	11.3%
	Percent Receiving Busy Signal	N/A	4%*
	Calls Serviced/Agent/Hour	41	22.6
	Average Transaction Time	0:45 - 0:60	N/A
C.	SUPPLY/DEMAND RATIOS		
	Vehicles/Total Agents	44.1	38.4
	Vehicles/Peak Agents	99.2	99.2
	Passenger Trips/Calls Handled	56	86
	Population/Calls Handled	0.9	1.4
	Trunk Lines/Population	74%	57%

*All trunks busy rate.

FIGURE 6-31. MILWAUKEE OPERATING STATISTICS

dramatic productivity improvements in several areas. Percent of calls lost from hold has been reduced from 11.3% to a low 6.4%. Calls handled/agent/hour has increased from a relatively poor 22.6 to an extraordinarily high level of 41. This represents an 81% improvement. Total calls serviced increased by 55%. Length of time on hold has been reduced from an unacceptably high 5-10 minutes to only 40 seconds.

These improvements were accomplished in conjunction with decreasing staff levels. Milwaukee reduced its total agent force by the equivalent of 2 full-time positions (an approximate 13% staff reduction), although peak period staffing levels remained unchanged. Hours of operation also were unchanged. Total agent pay hours were reduced by 14%.

The only element not held constant during this change was a 30% increase in trunk lines from 10 to 13. This could account for some of the increase in call handling capability.

According to Mr. Caruso, two features of the ACD equipment have brought about these productivity improvements. First, by taking calls off of hold in sequence, it has eliminated the random "long-hold" where calls just got "lost" in the queue. This is evident in the reduction of average waiting time on hold from 5-10 minutes to the present 40 seconds.

Second, is the ability of ACD equipment to provide MIS data and hence improve the quality of agent supervision. Mr. Caruso stresses that the key to agent productivity is availability to answer calls. They have determined that in the course of an 8-hour work day an agent should be available to answer calls for 440 minutes (excluding lunch, breaks, and miscellaneous non-work related activities). Prior to ACD, what the agent actually did with this time could be monitored only visually by supervisors. Now it can be documented on a CRT screen and on print-outs. This enables the supervisor to keep the agent actually "on the job" and not just occupying space in a cubicle. A similar point was made by Doug Anderson, Systems Coordinator at Los Angeles, where the agents had utilized the advantages of automated data retrieval to reduce their level of availability and maintain the old productivity levels.

Milwaukee now has among the best productivity measurements examined. It remains to be seen whether it can sustain a 41 calls/agent/hour standard unmatched by any of the other case study sites. It is possible that this performance represents a short-term morale boost caused by new equipment and new office space as well. However, data recently made available for 1983 indicates no decline in productivity. Milwaukee utilizes manual data retrieval.

6.8.4 Institutional and Labor Arrangements

Milwaukee's agents are unionized and many are former bus drivers. While the agents seem to have responded to Milwaukee's attempts to increase productivity (which was relatively poor prior to the new equipment), Mr. Caruso would still like to phase out the use of former bus drivers. Agent salaries start at $9.01/hour, approximately $18,741 annually. This is the second highest pay scale observed. Milwaukee has a labor contract which permits the use of part-timers. Agents receive 2 weeks of training. Training stresses the availability of agents to answer calls.

All public information functions are the responsibility of the Marketing Department.

6.8.5 Cost of Operations

Figure 6-32 displays the costs of Milwaukee's various marketing activities. Except for media and telephone information, Milwaukee did not allocate costs into the format utilized in this report. The cost of telephone information reflects labor costs only.

The average cost/call has been reduced from $0.59 in 1980 to the present $0.38. The system previously cost $505,000 to operate. ACD equipment resulted in a $75,000 reduction in personnel costs in the first year. Milwaukee officials estimate it would have taken an additional two agents and one supervisor to attain the ACD productivity levels. Relative to total operating costs, the new ACD equipment (and additional trunk lines) costs approximately $500/month more than the old system to operate. Milwaukee estimates that a break-even point will be reached in five years, with cumulative savings of $44,000 expected in ten years.

6.8.6 Summary

Milwaukee has the third lowest ratio of population/calls serviced (0.9) among all authorities studied. This ratio is lower than all but Louisville and Seattle. The old ratio (1.4) was closer to average. Milwaukee is now servicing 55% more calls than under the old equipment. The trip/call ratio (both before and after) is close to average. This difference in ranking between population/calls serviced and trips/call can be accounted for by the extremely heavy transit usage of the population. The number of calls received per trip is not unusual, but the number of calls per person is high given the intense usage of the transit service.

	Annual Budget	% of Total Operating Budget
Total Operating Budget	$ 63,200,000	-
Media	123,000	0.2%
Schedules	N/A	N/A
Community Relations	N/A	N/A
Telephone Information (labor only)	430,398	0.7%
TOTAL	$ 553,398	0.9%
Cost/Call		$0.38

FIGURE 6-32. COST OF MARKETING - MILWAUKEE

6.9 VIA METROPOLITAN TRANSIT (VIA) - SAN ANTONIO

San Antonio (VIA) was selected as a case study due to its extremely positive and aggressive attitude toward marketing in general and telephone information specifically.

6.9.1 Background

San Antonio provides service throughout the 1,197 square miles of Bexar County. It operates 546 vehicles and provided 28,600,000 passenger trips last year. San Antonio services a metropolitan area population of 961,688.

San Antonio is a dynamic sunbelt community with rapid population growth. As an example, 6000 office spaces are planned for construction in the downtown area within the next two years. San Antonio has capitalized on its growing reputation as an historical location to become a major convention destination. A major tourist development along its riverfront, as well as the traditional appeal of the Alamo and the history of the Southwest, has enhanced San Antonio's national reputation. San Antonio is a center of hispanic (Mexican) culture in the United States and recently elected a Mexican-American as mayor.

VIA, more so than other sunbelt authorities, appears well-integrated into the life of the community. A survey of public attitudes found that 90% of respondents believe the authority performs average or better than average in the utilization of tax dollars, while 74% expressed satisfaction with current service levels. The maintenance of a low (by today's standards) $0.40 fare has greatly contributed to the authority's popularity. In addition, innovative service ideas such as the purchase of 20 trolley buses replicating the design of 1930's era streetcars has contributed to the authority's popularity and visibility.

San Antonio's trips/capita ratio of 29.7 is low by northern standards, but is higher than the other mid-size sunbelt cities visited (Orange County, San Diego and Louisville). While San Antonio's population is less than Orange County and San Diego, San Antonio operates more vehicles than those authorities.

6.9.2 Marketing Philosophy

San Antonio is one of the most aggressive of the authorities visited in the active, multi-media promotion of its services. The telephone information number is a key part of those activities. The number is emphasized on all pieces of promotional material and on television and radio advertisements. A consultant advised San Antonio that if it did a good job of marketing, people wouldn't need to call, hence they should not emphasize the telephone number. However, San Antonio has aggressively pursued all marketing channels. San Antonio officials feel that schedule and telephone information are particularly important for transit networks with headways longer than ten to fifteen minutes.

San Antonio makes heavy use of television advertising. Like Seattle, San Antonio is a relatively isolated television market. San Antonio has developed

a particularly innovative TV advertising campaign based on the "Buppets", 6 bus-shaped puppets who talk and sing. The campaign was aimed particularly at children (and their parents) by emphasizing the availability of VIA service to popular destinations. Both the current and previous mayors appeared in ads, and stuffed "Buppets" were sold in stores during Christmas. The Buppets make numerous public appearances throughout the area. The campaign climaxed in the alleged "kidnapping" of one of the Buppets (see Figure 6-33). The campaign has won 7 advertising awards and in 1980 the San Antonio Chapter of the American Marketing Association recognized VIA as the "Marketing Firm of the Year". The campaign resulted in a 26% ridership increase on routes servicing malls and recreational facilities.

6.9.3 Operating Statistics

Figure 6-34 displays the statistical measurements for San Antonio's telephone information service. San Antonio utilizes manual data retrieval and has the third highest calls serviced/agent/hour level of 36. This figure is an estimate based on total call volumes and staffing levels. Plans are underway to upgrade the telephone equipment to MIS ACD quality.

