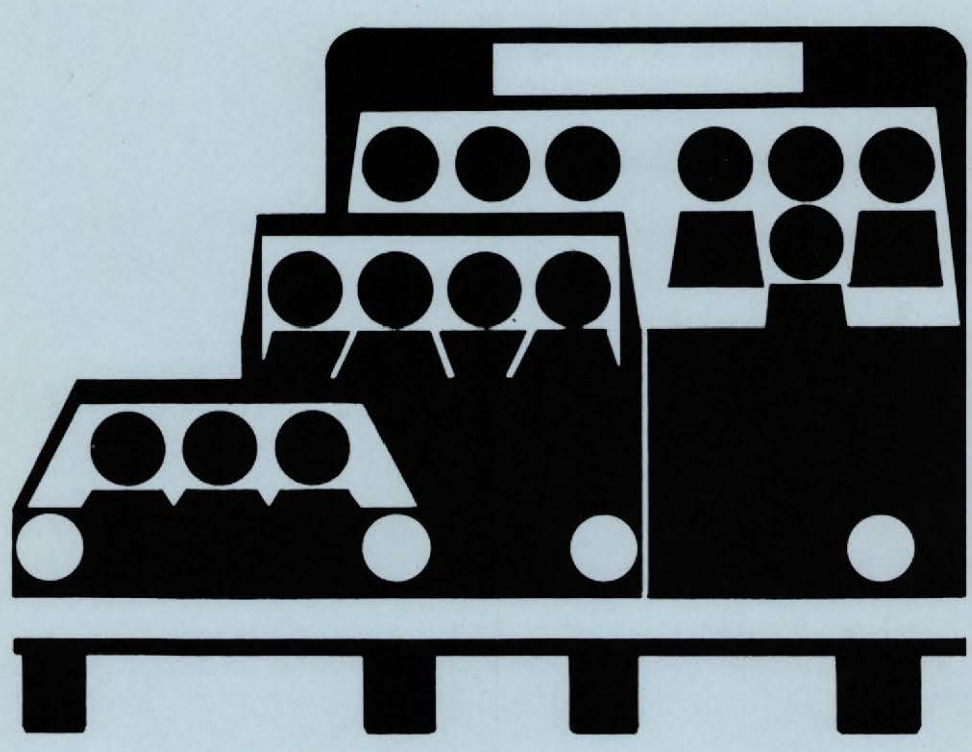
Buspools



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PREFACE

This report is one of a series dealing with various necessary ingredients for a successful Carpool/Buspool Program. It was developed by Alan M. Voorhees and Associates, Inc. for the United States Department of Transportation.

The goal of a Carpool/Buspool Program should be to satisfy travel requirements more efficiently by increasing passenger occupancy in autos and buses, thereby reducing the number of vehicles using the streets and highways. Achievement of that goal calls for coordination among many institutions within a metropolitan region, including public agencies and citizen and business groups. Participation by all of these groups and their knowledge of necessary program elements are critical to the success of the program.

The information and techniques presented in this series of reports should be considered as a guide to the development of a sound program in a metropolitan area. The program should be designed to make the existing street and highway system more efficient, to have a significant effect relative to energy conservation, and to foster urban and environmental goals.

The other reports prepared as part of this series, as well as other important documents concerning carpooling and buspooling can be obtained from the U. S. Department of Transportation.

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INTRODUCTION

The basic response to a goal for decreased fuel consumption is to increase the number of passengers per vehicle. In order to achieve an increase in the number of people utilizing each vehicle, individual transportation needs must be matched. This matching (regardless of who performs the matching function or how matching is effected) results in the pooling of transportation resources.

In what may be called a hierarchy of carpool/vanpool/buspool, the "buspool" potentially represents a high level of efficiency and low cost operation. In this context, "pooling" is the method whereby the users of service determine the routes, schedules, origins and destinations. The most elementary level of pooling is carpooling. A carpool can be formed by as few as two people with common travel desires who wish to pool their respective transportation resources. When the number of matched poolers exceeds the capacity of an automobile, a "vanpool" may result whereby a van-type vehicle is used with resulting lower per passenger operating cost. If the travel demand exceeds the capacity of a van, the next logical choice in the pooling hierarchy is the "buspool."