6.9.4 Institutional and Labor Arrangements

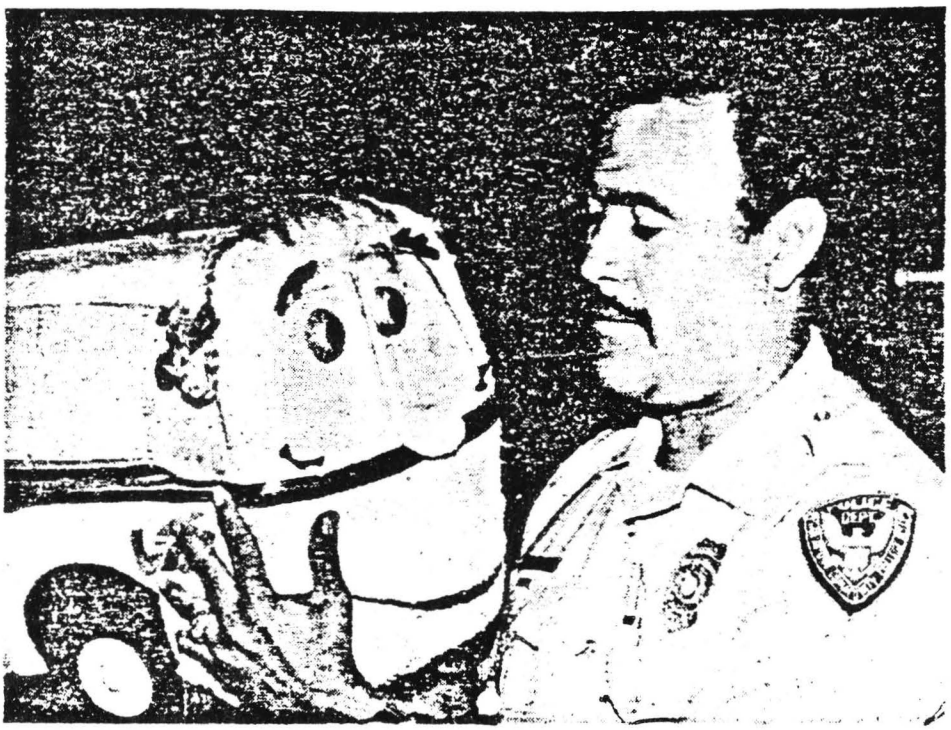
San Antonio is one of only three authorities investigated which employs primarily part-time agents. The others are Allentown, a much smaller authority, and Orange County. San Antonio currently utilizes 16 part-time and 5 full-time agents. Texas has strong right-to-work legislation and the agents are not unionized. No problems were reported with the proficiency of the part-timers. San Antonio is the largest authority visited with non-union labor.

San Antonio has among the most extensive on-going training programs. There is a 90-day "indoctrination" period. Agents are instructed to keep calls as brief as possible (accounting for a short average transaction time). Route knowledge and communication skills appear to receive equal importance. When there is a major schedule change, all agents must ride the bus during a low call volume time period or after hours, for which they receive after-hours pay. An incentive program awards the agent who records the highest number of calls each month without being absent or tardy. The agent receives dinner and a movie for two, a day off with pay, a certificate, an article in the VIA newspaper, and a picture posted in the work area. An agent of the year receives a $25.00 gift certificate in addition to all of the above. Staff meetings are held after work at 8:00 p.m. for one hour during which supervisors provide new information and discuss problems. Agents are paid for their time. Part-time salaries range from $4.69-$5.34/hour, and full-time salaries from $5.21-$5.41/hour.

All marketing activities except community relations are handled by the Marketing Department.

6.9.5 Cost of Operations

Figure 6-35 details the cost of San Antonio's various marketing functions. The cost of telephone information consists of labor costs.



TOOTSIE'S BACK!

Tootsie, VIA's beloved bus-shaped puppet, has returned. Patrolman Lalo Gonzalez inspects the busnap victim, who reappeared yesterday. The story's on page 12-A.

Missing Tootsie returns

Tootsie's back.

One of six bus-shaped puppets that have ridden VIA Metropolitan Transit Authority commercials to local fame, Tootsie had been the city's most illustrious missing cloth figure since a giant Kermit the Frog replica was snatched from outside the Witte Museum.

She disappeared last week from a San Antonio College classroom when she apparently was left behind after a presentation before a public relations class in McCreless Hall.

Campus police said they recovered the 3-foot-long buppet yesterday afternoon in the same classroom. But Ray Dudley, VIA community relations director, said circumstances surrounding Tootsie's reappearance were somewhat "frustrating."

Dudley said Sam Arriaga Jr., a city personnel official and the public relations instructor who arranged for the buppets' appearance during his class, told him he found Tootsie in his City Hall office yesterday, stuffed in a paper sack with a note attached.

Dudley said that Arriaga told him he took the buppet from his office to his public relations class and was going to notify VIA officials later but that patrolman Lalo Gonzalez, who was investigating Tootsie's disappearance, noticed the buppet and phoned the VIA offices.

Arriaga was not immediately available for comment on the case of the back-again buppet.

FIGURE 6-33. BUPPET AD CAMPAIGN

A.	OPERATING FACTS:	
	Total Number of Agents	13-1/2
	Agents on Line at Peak Hours	6
	Hours of Operation	6:00 AM - 8:00 PM; M-S
		8:00 AM - 8:00 PM; Sunday
	Number of Trunk Lines	12
	Calls Serviced/Year	858,088
	Percent of Itinerary Calls	N/A
B.	PROCESS EFFECTIVENESS	
	Percent of Calls to Hold	N/A
	Length of Time on Hold	0:30
	Percent Lost from Hold	7.3%
	Percent Receiving Busy Signal	N/A
	Calls Serviced/Agent/Hour	36
	Average Transaction Time	0:54
C.	SUPPLY/DEMAND RATIOS	
	Vehicles/Total Agents	40.4
	Vehicles/Peak Agents	91.0
	Passenger Trips/Calls Handled	33
	Population/Calls Handled	1.2
	Trunk Lines/Population	68%

FIGURE 6-34. SAN ANTONIO OPERATING STATISTICS

	Annual Budget	% of Total Operating Budget
Total Operating Budget	$ 36,436,612	-
Media	440,000	1.2%
Schedules	165,000	0.5%
Community Relations	41,627	0.1%
Telephone Information	188,055	0.5%
TOTAL	$ 835,055	2.3%
Cost/Call	0.22	

FIGURE 6-35. COST OF MARKETING - SAN ANTONIO

6.9.6 Market Research

San Antonio conducts considerable market research on its various marketing activities, but not specifically on telephone information. As an example, 84.3% of all respondents could recall the "Ruppet" campaign.

6.9.7 Summary

San Antonio, like most of the sunbelt cities visited, has a low ratio of trips/calls serviced (33). This is the fifth lowest ratio observed. The low trips/call ratios found in the sunbelt cities are almost certainly due to the lack of a long-term transit presence in the community, the resulting lack of transit knowledge among the population, and long route headways which place a premium on knowing when the next bus will arrive.

Not surprisingly, San Antonio spends a much larger share of its budget (1.2%) on media advertising than any authority visited. The total marketing budget represents the second highest percentage of total budget (2.3%) (tied with Louisville) among all authorities studied. The cost/call of $0.22 is the lowest observed. This can be accounted for by the use of part-time labor and the second lowest average transaction time (0:54) among authorities studied.

6.10 ORANGE COUNTY TRANSIT DISTRICT (OCTD)

Orange County (OCTD) was included as a case study for two reasons: 1) it is a mid-size authority which utilizes microfiche data retrieval, and 2) it annually conducts market research on the impact of its telephone information system. The microfiche system is discussed in Section 6.10.2 and the market research is discussed in Section 6.10.7.

6.10.1 Background

Suburban Orange County, located southeast of Los Angeles, is perhaps the outstanding example of post-World War II suburban sprawl development in the United States. It consists of 26 separate cities among 400 populated square miles. Anaheim, with 200,000 people, is the largest single city. Total service area population is 1,931,570. Even Anaheim is diffused, with no real CBD. The Orange County service pattern is basically laid out in a grid. Lacking any central drawing location, 25% of all riders must transfer to reach their destination.

Orange County operates a total of 497 vehicles in regular route service (they also operate dial-a-ride service). Last year they carried 31,592,254 passengers on all types of services. Orange County's market share of all trips is 2%, and their share of commuter trips is 2.5%. They have almost a 1:1 peak to base ridership ratio. The market share for "walking" is almost as high as the transit share. Twenty-five percent (25%) of the population used the bus at least once in the past year. The bus is perceived as a "lower class" transportation system. Prior to the formation of OCTD 11 years ago there was little public transit service in the area. Orange County has the second lowest ratio (16.4) of trips/capita among all authorities surveyed.

6.10.2 Microfiche Data Retrieval

Orange County has been utilizing microfiche data retrieval since 1977. Twenty-three keyboard machines of the type used in Chicago are employed. Sixteen of the machines were purchased in 1977 at a cost of $2600/machine. An additional seven machines were purchased in 1980 at a cost of $3400/machine. The machines are receiving heavier usage than intended and it now costs approximately $8,000 annually to maintain all of the machines. Keys are beginning to wear out. The transit network has outgrown the keyboard so that the agents can no longer press a single key to access a route, but rather must learn a combination of keys which changes whenever the system is updated.