The buspool, frequently called "Bus Club" or "Subscription Bus," represents transit service where the riders determine the operating parameters of the service (routes, headway, origins, destination, and in some instances, fare). This service does not only apply to commuter work trips, but it can also apply to shopping trips, social/cultural trips and others established on a daily, weekly or monthly basis.

The potential for a premium service at low relative cost is quite high with buspooling since per passenger costs can be minimized due to higher vehicle capacity. It must be noted, however, that from an energy conservation standpoint, buspools may not be the most efficient pooling option. The energy efficiency of a buspool is dependent upon the use of the vehicle after the pooled trip has taken place. Single direction use of a buspool with deadheading may result in an operation that would most effectively use autos or vans without the deadheading problem (since autos and vans can be parked at the end of the trip).

Another caution in the consideration of buspools is the necessity for available buses. With growing demand for transit service and resulting purchases of new buses, the buspool option can be considered for near-

term use only if surplus buses are available locally. In many areas, this may not be the case; therefore local availability of buses must be examined. For example, many transit operators may not be willing to charter buses since they already have a peak-hour demand problem. Possibly sightseeing, school or church bus operators could be contacted should this occur.

Existing buspools were often established in response to voiced desires of a group of potential users. Any bus service that developed in response to user desires on a regular basis can be described as a "buspool." Any bus service that is contracted on a regular basis with origins, destinations and schedules determined by the user can be defined as a buspool. Traditional charter service is the best example of "pre-buspool," the only factor missing is the regularity of the service.

The projects noted below indicate factors leading to successful buspooling and should be considered within the unique local situation as one tool in the endeavor to decrease fuel consumption. When the matching process is undertaken, buspools should be considered from the start as one means of providing service to the matched poolers.

SUCCESSFUL BUSPOOLS

Buspools, as defined above, are not new in the realm of urban transportation. Successful buspools can be found in several states from Virginia to California. Recent interest in buspooling, spurred by the energy crisis, has brought this travel option to light as a potentially efficient means of moving people with similar travel needs. If maximum efficiency is to be realized in new buspooling endeavors, the experience of past buspools must be counted on to minimize future problems. Documented examples of buspool experience can be found in the following cities:

Reston, Virginia
Mantua, Virginia
Columbia, Maryland
Los Angeles, California
St. Louis, Missouri
Meriden, Connecticut
Pittsburgh, Pennsylvania
San Francisco, California
Rochester, New York
Tuxedo, Maryland
Palo Alto, California
Southglenn, Colorado
Fredericksburg, Virginia
Detroit, Michigan
Omaha, Nebraska

The best known buspooling endeavor has taken place in Reston, Virginia. By examining this experience, much can be learned about the potential for buspooling in other urban areas.

The Reston Experience [1/]

Reston, Virginia is a planned community located 24 miles west of downtown Washington, D.C. In 1968, when the first buspool was started in Reston, the community contained a population of 3,000 residents. By 1980 this community is expected to cover a land area of 11.5 square miles and have a population of 70,000. Prior to 1968 commuter service between Reston and Washington, D.C. consisted of the private auto and one bus route located nearby, which served the area once per hour with a travel time of one and one-half hours. The operator had tried to schedule buses through Reston but was convinced that the affluent families would not utilize bus service.

In 1968 the Reston Community Association organized a committee to charter a bus and determine the schedule, pickup routes and destination points for Reston's first buspool. Passenger costs were computed based upon the charter rates charged by the operator; a breakeven operation of 35 passengers for a 51-seat bus was utilized.

The breakeven point in buspool ridership occurred in Reston after six weeks of operation. At that time the decision was made to increase service and to add other buses as each breakeven point was reached. Schedules, routes and other service factors were constantly refined, based upon ridership surveys, to insure that the service provided reflected the needs and desires of the buspoolers.

In 1969, a 7:00 p.m. "straggler" bus was added which covered the downtown areas served by the seven regular buspool routes. This service, while not paying for itself on a per ride basis, provided sufficient service improvement and flexibility to induce 80 additional riders to the system.

As the operation increased in size and scope of service, it became evident that a separate organization was necessary, so in 1971 Reston Commuter Bus was incorporated under the laws of Virginia. This is a non-profit organization run by a volunteer Board of Directors and 11 volunteer officers.

[1/] "Commuter Bus Clubs Serve the Suburbanite", Ervin Poka and Donald Morin, Urban Planning Division, Federal Highway Administration.

The Board of Directors for RCB, Inc., is responsible for preparing and distributing schedules, printing tickets (paid for by the sale of advertising space), surveying riders as to their preferences for service changes and quality of existing service, and handling all negotiations with the bus operator. The Board elects one rider on each bus to serve as the busmeister, who rides the bus free in return for his services. The busmeisters are automatically Board members and perform the following duties:

- Insure that the driver follows the correct route
- Sell ticket books
- Punch individual tickets
- Make weekly deposits in a special bank account from which the monthly bill would be paid to the bus company
- Coordinate passenger exchanges at bus connection locations
- Provide routing and schedule information to passengers

Busmeisters, in addition, make every effort to insure personalized service. They are the first ones to stand when buses are crowded, they re-direct buses onto alternate routes when the regular route is congested due to accidents or bad weather, they personally relay passenger complaints to the system's ombudsman, and they supervise special bus festivities to make certain everybody has a comfortable and congenial ride.

The cost per ride (1972-73) for Reston buspoolers was $1.20 with the purchase of a 10-trip ticket and $1.50 for a single trip cash fare. A token fare of 25 cents is charged for senior citizens and children under 12 ride free. The costs are computed based upon the total costs of operating the buspool. These costs include bus charter and operating overhead for RCB, Inc., whose only paid employees are an office manager and a secretary. During the off-peak hours, approximately one-half the buses are used for regular route service.

In 1973 Reston Commuter Bus, Inc. obtained permission to use the Dulles Airport Access Road to commute to and from Reston. This road is dedicated to the exclusive use of airport traffic; vehicles cannot exit prior to reaching the airport nor enter at any place but the airport on the return trip. The Reston buses have cards which activate gates at special Reston entrance and exit ramps (and use of the access road cuts commuting time significantly for the buspoolers).

Since the Dulles Airport Access Road splits the Reston community into two sectors, buses having collected passengers each morning in each sector meet at the Dulles ramps to exchange passengers and pool those with common destination. This, in effect, means that the buses act as two kinds of buspools: local circulation buspools and line haul express buspools. Operating in groups of two or three buses, they provide collection/distribution service. After rendezvousing at the Dulles ramps where passengers change on the basis of destination, they begin a line haul express function to employment hubs in Washington, D. C. In the evening the process is reversed at a point in Rosslyn, Virginia, just outside Washington, D. C. The exchanges are performed at both the Dulles ramps and Rosslyn in just a few minutes. For more information call Reston Commuter Bus, (703) 437-7800.

Case Studies of Other Successful Buspools

While the Reston experience shows what interested and dedicated commuters can do in a unique situation, the following examples of other successful buspools indicate the breadth of organizations, situations and economics that lend themselves to buspooling.

Allegheny County, Pennsylvania (Pittsburgh) - There are currently five commuter-type bus operations in Allegheny County. Three were formed as early as 1950 when some major companies relocated to downtown Pittsburgh and service was necessary to provide employee transportation These operations are highly institutionalized. The service is provided on a charter basis, with the Port Authority of Allegheny County providing the buses. Elected bus club officials make all arrangements monthly with the Port Authority and are billed monthly at current charter rates.

A unique bus club arrangement was instigated by a local citizen and it resulted in service beginning January 2, 1974. The citizen not only assembled the necessary number of riders desired by the Port Authority (30 the first month, 35 the second, and 40 thereafter), but also arranged for a 100-space parking lot to be used for a park-and-ride facility. The service involves a 20-mile one-way trip between suburban Murraysville and downtown Pittsburgh. The fare is $40 per month, payable in advance. Club members specify arrival and departure times. Working with the Port Authority, they also establish routing, downtown stops and even short-cuts. The Murraysville service is unique because of the local initiative required. The service users all live in Murraysville but have different places of employment in Pittsburgh.

The local contact is Gary Lingnen, (412) 231-3600, with the Port Authority of Allegheny County.