Orange County officials credit the microfiche system with an approximate 33% improvement in agent productivity. The standard calls/agent/hour level has risen from 21 to 28, with most agents doing around 30. Transaction time has been reduced from 145 seconds to 105 seconds. It takes approximately 3 seconds to access over 3,000 pages of information.

The entire system is updated by a contractor three times/year at regularly planned seasonal schedule changes. Interim microfiche updating is done only on major routes. Otherwise, the information is blanked out on the screen and the agent must refer to manual materials. It costs $1100 annually to update

the microfiche. Orange County officials estimate a call breakdown of 50% itinerary/50% schedule. Itinerary calls do not place an undue burden on the agents, who do have manual back-up material available.

The management of Orange County is content with the microfiche system and not interested in automated retrieval. According to Chuck Chapman, Supervisor of Customer Relations, they feel that the principal advantage of automated data retrieval is in consistency of answers and the selection of the best routing, rather than in productivity improvement. Given that the Orange County route network is both simple and stable, automated retrieval is viewed as somewhat of an unneeded luxury.

6.10.3 Marketing Philosophy

Telephone information is viewed as a sales tool. During slow periods, agents are encouraged to market pass sales and the bus information book. All advertisements include the telephone number as a tag line. Given the generally low-level of transit awareness in the service area, it is felt that people need direct information to verify routings and ride the bus. While schedules are a more cost-effective solution, they are considered ineffective among this type of population.

Among other marketing tools, direct mail is considered the most effective (San Diego has come to share this conclusion, see Section 6.12). In one quarter this year, mailings were sent to 300,000 of 700,000 households in the service area. Television and radio in the area are dominated by Los Angeles stations, making their use costly and inefficient. Print media are utilized for general awareness campaigns. A bus information book is sold through 400 retail distributors. The marketing emphasis is on the student and hispanic population groups which are considered to be the most transit-dependent in the region.

6.10.4 Operating Statistics

Figure 6-36 displays the statistical measurements for Orange County. Orange County is one of many authorities which have reduced their hours of operation in recent years. In OCTD's case, they cut back from 10:00 P.M. on weekdays to 7:00 P.M. There has been no change in total call volume as a result of this service reduction, but the lost call rate has increased from the range of 12-15% to a high 20%. Concurrent with this change in hours, Orange County reduced staff by two agents and one supervisor. As discussed below, over half of Orange County's agents are part-timers. Thus, the peak period staffing level basically equals the total staffing level where part-timers are counted as half an agent.

6.10.5 Institutional and Labor Arrangements

A single "Communications Department" handles all print and voice contact with the public including telephone information, advertising, public relations and pass sales.

Orange County's telephone agents are non-unionized. Orange County is also one of the few authorities to employ a large number of part-time employees.

A.	OPERATING FACTS:	
	Total Number of Agents	14-1/2
	Agents on Line at Peak Hours	14
	Hours of Operation	6:00 AM - 7:00 PM; M-F
		8:00 AM - 5:00 PM; S-S
	Number of Trunk Lines	25
	Calls Serviced/Year	1,100,000
	Percent of Itinerary Calls	50%
B.	PROCESS EFFECTIVENESS	
	Percent of Calls to Hold	25%
	Length of Time on Hold	5:00
	Percent Lost from Hold	20%
	Percent Receiving Busy Signal	1-2%
	Calls Serviced/Agent/Hour	28-30
	Average Transaction Time	1:45
C.	SUPPLY/DEMAND RATIOS	
	Vehicles/Total Agents	34.3
	Vehicles/Peak Agents	35.5
	Passenger Trips/Calls Handled	29
	Population/Calls Handled	1.7
	Trunk Lines/Population	71%

FIGURE 6-36. ORANGE COUNTY OPERATING STATISTICS

Eleven out of a total of 20 agents are part-timers. The part-timers have the option of moving up to full-time as positions become available. Contrary to the general perceptions of part-timers, Orange County has low staff turnover, an average of only four per year. The average staff person has five years of experience. Orange County officials believe that part-timers are as proficient as full-timers. Starting salary is $5.93/hour, approximately $12,334 annually.

Orange County agents receive four weeks of training of which three are in the classroom and one week is spent on-line. Orange County officials emphasize communication skills, particularly "controlling the conversation" to minimize transaction time (which is near average), in the training period.

6.10.6 Cost of Operations

Figure 6-37 displays the cost of the various marketing functions at Orange County. Figure 6-38 indicates in more detail the costs of providing telephone information.

6.10.7 Market Research

Orange County has done several call-back surveys during the last several years to test the impact of its telephone information service. The most recent was completed in December, 1981. The goal of the survey was to determine how effective telephone information was at "closing the sale", i.e. getting people to ride the bus.

For the most recent survey, 226 successful call-backs were made to first-time callers of telephone information. Orange County officials believe that if these first-time callers can be successfully brought into the system, they will become repeat riders. The results of the survey are summarized in a December, 1981 report by TRAM entitled, "First-Time Callers Survey Conducted for OCTD".

Among the first-time callers surveyed, 63% had never used the bus before. The other 37% were predominantly infrequent riders for whom telephone information functioned as a "security blanket". Of the previous riders, 37% were planning a trip to a new area and 11% were taking a new route.

As a result of the call, 81% actually rode the bus. Among prior riders, 87% took the trip. Among previous non-riders, 78% took the trip. Orange County did not ask (as Washington did) what callers would have done if they hadn't been able to obtain the information by telephone.

Orange County did not carry these results through to a financial cost/benefit analysis as did Washington, since the survey was aimed only at first-time callers, and not all callers. Orange County officials do not know what percentage of all callers are represented by first time callers, so it would be misleading to attempt to extrapolate the ridership figures to measure the revenue impact of all callers. It is interesting to note that at Washington, an almost identical percentage (82%) of all callers did report taking the trip, although only 67% of these would not have taken the trip if telephone information had not been available.

	Annual Budget	% of Total Operating Budget
Total Operating Budget	$ 68,000,000	-
Media	500,000	0.7%
Schedules	125,000	0.2%
Community Relations	100,000	0.1%
Telephone Information	415,280	0.6%
TOTAL	$ 1,140,280	1.6%

FIGURE 6-37. COST OF MARKETING - ORANGE COUNTY

Category	Operating
Agents	$ 396,000
Agent Training	9,980
Data Base Updating	
Microfiche	1,100
Manual	200
Microfiche Maintenance	8,000
TOTAL	415,280
Cost/Call	0.38

FIGURE 6-38. COST OF TELEPHONE INFORMATION - ORANGE COUNTY

Orange County did attempt to determine the frequency of future use among all respondents. Eighty-three (83%) percent said they would ride in the future. Figure 6-39 displays the projected ridership levels of previous riders and non-riders. Among previous riders, there was a shift to more frequent use.

Orange County also obtained some demographic information from the survey respondents. Eighty-eight (88%) percent of transit dependent callers utilized the bus as a result of their call, as opposed to 69% among the non-transit dependent. Interestingly, 95% of all callers (including the self-identified "transit dependent") lived in households with one or more cars. Among the "transit dependent", one-third lived in households with two cars, 13% had three or more cars, while only 10% had no automobiles at all in the household. This does not support the theory that users of telephone information are truly transit dependent. Almost half (477) of the callers lived within one block of a bus stop, and 92% lived within four blocks.

There are no significant demographic differences between first-time callers and all riders. For example, 9.7% of riders are elderly compared to 8.0% of first-time callers, while 10.4% of riders are youths compared to 7% of callers.

6.10.8 Future Directions

Orange County, like most authorities visited, is planning to replace its telephone company equipment with new ACD equipment for enhanced MIS and agent monitoring capability.

6.10.9 Summary

Orange County has the second lowest vehicle to peak period agent ratio (35.5) but the vehicle to total agent ratio (34.3) is closer to average due to the employment of part-timers. Orange County has the third lowest ratio of trips/calls serviced (29), but the ratio of population to calls (1.7) is close to average reflecting the lack of transit usage by a large segment of the population.

A. Previous Non-Riders

- 33% Plan to Ride 5 or More Days/Week
- 19% Plan to Ride 1-4 Days/Week
- 23% Plan to Ride 1-3 Days/Month
- 20% Don't Know

B. Previous Riders

	Previous Use	Planned Use
o 5 or More Days/Week	18%	33%
o 1-4 Days/Week	18%	19%
o 1-3 Days/Month	12%	23%
o Less Than One Day/Month	43%	14%
o Don't Know	9%	11%

FIGURE 6-39. PROJECTED RIDERSHIP LEVELS OF CALLERS - ORANGE COUNTY

6.11 TRANSIT AUTHORITY OF RIVER CITY (TARC), LOUISVILLE

Louisville (TARC) was selected as a case study due to the highly supportive attitude of its management toward telephone information.