Columbia, Maryland - The Columbia Association, acting as an agent for interested citizens, put up $2,300 to start bus service between Columbia and downtown Washington, D.C. (30 miles one-way) in 1970. Originally the Columbia Association chartered two buses from Eyre's Bus Service of Woodburn, Maryland. Service has now expanded to ten 39- to 49- passenger buses, depending on what is available. From the very beginning, sufficient revenue was generated so that the initial $2,300 was never depleted. Service is provided on a 10-ride ticket or single ride basis. Fares are $2 per one-way trip or 10 rides for $15. Fares were formerly $1.75, but charter fares were increased; consequently, a fare increase was necessary.

A resident committee handles day-to-day scheduling and necessary changes. The Columbia Association arranges for the services, monitors the charter contract and certifies the bills. The service is provided between various collection points in Columbia to 17 points in downtown Washington, D.C. Each bus has a bus captain similar to Reston's busmeister. Some buses collect on the east side of Columbia and others on the west side each morning. An interesting feature of the service is the fact that the buses, upon reaching Washington, D.C. each morning, do not return to Columbia. The buses are parked during the day at a lot in Wheaton, Maryland (suburban Washington, D.C.) until the return trips in the evening. The drivers use one bus to return to the Eyres office from the Wheaton parking lot. There have been no regulatory or insurance problems.

Through the Columbia Association, two additional commuter routes have been added. There has been service between Columbia and Baltimore, Maryland (provided by Eyres) for one year, utilizing two buses with a one-way fare of $1.25 or 10 rides for $10; service is provided on a cash basis and costs are covered by fare box revenue. Also, a commuter service was started in January, 1974, between Columbia and the National Institute of Health; Carter Bus Service provides one bus with a flat fare of $1.25 for a one-way trip. In each case, the Columbia residents have expressed interest in commuter service and the Columbia Association has been the facilitator.

In addition to aiding with commuter service, the Columbia Association, with a staff of three, also operates 10 buses exclusively within Columbia. Dial-a-ride service is offered between 6:30 - 8:30 a.m. and 7:30 - 11:00 p.m., with a fixed route service during intervening hours. Five routes are served at one-hour headways. The morning call-ride

service provides some residents with connecting service with downtown Washington, D.C. bus service.

For more information, call William Burton, Columbia Association, (301) 730-4288.

Omaha, Nebraska - The public transit system in Omaha has promoted buspooling to the point where three buses are utilized for peak-hour commuter service between surburban areas and downtown Omaha. Two buses operate between suburban park-and-ride lots and downtown Omaha (one 12 miles and another 18 miles). A third bus circulates in the vicinity of the park-and-ride lots and then travels downtown. The buses are operated by union drivers. The current buspool service is approximately five weeks old and ridership is satisfactory.

The fare for this service is 40 cents per ride or 35 cents per ride using a punched ticket; transfers are free. Service is essentially express to the downtown area. When this point is reached, stops are frequent. Park-and-ride lot utilization was negotiated by officials of the public transit system. Officials of the Western Electric Company and two suburban communities (Millard with a population of 6,000, and Belleview with a population of 25,000) have expressed interest in similar service. Expanded service is anticipated.

For more information contact J. W. Pospisil, Omaha Transit, (402) 341-0800.

Tuxedo, Maryland - Atwoods Goldline Service in Tuxedo, Maryland (suburban Washington, D.C.) charters buses to various groups who are responsible for determining pickup points, destinations and schedules. Each group is responsible for its own fare collection. The amount of bus club business has expanded from one bus per day in 1968 to approximately 15 buses per day at the present time. Groups using the service are varied, with rider clubs and employer sponsored service being represented.

- National Geographic Society - 8 buses per day
- Washington Bus Riders, Fort Meade - 1 bus per day
- Congressional Secretaries Club - 2 buses per day
- EPA employees - 1 bus per day
- Atomic Energy Commission - 3 buses per day

Service varies by commuter group. The EPA group commutes between a suburban shopping center and downtown Washington, D.C. (approximately

a 30-mile one-way trip). The AEC group commutes between Germantown, Maryland and downtown Washington, D. C. (a one-way distance of 40 miles). Revenue is remitted by the bus clubs at mutually agreed intervals. The operation is managed and controlled by Atwood Goldline Service. The services all originated from telephone inquiries by interested parties.

Two problems of significance involved (1) the bus operators who consider the jobs rather undesirable because of the long distance trips, and (2) an insufficient number of buses. There have been no regulatory or insurance problems. Atwood will continue to seek this type of business so long as equipment is available and operators can be found to drive the buses.