6.11.1 Background

TARC services the metropolitan Louisville area and has recently initiated service across the Ohio River into Indiana. Louisville provided 18,000,00 passenger trips last year on 311 revenue vehicles. It services a population of 811,603. Market research has found that TARC has a positive community image, although lack of route knowledge is perceived as a drawback to increased ridership. Louisville has a low ratio (25.1) of trips/capita.

6.11.2 Marketing Philosophy

According to Lynn Lawson, Louisville's Director of Marketing, "the travel center (telephone information) is one of Louisville's most utilized resources". Louisville officials view telephone information as both a means to increase ridership and to enhance the general image of the transit authority. Market research indicates that the telephone service is a valuable tool in Louisville's communication with the consumer market. Louisville officials also consider pocket schedules to be an important informational resource. According to market research, consumers regard pocket schedules as a secondary source of TARC information.

Louisville utilizes radio, television and newspaper advertising to launch special promotions (such as the opening of service to Indiana) and conduct on-going marketing campaigns. A portable mobile information station has been developed to circulate among schools, malls, fairs and the like.

6.11.3 Operating Statistics

Figure 6-40 illustrates the statistical measurements for Louisville. By many of the criteria utilized, Louisville has by far the highest level of telephone service among the authorities visited, consistent with Louisville's management's high level of support for telephone information.

6.11.4 Institutional and Labor Arrangements

Agent starting salary at Louisville is $4.09/hour, or $8,507 annually. Of nineteen agents employed, three are employed part-time. All agents are entry-level, non-unionized personnel. Agents are trained for six weeks in both communication skills and the details of the transit route network.

All public informational activities at Louisville are handled by the Marketing Department.

6.11.5 Cost of Operations

Figure 6-41 details the cost of Louisville's various marketing activities. The cost of telephone information reflects only labor costs.

A.	OPERATING FACTS:	
	Total Number of Agents	17-1/2
	Agents on Line at Peak Hours	10-12
	Hours of Operation	6:00 AM - 11:30 PM; M-F
		7:00 AM - 11:30 PM; S-S
	Number of Trunk Lines	14
	Calls Serviced/Year	1,200,000
	Percent of Itinerary Calls	90%
B.	PROCESS EFFECTIVENESS	
	Percent of Calls to Hold	90%*
	Length of Time on Hold	0:08
	Percent Lost from Hold	N/A
	Percent Receiving Busy Signal	N/A
	Calls Serviced/Agent/Hour	27.5 (est.)
	Average Transaction Time	0:25 - 0:30
C.	SUPPLY/DEMAND RATIOS	
	Vehicles/Total Agents	17.8
	Vehicles/Peak Agents	28.3
	Passenger Trips/Calls Handled	15
	Population/Calls Handled	0.7
	Trunk Lines/Population	95%

*All calls go to hold automatically.

FIGURE 6-40. LOUISVILLE OPERATING STATISTICS

	Annual Budget	% of Total Operating Budget
Total Operating Budget	$ 24,800,000	-
Media	192,350	0.8%
Schedules	71,250	0.2%
Community Relations	N/A	N/A
Telephone Information	317,000	1.3%
TOTAL	$ 528,600	2.3%

FIGURE 6-41. COST OF MARKETING - LOUISVILLE

6.11.6 Summary

Louisville's vehicles to peak period agents ratio (28.3) is 25% lower than the next lowest authority (Orange County). The vehicle to total agent ratio of 17.8 is lower than all but San Diego. Louisville has the second highest (to Washington) trunk line to population ratio. The ratio of trips/calls serviced (15) is almost 90% lower than the next three lowest authorities (Orange County, San Diego and South Bend), which are clustered in the 28 - 29 range. The ratio of population to calls serviced (0.7) is also the lowest observed (equalling Seattle).

As evidenced by these statistics, Louisville's riders and residents appear to have a greater proclivity for the use of telephone information than found elsewhere. This could indicate a need to provide more information in other forms. Louisville's reported average transaction time of 0:25-0:30 would certainly support high call volumes of the type described above. However, this standard is almost 100% lower than the next lowest, 54 seconds reported by San Antonio. It also seems inconsistent with an estimated 90% itinerary calls (also the highest reported) since itinerary calls are typically the longest. Nevertheless, Louisville's high call volumes are consistent for a sunbelt city with low levels of transit knowledge and tradition, and high route headways.

Given this high level of telephone information usage, it is not surprising that Louisville devotes the second highest budget share (1.3%) to telephone information (surpassed only by Seattle). Louisville has the lowest wage scale and second lowest cost/call ratio (surpassed only by San Antonio) reported.

6.12 SAN DIEGO TRANSIT CORPORATION (SDT)

The San Diego Transit Corporation (SDT) was included as a case study due to a recent test of CRIS, Computerized Rider Information Systems. Through the use of a specially coded dialing system, CRIS provides computer generated voice responses on a route or even stop specific basis. CRIS also provides the capability for updated status reports on delays, weather-related problems, etc. While this capability was available in San Diego, it was never utilized.

The theoretical advantages of computerized voice response systems are (1) a reduction in the long-term operating cost of telephone information, and (2) the generation of new ridership through a reduction in the uncertainty of riding transit brought about by the provision of timely, route-specific status reports.

UMTA is sponsoring, through the Transportation Systems Center, in-depth evaluations of CRIS at four sites: Columbus, Ohio, Erie, Pennsylvania, Salt Lake City, Utah, and Pittsburg, Pennsylvania. While we wished to include a CRIS site in this report, we did not wish to interfere with an on-going and highly specific study. San Diego was selected because it was not included in the on-going UMTA project and implemented and evaluated CRIS on its own.

Two caveats must be expressed regarding the results of this test. The first is that San Diego is a sunbelt city with among the most benevolent climates in North America. The value of the CRIS concept was first documented in Canadian cities where climate made up-to-date bus status reports a highly important piece of information. The four UMTA/TSC test sites are also cold-weather cities.

The second point is that the test and evaluation were designed and carried out by San Diego in conjunction with a CRIS contractor. Both the test itself and evaluation methodology were much briefer and less rigorous than that planned for the UMTA/TSC test sites. Disagreements between San Diego and the contractor, as well as a temporary loss of interest on the part of the contractor, resulted in delays and mid-experiment design changes which could also have impacted the results. This should not impune the motivations or capabilities of the San Diego officials and those of the contractor both of whom conducted a good-faith experiment which involved considerable time and expense on their parts.

6.12.1 Background

San Diego is in many ways the prototype sunbelt city. It has a high residency turn-over, including both individuals moving into and out of the area and within the area. A huge military presence contributes to the extent of transiency in the population. In addition, San Diego is a major tourist area. The city has one of the outstanding freeway systems in the nation, with little in the way of traffic congestion. Its climate is mild and dry throughout the year. San Diego is not an area with a strong transit tradition and SDT claims a modal split of only 2% for all trips. San Diego provides a low rate of 20.8 trips/capita.

San Diego operates a fleet of 280 buses servicing a population of 1.2 million. While San Diego has the 8th largest population of authorities visited, it has only the 12th largest vehicle fleet. SDT also provides telephone information for several public carriers as well as the San Diego Trolley (or Tijuana Trolley as it is affectionately called). The trolley, a 16-mile line from downtown San Diego to the Mexican border, is operated by a separate public corporation. SDT provided approximately 25,000,000 passenger trips last year.

6.12.2 San Diego's CRIS Test

San Diego contracted with the firm of Teleride Limited of Toronto, Ontario to conduct its CRIS test. Teleride is one of the leading developers of CRIS technology. San Diego paid Teleride $50,000 for the marketing expenses involved in the test. Teleride spent $546,000 of its own funds. The test was to be a simple one: routes with CRIS had to "outperform" control routes which were subjected to a marketing campaign but no new technology. "Outperform" was defined as a revenue ridership improvement differential of at least 3% over the control routes.

Based on its experiences in Canadian cities such as Ottawa and Mississauga, Ontario, Teleride Limited has made some very specific claims for its CRIS system called "Telerider". These claims are summarized in an August, 1982 marketing paper entitled "Telerider: A Marketing Tool for Transit".

"(In Mississauga) Telerider generates from 50 to 100 times the normal call volume and has been credited with a 10% increase in ridership each year. In Ottawa, Telerider has gotten 7 times the number of phone calls. Ridership has gone up about 3% per year for each year since installation. More importantly, off-peak ridership is up 10%".

According to Mark Lowthian, Information Services Representative, San Diego's goals for this test were two-fold: 1) increase revenue ridership, and 2) reduce the considerable burden (see Section 6.11.4) on the telephone information system. Of the two, increasing revenue ridership was the more important, particularly in the off-peak period when San Diego operated at about 40% capacity. In regard to reducing the burden on traditional telephone information, a pre-test found that 20% of all calls to San Diego were the schedule-type question (as opposed to 79% itinerary questions) and thus could be handled by Teleride. By diverting some of these calls to Teleride, San Diego officials hoped to improve the efficiency of the existing telephone information service. They did not intend to cut-back on staff, but rather to handle a larger percentage of existing demand.

The installation of Teleride took place between January and June, 1982. Installation took considerably longer than had been anticipated. Five "typical" routes were selected for Teleride and three similar routes were chosen for the control marketing campaign.

From the beginning, San Diego and Teleride experienced differences of opinion on marketing philosophy. These disagreements were critical to the success of the test since the Telerider could only succeed if marketed properly. Teleride presented San Diego officials with several elements of marketing

campaigns which had been successfully employed in Northeast cities. San Diego officials worked with Teleride and a local advertising agency to develop an advertising campaign appropriate to the San Diego area.

Once marketing strategy had been agreed upon, a direct mail house was contracted to send materials to all households within 1/4 mile of the test and control routes. Material for the Teleride routes included the following:

- A letter from the General Manager extolling the virtues of public transportation.
- A description of the Telerider.
- A map of the route showing bus stops and the Telerider telephone number for that route.
- A telephone receiver sticker on which to write the Telerider number.
- A perforated wallet card on which the Telerider number could be written.

The control routes, instead of receiving the Telerider material, received a business reply card with which they could send for a brochure on "how to ride the bus". The direct mail house predicted that responses would be received from 500-1,000 households out of 46,000 targeted. San Diego has received in excess of 10,000 responses, a 20% response rate on control routes. This was San Diego's first experience with direct mail marketing.

The initial response to the Teleride campaign was disappointing, with call volumes far below predicted levels. Loss of interest on the part of Teleride and budgetary constraints at San Diego, delayed and eventually cancelled a second planned direct mail campaign. During this time, Teleride altered its philosophy. While still believing that in the long run Telerider would attract new riders, they now stressed the capacity of Telerider to increase the ridership frequency of existing riders. This change required a different marketing tactic. Thus, an on-board marketing campaign targeted to existing riders was agreed upon.

The second marketing packet on the Telerider routes consisted of a greatly simplified map on the brochure describing Telerider. This brochure emphasized the telephone number much more prominently. The control routes received brochures entitled "A Bus for All Reasons" which emphasized businesses and activities along the route.

The test continued for six months until December, 1982. The final results were as follows:

Teleride Routes	-2.8%
Control Routes	+1.3%
Rest of System	-7.0%

Thus, while both the Telerider and control routes did far better than the routes which received no special attention, the control routes outperformed the Telerider routes by 4.1%.

San Diego's conclusion from this test is that direct, person to person marketing is a highly effective technique of which they would like to do more. They do feel that the Telerider has other potential uses if funding were available. These include the following:

- Provide each agent with an updated route status report on a CRT screen.
- Provide route-by-route schedule displays for agents on a CRT.
- Develop reports on number of calls by route, stop, sub-area, and time to aid in service planning.
- Place off-site displays at shopping centers, airports, etc.

Several disagreements remain between San Diego and Teleride regarding how the test was conducted. Teleride felt that the control marketing campaign was too extensive while San Diego believed it was comparable to the Teleride campaign. According to San Diego officials, Teleride officials at various times stated that the Telerider concept (1) could be universally grasped, (2) required person-to-person contact, or (3) required major media exposure. The latter was clearly not cost-effective in a small controlled study.

In summary, the following conclusions can be stated:

- It is essential that in undertaking a test of this type, the transit system and contractor be in complete agreement on means and ends at the outset. While San Diego and Teleride were in agreement on the goals (ends) of the test, they were not always in complete agreement on means.
- The usefulness of the CRIS concept in a non-transit oriented, benevolent climate community remains to be demonstrated. This finding has no bearing on the UMTA/TSC test currently underway in four cold-weather cities.
- San Diego officials believe Telerider could still be cost-effective. They estimate that they lose 5,000 calls/day. If 20% are schedule-type calls which could be diverted to Telerider, this would divert 1,000 calls/day (or 4 agents) from the traditional telephone system. In the long run, given the funds to make the capital investment, it would be a cost-effective way of increasing productivity while controlling labor costs.

6.12.3 Marketing Philosophy

San Diego considers telephone information to be "crucial" both because of the high population turnover in the area and the complexity of the transit network. The route network requires considerable individual initiative to utilize due to the large number of transfers required. Telephone information is crucial given this complexity, lack of transit knowledge on the part of the resident population, and large numbers of tourists as well. The telephone information number is integrated into all forms of marketing and utilized as a tag line on advertisements. San Diego has in the past emphasized community and employer liaison. As a result of the success of the controlled marketing campaign conducted as part of the Teleride test, greater emphasis will be placed on on-board marketing. San Diego has done some radio advertisement and less television.

6.12.4 Operating Statistics

Figure 6-42 displays the statistical measurements for San Diego's telephone information system. San Diego is another authority which has cut back its hours of service in recent years (from 11:00 P.M. to 8:30 P.M.). San Diego officials felt that late-night call volumes were too low to justify service and that most people were calling regarding next-day trips anyway. San Diego has little night-time bus service. They also felt that the more agents on active duty the greater the overall productivity as other agents would keep the system moving while one handled a particularly difficult call. Hence, productivity declined during late-night "graveyard" shifts.

6.12.5 Institutional and Labor Arrangements

All public information, with the exception of schedule preparation, is handled by a single Marketing Department. Schedules are handled by the Planning and Schedule Department.

Telephone agents are unionized but this presents no real problems. San Diego officials believe that productivity is directly related to experience and try to encourage stability through positive employee-management relations. They do not utilize part-time employees because they feel that part-timers receive insufficient practice to maintain proficiency, and tend to have high turn-over rates as well. Starting salary is $5.97/hour, or approximately $12,418/year.

6.12.6 Cost of Operations

Figure 6-43 illustrates the budget for San Diego's various marketing activities. The budget for telephone information basically consists of labor costs.

6.12.7 Future Directions

San Diego, like most of the authorities visited, is in the process of purchasing improved ACD equipment to enhance their MIS capability. They are also planning to improve the agent seating arrangement, but they are undecided as to whether or not to purchase modular furniture. They are definitely interested in automated data retrieval for improved consistency in answers, superior routings, and reduction in training time. They are also interested in a computer-generated voice response connected to the automated retrieval system, as was discussed in the Los Angeles section (6.2). They feel that microfiche data retrieval is not as fast nor as effective as their present manual system.

6.12.8 Summary

San Diego has the highest call busy percentage (50%) among all authorities studied. They are admittedly overwhelmed by the demand for telephone information, hence their interest in CRIS. Hold ratios are not unusually high, however. San Diego has the lowest ratio of vehicles to total agents (17.0) and the third lowest ratio of vehicles to peak period agents (43.1). The trips/calls serviced ratio of 28 is lower than all but Louisville.

A.	OPERATING FACTS:	
	Total Number of Agents	16-1/2
	Agents on Line at Peak Hours	6-1/2
	Hours of Operation	5:30 AM - 8:30 PM
	Number of Trunk Lines	20
	Calls Serviced/Year	896,159
	Percent of Itinerary Calls	79%
B.	PROCESS EFFECTIVENESS	
	Percent of Calls to Hold	80-85%
	Length of Time on Hold	1:00
	Percent Lost from Hold	8.4%
	Percent Receiving Busy Signal	50%
	Calls Serviced/Agent/Hour	33
	Average Transaction Time	1:30
C.	SUPPLY/DEMAND RATIOS	
	Vehicles/Total Agents	17.0
	Vehicles/Peak Agents	43.1
	Passenger Trips/Calls Handled	28
	Population/Calls Handled	1.3
	Trunk Lines/Population	91%

FIGURE 6-42. SAN DIEGO OPERATING STATISTICS

	Annual Budget	% of Total Operating Budget
Total Operating Budget	$ 47,872,077	-
Media	150,000	0.3%
Schedules	150,000	0.3%
Community Relations/Direct Marketing	50,000	0.1%
Telephone Information	405,102	0.8%
TOTAL MARKETING BUDGET	$ 755,102	1.5%
Cost/Call		$0.45

FIGURE 6-43. COST OF MARKETING - SAN DIEGO

Population/calls serviced (1.3) is closer to average. This is consistent with sunbelt cities in which a large portion of the population is "outside the system" and do not call, while riders have low levels of transit knowledge and call frequently.