For more information, contact L. F. Hanson, President Atwood Goldline Service, (301) 773-7100.

STATAR (Steps Toward Automated Transportation Around Rochester) - STATAR, a non-profit, non-incorporated organization, began in 1965 as a carpool group dedicated to getting people to and from work in downtown Rochester. The service administered by STATAR grew to three chartered buses with three others under organization when a bus strike curtailed further growth. The three chartered buses, which served Eastman Kodak and other employers, stayed in operation, but recent events have reduced STATAR's service to one chartered bus. This occurred when one bus route was eliminated because it was too competitive with a route operated by a recently formed transit authority and the other was eliminated because Eastman Kodak work schedules were changed. The only remaining STATAR route operates 20-25 miles between Pennfield (a suburb of Rochester) and downtown Rochester, and then to Kodak Park. An informal STATAR group dictates the bus route and schedule, collects fares and designates stops. There are three principal pickup points. STATAR uses park-and-ride lots for which the group made their own arrangements.

A 45- to 53-passenger bus is rented from the public transit authority. A full range of fares has been established by STATAR.

- Annual fee is $215
- Semi-annual fee is $125
- One-way cash fare trip is $1
- One book of ten rides is $8

Other fare plans oriented to Eastman Kodak employees are also available. While more buses could possibly be added even though Eastman

Kodak has decided on staggered work hours, this would create more work for STATAR, which would prefer to stay an informal group.

The local contact is Bob Tuite, c/o Eastman Kodak Research Laboratory, Building 59, Rochester, New York 14650.

Golden Gate Bridge Highway and Transportation District - This public agency in San Francisco, leases equipment and drivers to "Commuter Clubs." Beginning in February 1971, with one club and one bus, the operation has grown to five clubs and 11 buses. The clubs principally operate between Marin and Sonoma Counties and downtown San Francisco. Buses are obtained from sightseeing or charter bus companies by the District through a competitive bidding process based on a desired level of service for a zone of operation. District officials, by meeting with interested citizens representing employment concentrations or resident groups, will start a club for 30-35 persons.

The Commuter Club members set the routes and schedules in cooperation with the District. It is intended that when the buses are 100 percent full, the Club bus should be self-supporting; the District will, if necessary, subsidize the operation to the limit of $500 per bus per month; the average subsidy per bus per month has been approximately $350. The subsidy process extends over a three-month period because of discrepancies between the per diem bills submitted by the charter bus company to the District and the monthly payments by the clubs. The District encourages all clubs to be self-supporting, but this is quite difficult to achieve. Each club solicits its own members, collects its own dues and makes a monthly payment to the District. The District leases the equipment and drivers to operate the Commuter buses. Since the District is the instigator of the service, they carry separate insurance to cover their liability. Each commuter bus has free passage over the Golden Gate Bridge and use of an exclusive bus lane. The longest bus run to downtown San Francisco covers a distance of 55 miles. The least cost per bus varies depending upon the zone of operation. The District advises the clubs regarding Commuter Club activities and also performs the bookkeeping. The District has assumed this responsibility for two reasons: (1) they wish to increase bus ridership, and (2) private bus companies prefer to contract with an agency rather than citizen groups. Sightseeing buses have been considered as the best source of Commuter Club buses because they are usually idle during weekday peak hours but utilized at midday and on weekends. It is important to note that while the District already operates 188 buses of its own, in the past, funds were not available to obtain additional buses for regular service. Therefore, arrangements were made to lease club buses.

For further information, contact Tito Sasaki, Engineering Department, Golden Gate Bridge, Highway and Transportation District, (415) 346-5858, extension 37.

COM-BUS - Long Beach, California -- For the last six years, COM-BUS, recently incorporated as Southern California Commuter Bus Service, Inc., has been organizing, coordinating and providing commuter bus service in the Los Angeles area. The current level of service involves 47 buses transporting workers between their homes and places of work. Two basic routes are between Orange County and the Los Angeles airport area, and the San Fernando Valley and the Los Angeles airport area. COM-BUS has just applied to the California Public Utilities Commission (PUC) for authority to serve government employees at the Civic Center from all areas of Los Angeles and Orange County.