6.13 CAPITAL DISTRICT TRANSPORTATION AUTHORITY (CDTA), ALBANY

Albany (CDTA) was selected as a case study because it has cut-back on telephone information service hours from 24 hours/day to 12 hours/day. As it turned out, many other authorities had also reduced hours to some extent. Albany provided an interesting analysis of the pros and cons of a decision faced by many authorities in recent years, as well as a variety of other issues facing a small/medium size transit authority in the provision of telephone information.

6.13.1 Background

Albany (CDTA) provides service to the cities of Albany, Troy and Schnectedy, and the surrounding areas. It services a metropolitan area population of 759,100. As with most mid-size Northeastern cities, the Albany area has a fairly stable population base. Albany operates 240 revenue vehicles and last year provided 15,000,000 passenger trips. Albany provides 3-4% of all trips and 7% of commuter trips in the area. Albany has a low trip/capita ratio (19.8). Cities of this size tend to have stable, though fairly limited, ridership bases.

6.13.2 The Decision to Reduce Service Hours

Until a year ago, bus dispatchers doubled as telephone information agents at Albany. Since they were available to dispatch vehicles until 1:00 A.M., it was cost-effective to have them answer the phone as well while on duty. In general, the dispatchers were thought to be too engaged in the performance of their other assigned duties to adequately perform the telephone information function. Additionally, the labor contract then in force did not provide a job classification of "telephone operator". This resulted in "operators" being classified and paid as drivers and/or supervisors-dispatchers. This essentially precluded the hiring of employees exclusively for telephone information.

A provision in the new labor agreement permitted the creation of new job classifications and pay scales, including telephone information operators. In addition to these efforts to fully staff telephone information during the day, Albany concurrently decided to end nighttime "live service".

Live agent service is now provided from 6:00 A.M. to 6:00 P.M. From 6:00 P.M. to midnight, a recording provides a general description of evening service availability. From midnight to 6:00 A.M., the message informs the caller that there is no bus service after 1:00 A.M. and that they should call for information in the morning.

Nighttime call volume is approximately 100. Call volume has not changed since the service cut-back. The consensus among Albany officials is that many late night calls were of the nuisance variety and not people looking for early morning schedule information. There is some disagreement regarding whether or not 6:00 A.M. is early enough to start service. Some officials feel that little bus service begins that early and it is sufficient, while others would like to start earlier.

Only one complaint has been received regarding the change. Many more complaints had been received regarding the poor quality of nighttime service under the old system. People accused Albany of "false advertising" for claiming that it provided 24-hour information service.

6.13.3 Marketing Philosophy

Albany's marketing philosophy is strongly oriented toward schedule distribution. Schedules are reprinted each time there is a major service change. Weekly drops are done at each of 300 schedule distribution centers. Schedules are also distributed on the bus. The community is described as "oriented toward schedules".

Paid advertisements are primarily public awareness-oriented and do not include the telephone information number. Public service announcements do include the number.

Jack Reilly, Manager of Planning and Development, feels that most people ride the same bus all the time, and that information should be targeted to the "impulse buying" market. This market, which rides primarily off-peak, will not randomly arrive at bus stops and wait for a bus because off-peak headways are too long. Schedules are often too complex for the rider unfamiliar with the route network. Therefore, the telephone is the key informational tool for this market.

6.13.4 Operating Statistics

Unlike at larger transit authorities, Albany's telephone agents are still multi-functional (even though they are no longer dispatchers). On a routine basis they perform the following jobs: 1) general telephone information, 2) dial-a-ride reservations, 3) building receptionists, and 4) building security. In reality, it is difficult to ignore a person standing in front of you who wants access to the building, and thus the latter two functions assume de facto priority. Working as they do in a public space with considerable background noise is distracting to agent and caller as well.

Figure 6-44 details the statistical measurements for Albany. Most of the information regarding system productivity was obtained by interviewing two agents in the company of their supervisor, the Transportation Director. Albany had little data of this type, with the exception of a "ring busy" study conducted by the telephone company to determine the percentage of calls not getting through.

The interview with the two telephone agents was illustrative for a number of reasons. First, they found the "intellectualizing" involved in assigning specific numbers to their daily routine to be a difficult and frustrating process. They were extremely reluctant to stand on an answer, despite our reassurance and those of their supervisor that this was in no way a "performance review". Second, they gave widely varying answers. For example, one estimated average hold at 5 minutes while the other said five seconds (they were not interviewed together). While one agent had considerably more experience than the other, it did not seem to be a sufficient explanation for their divergent answers. The discrepancies could not be explained by the

A.	OPERATING FACTS:	
	Total Number of Agents	4
	Agents in Line at Peak Hours	3
	Hours of Operation	6:00 AM - 6:00 PM
	Number of Trunk Lines	5
	Calls Serviced/Year	182,000
	Percent of Itinerary Calls	N/A
B.	PROCESS EFFECTIVENESS	
	Percent of Calls to Hold	15-20%
	Length of Time on Hold	N/A
	Percent Lost from Hold	<20% (est.)
	Percent Receiving Busy Signal	3%
	Calls Serviced/Agent/Hour	30-40
	Average Transaction Time	1:00 (est.)
C.	SUPPLY/DEMAND RATIOS	
	Vehicles/Total Agents	60.0
	Vehicles/Peak Agents	80.0
	Passenger Trips/Calls Handled	82
	Population/Calls Handled	4.4
	Trunk Lines/Population	36%

FIGURE 6-44. ALBANY OPERATING STATISTICS

Transportation Director. As a second example, one said no calls were lost from hold while the other said "less than 20%". Finally, one estimated average transaction time at 1-2 minutes while the other said 15 seconds to 1-1/2 minutes. A test call by the Transportation Director took 40 seconds.

The data acquired in this manner appears unreliable at best. Casting no aspersions on the proficiency or dedication of these agents whatsoever, it was clear that they had never thought about their jobs in the type of neat compartmentalized functions which planners and government consultants like to use. Given the perception among Albany officials that the route network is relatively simple and that most calls are "basic schedule information," the performance indicators reported by the agents may be relatively accurate. Given the several functions of the agents, a performance of 40 calls/hour, even if calls are of short duration, seems high.

Albany officials still feel that the delivery of telephone information could be improved in several ways. They would like to isolate agents in their own room and eliminate their peripheral functions. They would also like new ACD equipment for MIS data and monitoring as well as call sequencing. Albany was one of the few authorities visited where the agents informally sequence calls among themselves (of course, there are no more than 3 agents working at any one time). They are also interested in automated retrieval (retrieval is presently manual) and CRIS (see Section 6.13.8).

6.13.5 Institutional and Labor Arrangements

For one of the smaller authorities visited, Albany has among the more complex marketing institutional arrangements. The telephone agents are nominally under the supervision of the Transportation Director. This arrangement is undoubtedly somewhat of a "bureaucratic hold-over" from the days when dispatchers handled telephone information. While the Transportation Director provides traditional employee supervision, the principal interest in the intricacies of telephone information clearly resides in the Planning and Development Department. The Planning Department had arranged for the ring busy study, was pursuing automated retrieval and CRIS, and had the most interest in the quality of information and its role in marketing. All other marketing activity was centered in a Public Information Office. Coordination between Planning and Public Information appeared to be fairly close.

Agents are unionized but as discussed above now have a separate job classification from drivers and dispatchers. One agent is an ex-driver, the other three are entry-level clerks. Each agent receives one month's training emphasizing communication skills as well as route knowledge. Starting salary is $4.62/hour, approximately $9,609 annually.

6.13.6 Cost of Operations

Figure 6-45 displays the cost of Albany's marketing functions. The cost of telephone information reflects labor costs.

	Annual Budget	% of Total Operating Budget
Total Operating Budget	$ 17,000,000	-
Media	112,900	0.7%
Schedules	31,500	0.2%
Community Relations	N/A	N/A
Telephone Information	88,400	0.5%
TOTAL	$ 233,800	1.4%
Cost/Call	$0.48	

FIGURE 6-45. COST OF MARKETING - ALBANY

6.13.7 Market Research

Albany recently completed a study ("Final Report on CDTA Market Survey," Fact Finders, March, 1983) which analyzed the impact of various marketing activities. The survey found that the most riders (39.9%) obtained information through printed schedules, followed by telephone information (20.4%). The principal factor motivating people to ride the bus was route convenience (84.6%) followed by availability of schedule information (76.7%).

6.13.8 Future Directions

Albany, in particular the Planning Department, is greatly interested in technological advancement in the information field. They will shortly be joining the UMTA CRIS project, and are interested in automated retrieval as well. Jack Reilly believes in CRIS for its revenue generation capability. In the short run, it will impact primarily the discretionary off-peak market. In the long run, it will improve the quality of all service by reducing waiting time. Mr. Reilly believes that by improving service information and quality in this way, transit authorities will have greater fare-setting latitude in the future. He believes that the ability to provide quality service and charge appropriately for it is the key to the future financing of public transit.

Mr. Reilly's staff is particularly enthusiastic about automated retrieval. They believe it would be most helpful during severe weather or other service disruptions. They also believe, in agreement with Washington, that it would enhance the quality of information by enabling agents to quickly confirm answers, reduce transaction time, and provide more detailed information. For example, current schedules provide only five time points for each route, while an automated system could have twenty.

6.13.9 Summary

Albany has the third highest ratio of vehicles to total agents (60.0), but they provide the third fewest hours of live service (only Portland and South Bend provide less). The ratio (80.0) of vehicles to peak period agents is closer to the average. Albany has the highest ratio of population to calls serviced (4.4) and has the second lowest number of trunk lines/capita next to Chicago. Unlike Chicago, however, Albany has little evidence of latent demand with a call busy rate of only 3% (as determined by the ring busy study).

6.14 LEHIGH AND NORTHAMPTON TRANSPORTATION AUTHORITY (LANTA), ALLENTOWN

Allentown (LANTA) is a case study on the provision of telephone information at a small transit authority.

6.14.1 Background

LANTA services a population of 300,000 in Lehigh and Northampton Counties of Eastern Pennsylvania. Service is focused on the cities of Allentown and Bethlehem. The recession in the steel industry has impacted Eastern Pennsylvania quite severely. Despite being used as a symbol of industrial decay by song writer Billy Joel in the song "Allentown", in fact Allentown has not been hit as hard as other communities in Pennsylvania such as Johnstown which has 26% unemployment. Last year, LANTA provided 4,570,000 passenger trips on 59 revenue vehicles. Allentown has the lowest trips/capita ratio (15.2) of all the case study sites.

6.14.2 Marketing Philosophy

Unlike South Bend, the other small authority visited (see Section 6.15), Allentown officials view telephone information as a necessary public service rather than a marketing tool. There has been no effort to publicize the telephone number other than to include it in printed material. Denis J. Meyers, Director of Development, stated that he had been influenced by the views of Seattle officials expressed at the 1979 Workshop regarding the de-emphasis of telephone information. He views telephone information purely as a supplement to schedule information and points out that bus drivers regularly notify riders of schedule changes. As noted in a recent marketing survey ("The 1981 LANTA Market Area Telephone Survey") marketing efforts are oriented toward increasing the frequency of existing riders more than in attracting additional riders.

In general, Allentown has had to take a hard look at marketing expenditures for budgetary reasons. They have gone from a full-scale promotional program with an advertising agency to a more modest in-house effort with specific promotional projects such as the acceptance of food instead of fares during Holy Week. The Director of Development is a strong believer in direct mail campaigns. Mailings including free tickets and riding instructions are sent to all households within two blocks of bus routes. About 5,000 households are covered every four months. A test of one such campaign found a 3.5% ridership response rate, primarily due to the provision of schedule information in the packet. Mr. Meyers feels that this direct approach is more effective than general advertising campaigns which "I have never been able to relate to rider response".

6.14.3 Operating Statistics

Figure 6-46 displays the statistical measurements for Allentown. As can be seen, little analysis of telephone productivity has been undertaken. Mr. Meyers judges the success of the system by the lack of public complaints. He feels that the addition of an off-hours recording has reduced complaints to 1-2 letters/month.

A.	OPERATING FACTS:	
	Total Number of Agents	1-1/2
	Agents on Line at Peak Hours	1
	Hours of Operation	5:00 AM - 9:00 PM; M-F
	Number of Trunk Lines	4
	Calls Serviced/Year	75,000
	Percent of Itinerary Calls	8%
B.	PROCESS EFFECTIVENESS	
	Percent of Calls to Hold	N/A
	Length of Time on Hold	0:30 - 0:60
	Percent Lost from Hold	N/A
	Percent Receiving Busy Signal	N/A
	Calls Serviced/Agent/Hour	25
	Average Transaction Time	2:00-3:00
C.	SUPPLY/DEMAND RATIOS	
	Vehicles/Total Agents	39.3
	Vehicles/Peak Agents	59.0
	Passenger Trips/Calls Handled	61
	Population/Calls Handled	4.0
	Trunk Lines/Population	73%

FIGURE 6-46. ALLENTOWN OPERATING STATISTICS

Allentown has one agent on duty at any given time. They provide 16 hours of live service daily. Allentown utilizes 3 part-time agents each of whom works a 4-hour shift during the 7:00 A.M. to 7:00 P.M. period. Dispatchers provide additional service from 5-7 A.M. and 7-9 P.M. Each agent is also responsible for answering two administrative lines. One agent has worked for the private operator and then Allentown for 30 years, one for 12 years, and the other has worked at Allentown for 2 years. They utilize an ordinary switchboard operation. Mr. Meyers feels there is no need for ACD equipment or computerized data retrieval, as, "the agents have not complained".

6.14.4 Institutional and Labor Arrangements

All marketing activities at Allentown fall under the Director of Development. The part-time agents are covered by standard labor agreements and receive limited benefits. Salaries range from $3.85/hour ($4,040 annually, 4-hour days) to $5.60/hour ($5,824 annually).

6.14.5 Cost of Operations

Figure 6-47 displays the cost of Allentown's marketing activities. The only allocated costs for telephone information are labor costs. Note that all functions other than telephone information and media advertising are grouped together, resulting in a relatively high percentage of the total budget (1.1%).

6.14.6 Summary

Allentown's capacity ratios are generally in the normal ranges, indicating that sufficient capacity is provided for the size of the service area. The ratio of population/calls serviced (4.0) is higher than any other transit authority except Albany, reflective of Allentown's low trip/capita rate. Only 8% of all calls are itinerary in nature.

	Annual Budget	% of Total Operating Budget
Total Operating Budget	$ 4,800,000	-
Media	30,000	0.6%
Schedule Distribution/Community Relations/Consultant	53,150	1.1%
Telephone Information	21,243	0.4%
TOTAL	$ 104,393	2.1%
Cost/Call	$0.28	

FIGURE 6-47. COST OF MARKETING - ALLENTOWN

6.15 SOUTH BEND PUBLIC TRANSPORTATION CORPORATION (TRANSPO), SOUTH BEND

South Bend (TRANSPO) was the smallest authority studied in terms of revenue vehicles (57). In July, 1981, South Bend completed an internal evaluation of its telephone information system ("TRANSPO Telephone System Task Force Report") which analyzed the current service and potential options for augmentation. The undertaking of this self-appraisal caused us to select South Bend as one of the two "small authority" case studies.

6.15.1 Background

The community of South Bend, Indiana, located ninety miles east of Chicago, is best known as the home of Notre Dame University. Nevertheless, TRANSPO services a metropolitan area population of 200,000 centered in South Bend and its twin city of Mishawaka. While TRANSPO provides service to and through the Notre Dame campus, it is by no means a university transit system. South Bend operates 57 revenue vehicles and last year provided 3,615,000 trips. Market penetration is approximately 1.6% of all trips. South Bend has a low trip/capita ratio of 18.1. While the South Bend area (like much of the industrial Midwest) has been hard hit by the recession, downtown South Bend has enjoyed something of a renaissance in recent years with urban renewal opening up the waterfront and resulting in the construction of a convention center/hotel complex.

6.15.2 TRANSPO's Dilemma: How Much Service is Enough?

South Bend employs a single telephone agent who has worked there for five years. This agent also assists in the preparation of other marketing material and functions as a building receptionist. She works 8-5, Monday-Friday. Service at other times consists of a 90-second recording which provides information on all 15 TRANSPO routes, including hourly departures from the two main transfer points. A staff secretary covers when the agent is on break. Complaint calls are sent directly to the Director of Marketing.

In its 1981 analysis, South Bend considered the following options for augmenting service:

- Use of back-up personnel
- Utilize all clerical personnel on a rotating back-up basis
- Institute flextime for clerical personnel to provide 6:00 A.M. - 10:00 P.M. coverage
- Close at lunch hour and utilize a recording
- Utilize volunteers as back-up
- Re-design schedules for easier comprehension
- Hire an additional full-time agent

South Bend settled on the most basic solution, the use of a single staff secretary for back-up. As shown in Section 6.15.4, there is no evidence that South Bend is failing to meet existing demand, but the TRANSPO study concludes: "An additional full-time person may not currently be justified. However, it is an alternative that should not be disregarded as TRANSPO's information line receives increased visibility resulting from 650 posted bus stop signs".