COM-BUS handles every aspect of developing and managing a successful commuter bus system. This includes:

- Surveying employees to define optimum routes, stops and schedules
- Establishing route and schedules
- Obtaining late model, air conditioned, reclining coaches with professional drivers
- Coordinating with passengers
- Collecting fares
- Establishing and enforcing bus rules
- Handling passenger complaints
- Supervising entire commuter operations
- Obtaining Certificates of Convenience and Necessity from Public Utilities Commission

Buses are obtained from many well-established charter bus companies which include:

- Leisure Lines
- Mark IV Charter Lines
- Siesta Coach
- Great Western Stage Lines
- International Sightseeing Tours

- Pink Bus Lines
- Kingsmay Transportation, Inc.
- YMT Tours

Commuter bus routes vary between 20-65 miles, sith the average commuter bus trip being approximately 30 miles. A typical fare for a 35-mile, one-way trip (70 miles round trip) is $10 per week. COM-BUS leases the buses for commuter use only. From 8:00 - 4:00 p.m. the charter bus companies can utilize the buses for other purposes.

An interesting aspect of the COM-BUS operation concerns driver assignments. By carefully matching professional drivers to commuter bus routes, the commuter buses are often taken home at night. For example, if a driver happens to live in Orange County, he is assigned to a commuter route leaving Orange County. This arrangement is often so convenient that the drivers use the bus instead of communting to the busyard in their own personal car.

For information, contact Ron Hoffman at COM-BUS, (213) 438-3407.

Government Employees Insurance Company (GEICO) - GEICO, located in Chevy Chase, Maryland (a suburb of Washington, D.C.), responded to a parking shortage with a carpooling and buspooling program. The company provided buspools from park-and-ride lots at outlying shopping centers to the GEICO office. This employer-instituted program indicates the potential for organizing buspools at this level. The employer can provide one of the most efficient catalysts for buspooling. The necessary factors of location of residence and work hours are known by the employer, therefore allowing the employer to effectively insitute buspooling service for employees.

Oregon - Another example of employer generated interest in buspools is shown by the program established by Governor McCall in Oregon. The Governor directed that a feasibility study be performed for providing bus service for State employees commuting to work between Portland and Salem. Buses would pick up State employees at strategic points and transport them to their place of work by 8:00 a.m. and depart for the original pickup points after 5:00 p.m. The cost of the service would be financed through user charges. The Governor has indicated that he would like to see such a service in operation by early 1974.

Specialized Buspools - Other even more specialized buspools are being established throughout the country. Ski area buspools are being established to transport ski enthusiasts from metropolitan areas to the ski

regions. Other buspooling efforts for sports events have been in existence for years, but the interest in and use of these services has grown dramatically and can provide even greater opportunities for increased transportation efficiency.

CRITERIA FOR BUSPOOL OPPORTUNITIES

Much can be learned from the buspooling examples described above. The Reston experience points out several factors required for successful buspooling.

First, a number of people with similar travel desires were found to patronize the service. Similar origins (Reston) and destinations (Washington, D.C.) for a large number of people (over 1,000 passengers per day) exist in the Reston experience.

Second, while the out-of-pocket cost ($1.20 per trip) may be higher than carpool costs, the buspool provides a high level of service without the traditional tension of commuter driving (on a total cost basis, however--comparing the buspool's cost with owning a second car--the buspool can be less expensive). A survey of 500 Reston express riders answering a questionnaire in November 1971, indicated that 21 percent had actually reduced the number of automobiles owned as a direct result of the subscription bus service. Another 8.4 percent said they would probably reduce the number in the future, and 43.4 percent said they would probably not increase the number. In addition, 49.4 percent mentioned that they would have owned more automobiles if the bus were not available. Also, 43.6 percent said that they would not have moved to Reston if the bus were not available. The use of the Dulles Access Road, which significantly reduces the commuting times, provides even greater potential for the Reston service.

Third, an interested group of commuters with initial support from the Reston Community Association provided the catalyst for initiating the service.

Fourth, a transit carrier (WV&M) existed and had equipment available for charter.

Finally, Reston residents in the beginning were no more amenable to bus service than other suburban communities, but they were attracted as a high level of service developed.

Motives for Reston residents were to "decrease the number of private vehicles in use, promote traffic safety, reduce traffic, noise, and environmental pollution." To these motives is now added the energy crisis and the resulting necessity for increased travel efficiency which buspools can provide.