6.15.3 Marketing Philosophy

South Bend presents a completely different marketing philosophy from Allentown, the other small authority visited. Telephone information, according to Mary Beth McAdams, Director of Marketing, is viewed as both a public relations and informational tool. The telephone number is prominently displayed on all forms of marketing - print advertisements, bus stop signs, radio spots, and brochures. No schedule information is provided on bus stop signs. A recent newspaper and radio advertisement campaign focused on South Bend's single telephone agent, describing her as a "personal travel agent". Figure 6-48 displays an example of a newspaper ad. Since South Bend has only a single agent, a personalized campaign of this nature is a natural and potentially effective technique. Ms. McAdams has little faith in people's ability to comprehend schedules, and feels the telephone is the key informational tool.

6.15.4 Operating Statistics

Figure 6-49 displays the statistical measurements for South Bend's telephone information system. These figures would appear to indicate that South Bend is having no difficulty meeting the demand for telephone information. The single agent handles 40 calls/hour, the highest figure at any of the case study sites except Milwaukee. Given that she provides most answers by memory and that only about 50% of calls involve an itinerary question, this call rate is credible. Even itinerary calls could not be terribly complex, given that South Bend operates all routes on 30 minute headways out of two pulse transfer points (one each in South Bend and Mishawaka). While most calls (60%) go to hold (not surprising given one agent and three lines), only 2% are lost and average waiting time is only 30 seconds.

6.15.5 Institutional and Labor Arrangements

All marketing functions are handled by a single Marketing Department. There are no labor issues as telephone information consists of a single, long-time employee.

6.15.6 Cost of Operations

Figure 6-50 displays the costs of South Bend's marketing activities. The cost of telephone information at South Bend essentially equals the cost of one individual's salary plus overhead. South Bend officials requested that we not specifically site that figure.

6.15.7 Summary

South Bend spends the second highest share of its budget (among authorities studied) on media advertising (.9%), primarily radio, while schedule distribution (.1%), community relations (<.1%) and surprisingly telephone information (.2%) are among the lowest. Allentown, despite seeming to de-emphasize telephone information, provides 7 more hours of "live" service and spends twice as large a budget share (.4%) on it. South Bend's trips/calls serviced ratio of 29 is the third lowest, and both trips/calls serviced and population/calls serviced (1.6) ratios are much lower than in Allentown,

FIGURE 6-48. SOUTH BEND NEWSPAPER ADVERTISEMENT

A.	OPERATING FACTS:	
	Total Number of Agents	1
	Agents on Line at Peak Hours	1
	Hours of Operation	8:00 AM - 5:00 PM
	Number of Trunk Lines	3
	Calls Serviced/Year	125,000
	Percent of Itinerary Calls	50%
B.	PROCESS EFFECTIVENESS	
	Percent of Calls to Hold	60%
	Length of Time on Hold	0:30
	Percent Lost from Hold	2%
	Percent Receiving Busy Signal	N/A*
	Calls Serviced/Agent/Hour	40
	Average Transaction Time	2:00
C.	SUPPLY/DEMAND RATIOS	
	Vehicles/Total Agents	57.0
	Vehicles/Peak Agents	57.0
	Passenger Trips/Calls Handled	29
	Population/Calls Handled	1.6
	Trunk Lines/Population	82%

*All lines are rarely busy, according to the personal observations of the Marketing Director.

FIGURE 6-49. SOUTH BEND OPERATING STATISTICS

	Annual Budget	% of Total Operating Budget
Total Operating Budget	$ 6,000,000	-
Media	57,000	0.9%
Schedules	4,000	0.1%
Community Relations	2,000	0.0%
Telephone Information	N/A	0.2% (est.)
TOTAL	N/A	1.2% (est.)
Cost/Call	N/A	

FIGURE 6-50. COST OF MARKETING - SOUTH BEND

despite the provision of only 9 hours of daily live service (Allentown provides 16). This reflects South Bend's greater promotion of telephone information. Agent ratios are appropriate given the authority's size, thus there is no evidence of latent demand not being adequately addressed.

APPENDIX A. RESEARCH DOCUMENTS AND INTERVIEWS

Documents

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Anderson, Gary, Forum Communications.

Bruno, Joe, Rockwell International-Northeast Regional Sales Office.

Coffman, Larry, Municipality of Metropolitan Seattle - Manager of Marketing and Productivity

Cudahy, Brian, Urban Mass Transportation Administration

Diller, Suzanne, System Development Corporation (SDC)-SCRTD On-Site Manager

Engelken, Albert, American Public Transit Association, Director of Communication Services

Everett, Peter, Seattle Metro, Consultant

Forde, Deborah, New England Telephone, Telemarketing Specialist

Fowler, Patrick L., Washington Metropolitan Area Transit Authority, Supervisor, Consumer Research

Graueb, W. Campbell, Transportation Research Board, Engineer of Public Transportation

Jakobsche, Joseph, Miami Metro Transit Agency, Director of Planning, Marketing and Scheduling

Kates, Dr. Louis K., Teleride, Inc., Consultant

Lumley, Aubrey, Chairman, APTA Sub-committee on Communications

Prowda, Robert, Tri-County Metropolitan Transportation District of Oregon, Director of Marketing.

Rosen, Stanley, Chase, Rosen and Wallace

Wood, Peter, Mitre Corporation

APPENDIX B: LIST OF CASE STUDY INTERVIEWS AND DOCUMENTS

INTERVIEWS

1. Chicago

   Mary Brouch, Section Manager - Consumer Information
   Hubert Messe, Manager of Communications
   James W. Kaempf, Manager of Marketing
   Joanne Clark, President-Very Important Personnel (VIP)
   Mike Prez, Manager of Telephone Information-VIP
   Kathy Malone, Supervisor-VIP
   Roy Williams, Assistant Supervisor-VIP

2. Los Angeles

   Doug Anderson, Systems Coordinator

3. Washington

   Michael Noonchester, Assistant Director, Office of Marketing
   Patrick Fowler, Supervisor-Consumer Research
   Francis Gray, Supervisor-Transit Information
   Tom Weeks, Transit Information Supervisor
   Linda Goetchius, Transit Information Supervisor

4. Seattle

   Larry Coffman, Director of Marketing
   Mary Peterson, Chief of Telephone Information
   Ray Shea, Supervisor of Advertising
   B.J. Carroll, Supervisor of Customer Services
   William Daucher, Consumer Research

5. St. Paul

   Robert LaShomb, Director of Planning, Development and Communications
   Fred Severin, Director of Transit Inquiry Systems
   Carol Armstrong, Manager of Telephone Information Center

6. Portland

   Robert Prowda, Director of Marketing
   Lana Nelson, Manager of Customer Services
   Jim Sobczak, Supervisor of Customer Service Center
   Myrtle Bachedler, Assistant Supervisor of Customer Service Center
   Jane Clark, Information Specialist

7. Miami

   Joseph Jakobsche, Director of Planning, Marketing and Scheduling
   Patricia Tims, Telephone Information Supervisor
   Fred Warner, Telephone Information Supervisor

8. Milwaukee

   Joseph A. Caruso, Marketing Director
   Val Salmins, Information Center Supervisor
   Two Telephone Information Agents

9. San Antonio

   Patricia Garza, Director of Marketing Promotions
   Donna Gomez, Supervisor of Customer Services
   Ray Dudley, Director of Community Affairs

10. Orange County

    Chuck Chapman, Supervisor of Customer Relations
    Mike Barnes, Manager of Communications
    Ron Redmond, Marketing Specialist-Advertising and Promotion
    Wendy Burlew, Supervisor of Telephone Information
    Gary Espinoza, Supervisor of Telephone Informtion

11. Louisville

    Lynn Lawson, Director of Marketing
    Debbie Johnson, Supervisor-Telephone Information Center
    Virginia Shultz, Junior Supervisor

12. San Diego

    Mark Lowthian, Information Services Representative
    Linda Walker, Advertising Services Representative

13. Albany

    Jack Reilly, Manager-Planning and Development
    Carmino N. Basile, Transportation Planner
    Denise McCoy, Public Information Officer
    Dennis Dee, Transportation Director
    2 Telephone Information Agents

14. Allentown

    Denis J. Meyers, Director of Development

15. South Bend

    Mary Beth McAdams, Director of Marketing

DOCUMENTS

Los Angeles

"Socio-Economic Impact Assessment of Automated Transit Information Systems (ATIS) Technology-Draft National Report," Wilson-Hill Associates, Inc., May 10, 1982.
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Portland

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The Effectiveness of
telephone information