Buspools have grown from the citizen's interest (as in Reston), from employer interest (GEICO), from transit operator interest (as in Omaha) and from joint efforts. The organizations, fare collection, strategies, and responsibilities for buspooling are as varied as the number of buspools. Commonality exists, however, in the following factors:

- Relatively high density destination--central business district, large employer, large industrial/office complex, etc.
- Relatively high volume collection points--park-and-ride lots, new town centers/apartment complexes, high density residential areas. The high volume indicates the necessity for a limited number of stops which is required for successful buspool service.
- Transit equipment available for charter.
- Line haul distances great enough to allow competition between transit and auto service (travel times below 15-20 minutes are served far better by the private auto due to scheduling flexibility, thereby making buspools much worse on a level of service comparison).
- A group or organization providing a catalyst for initiation of service (employers can provide an excellent catalyst).
- High level of service (for example, reclining seats available for everyone).

Other factors, while not being absolutely necessary, will provide even greater opportunity for buspools.

- Preferential treatment of buses on the roadway (e.g., exclusive lanes, preferential traffic signals).
- Preferential treatment of buses at destinations (more convenient discharge and pickup points, earlier plant dismissal, etc.).
- Provision of bus shelters.
- Provision of a late bus to pick up those returning late from work.

Perhaps the most valuable lesson to be learned from the existing buspool experiments is that the users, having decided upon the level of service desired and destination points, took the initiative to create and continue direct communication between themselves and the transit operators. This has resulted in transit service which provides exactly what the user desires, paying for itself out of the fare box. The convenience of the buspool, the lack of auto commuter frustration, and the elimination of the necessity for a second car have all provided incentives for buspool usage. The energy shortage and the resulting high cost/unavailability of gasoline should provide an even greater incentive for the development of buspools.

DETERMINING BUSPOOL DEMAND

For the private citizen, citizens group, employer, transit operator or other organization to implement a buspool, several questions must be answered. These questions form the steps in a decision process that procedes from the general to the specific:

1. To pool or not to pool?
2. Where?
3. When?
4. How?

1. To Pool or Not to Pool?

The pooling concept is one means to reduce energy consumption by matching people with similar travel needs and desires. Within the total context of improved transportation efficiencies, this matching procedure can allow higher productivity per vehicle. The decision to pool transportation resources has been made by many people through the United States. The reasons are many and each points to the desirability of the pooling concept.

Economically - The higher the number of passengers per vehicle, the lower the per passenger mile operating cost. From a private business viewpoint, reduced parking facilities at suburban offices and manufacturing facilities could result in significant savings in land use and reduced costs to the employer for providing parking spaces.

Ecologically - The pollution levels per commuter go down as the occupancy goes up; two people per car causes less pollution per passenger than one person per car, 15 people in a van causes even less pollution per passenger with 50 people per bus providing the lowest pollution level per passenger.

Safetywise - The accident rate per passenger mile is lower for buses than for autos, hence the greater use of buses can substantially reduce the total accident rate per passenger mile of travel.

Tensionwise - The slogan "Leave the Driving to Us" is pertinent to the pooling issues; a commuting trip where one can read, sleep, talk or relax is a much more pleasant and tension-free experience than the traditional self-drive commuter trip.

2. Where?

Once a person or group has decided to pool transportation resources by matching people with similar travel needs, the next question is Where? Where will pickup points be (home, park-and-ride lots, shopping centers, community centers, schools, etc.)? Where will be the destination points be (central business district, industrial park, shopping centers, commercial office complex, etc.)? The determination of these locations will be entirely dependent upon the expressed needs and desires of those wishing to use the service and will also depend upon the answers to the next question of When? The answer to this initial question will merely be a list of possible service locations. This list should be refined and revised as the process gets more specific.

3. When?

The time of service will also be dependent upon the expressed desires of those wishing to use the service. Is service desired only for the work trip (A. M. and P. M.)? Is service desired for midday travel (shopping, etc.)? Is nighttime service needed (for recreational or shift work trips)? Based upon the expressed desires of more than one person desiring to make a trip on a regular basis, a "demand matrix" can be established. This matrix is merely a preliminary matched list of those people desiring to make trips to and from similar locations at similar times. This preliminary list is invaluable in answering the next question of How?

4. How?

Once the preliminary matched list of people with similar travel desires has been determined, the next question is: How can this service be provided? This provokes several related questions.

What type of equipment is required? - If it is found that only two to five people have similar travel desires, then the logical choice is a pool

that takes the form of a carpool. By increasing the occupancy of an auto three to five passengers per trip, efficiencies can result as noted previously. If, however, more than five people are matched (have similar travel desires) on a regular basis, a vanpool can be considered.

While the main criteria for choosing equipment type will be the number of matched passengers per pooled trip, other factors must be considered (these considerations will vary based upon the local situation). If the required number of miles per passenger does not increase significantly between the two cars versus one van alternative, and if the operating situation (drivers pay, volunteer drivers versus hired drivers, etc.) does not change significantly, then a van can be the most effective pooling vehicle. If utilizing a van would require the purchase of a special vehicle (assuming that the alternative two cars are already owned) or hiring a driver (assuming the auto drivers are volunteers), then two auto pools may be more efficient than one van. When the number of people per pooled trip exceeds the traditional auto capacity (five people) however, a van should be considered based upon the unique situation at hand.

When the number of people with similar travel desires exceeds the traditional capacity of a van (10-15 depending upon configuration), then more vans or a bus can be considered as an alternative. Similar factors affect the choice between vans and a bus as affect the autos versus van decision. Will the number of miles per passenger go up significantly? Will a different labor situation make a bus more costly than two or three vans? Are buses available locally for pooling? These questions must be answered on a local basis to consider the buspooling alternative. Based upon the answers to the above questions, the next questions can be addressed.

What type of organization is required? - While the requirements for implementing a buspool will be unique for each local situation, several general questions must be answered. The organizational aspects of pooling are discussed elsewhere in this report and are also covered under the carpool and vanpool discussions. For buspools, the following organizational questions are pertinent to deciding what, if any, organiation is required.

- Does the local transit property have buses available for pooling?
- Is the local transit property willing to organize the service?

- If so, will they handle fare collection also?
- If not, will they charter the bus for pooling?
- If the local transit property desires a charter situation, will they handle fare or must the pooling organization do this?
- What will be the charter/pool fare? (If the local operating property runs the service, they would determine the required fare; if a charter situation occurs, the pooling organization must compute the required fare based upon costs).

If the local transit operator handles the service, determines fare and provides the equipment, an organization consisting only of an ad hoc pooling committee will suffice. This committee can provide liaison between the users of the service and the operator. This liaison function should include an expression of the service desired and aids for determining the exact routes and schedules. If the local transit operator wishes to charter the buses, then a more formalized organizational structure must be initiated. In this case, the pooling organization determines routes, schedules, fares, fare collection procedure, and must publicize the service.

The size of the buspooling endeavor dictates the size and degree of formality (e.g., incorporation) of the pooling organization. The Reston experience provides a perfect example of this situation. The amount of fare charged is based upon the actual costs of providing the service (charter plus overhead of actual costs as determined by the operator). Since this service is premium, the costs are higher than traditional transit service (most buspools charge approximately $1.00 per ride); but the convenience of the service, elimination of the need for second car, lack of available gasoline for unlimited auto use and several other factors have made buspools a success even at relatively high fare levels. If the local transit operator does not desire either a charter operation or full responsibility for a buspool, a lease option can be considered. When dealing with any transit operator, a legal analysis must be performed to determine buspool feasibility.

What Will Be The Fare Collection Procedures? - Once the organizational structure and amount of required fare have been determined, the fare collection procedure must then be organized. The type of pooling organization will determine the fare collection to some extent but most buspooling operations, regardless of organization structure, have opted for weekly or monthly commutation tickets. This procedure provides a basis (weekly or monthly) for advanced planning of the service, simplifies fare collection and allows "pay by mail" which commuters find convenient.

Once the above questions have been answered for the unique situation at hand, the exact routes and schedules of the buspool can be determined and riders can be signed up. When the initial service has begun and ridership developed, other amenities can be considered. Bus shelters, straggler bus, service additions and expansion of service hours are all improvements that can be considered within the context of the above analysis techniques.

Interested people, be they a community, group employer, transit operator or public agency can provide the catalyst for initiating a buspool. By answering the above questions for the unique situation and by communicating with the transit operator, this efficient pooling method can become a reality.