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California Steam Bus Project

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project report on community attitude surveys
Phase 1

Scientific Analysis Corp.

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CALIFORNIA STEAM BUS PROJECT

FINAL REPORT OF THE PROJECT MANAGER, SCIENTIFIC ANALYSIS CORPORATION,
TO THE PROJECT DIRECTOR, OFFICE OF RESEARCH, CALIFORNIA STATE ASSEMBLY

PROJECT REPORT ON COMMUNITY ATTITUDE SURVEYS

Phase I

This Report is the product of a project financed in part by the U.S.
Department of Transportation, Urban Mass Transportation Administration.

The contents of this Report reflect the views of Frank J. Stefanich, Jr.,
Survey Controller, Scientific Analysis Corporation, who was responsible
for the facts and accuracy of the data presented herein. The contents
do not necessarily reflect the official views or policy of the Department
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16. Abstract Preliminary to a demonstration of Rankine Cycle external combustion propulsion systems in urban transit vehicles, survey data were collected to measure the extent of public concern about air pollution and the extent to which California residents see the need for alternatives in transportation to alleviate or reduce air pollution. Three surveys were conducted by Survey Research Centers at the University of California at Berkeley and Los Angeles. In addition, a survey of patron attitudes on steam and diesel buses was designed and pilot tested by Scientific Analysis Corporation. Follow-up data will be collected as prototype modified steam buses developed under this project enter revenue passenger service. In the initial surveys, attention was given to public attitudes concerning the most serious contemporary problems, the relative danger of smog and air pollution, the principal causes of air pollution, means of redressing air pollution, frequency of bus use, reasons for present level of bus use, impact of steam propulsion for buses on air pollution, and attractiveness of steam buses. Although each survey was unique, several common questions permitted cross-survey analysis. Generally concern for the problem of air pollution was very high, and automobiles were ranked with "industry" as the principal cause. Other findings are summarized in detail, and data tabulations are appended. Sampling methods for each survey are also discussed.					
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Three surveys conducted by the Survey Research Centers at the University of California, Berkeley and Los Angeles, were designed to measure the extent of public concern about air pollution and to what extent residents of California see the need for alternatives in transportation to alleviate or reduce air pollution. In addition, Scientific Analysis Corporation has designed and pilot tested a survey of patron attitudes of steam and diesel buses. These surveys will be conducted when the Brobeck, Lear and SPS steam buses enter revenue passenger service. From this data, it is possible to infer with some reasonable reliability about the public's potential adaptability to alternative means of transportation, especially innovations and new developments in metropolitan bus transportation.

The Los Angeles Metropolitan Surveys #2 and #3 (LAMAS II and LAMAS III) were conducted by the Survey Research Center at U.C.L.A. in October and November, 1970 and in March and April 1971, respectively. The Bay Area Survey #1 (BAS I) was conducted in May and June 1971. As can be noted in Table I, each survey is unique, although some of the questionnaire items do appear in both LAMAS III and BAS I. It is possible, therefore, to make some analyses across surveys. Generally, there was a fairly high degree of consistency for the items mutual to more than one survey. Concern for air pollution, for example, remains rather constant.

When presented with a listing of ten most pressing domestic problems facing Americans today, 52.6% of the respondents of LAMAS II indicated that

they thought air pollution was one of the three most serious problems. Only "unemployment" (64.0%) and "crime and violence" (55.5%) were selected more frequently. No other problem was selected by more than two-fifths of the population. "Property tax" received 39.6%, "race relations" 18.5%, and "poverty" 18.3%.

This finding, "air pollution a serious problem", holds true when controlling for age, income, education and ethnic background. A noticeable pattern exists for this item and others relating to pollution, as well as those items testing willingness to try alternative measures. There appears to be a slightly higher concern on the part of those in the community who are younger, who are higher educated and who have higher incomes. Other studies have indicated that these demographic characteristics are salient for the socially and politically conscious. We also know that the concern about air pollution is higher in areas of the state which suffer the most from this problem. Hence, the rate of concern is higher in Los Angeles than in Northern California. Otherwise, these findings hold fairly constant across all population subgroups, with one interesting exception. Blacks list unemployment, crime and violence, property tax, race relations, and quality of schools before air pollution as serious problems.

Intensifying the situation slightly, 84.9% of the sample stated that they felt air pollution had reached a point where they considered it to be dangerous to human health. This opinion verges on consensus, as all subgroups in the study responded above 83% that air pollution is a serious health problem.

The main cause for air pollution is, of course, attributed to automobile emissions (67.2%). "Industry and factories" were cited as the second main cause with 56.9%. In the LAMAS studies, "Oil refineries" were coded separately, placing third with 15.5%. It is significant, therefore, that for most California residents, both automobiles and industry are perceived almost equally as the main causes of air pollution in this state. Again, there was little variance between subgroups.

Given that the problem exists and that the public recognizes its existence, the next question to ask is "what can be done about it?" In the LAMAS II survey, 17.4% of those surveyed confessed that they didn't know what could be done to reduce air pollution. Conversely, 34.7% suggested controlling chemical and industrial wastes, while 34.5% suggested controlling automobile exhaust emissions. The elimination of the gasoline engine was supported by 17.9% of those surveyed. Other solutions suggested were "enforce laws and pass new legislation" (17.3%), "the use of filters and smoke control devices (16.6%), and "use public transportation and rapid transit" (16.2%). Again, the primary response is almost equally split between industry and the automobile. When looking at the population subgroups, there is a slight trend to emphasize the responsibility of private industry over that of the individual. Indeed, most of the eleven possible suggestions involve industry and government action rather than action on the part of the individual. Individual activities (car pools, educate public and control backyard burning) were perceived as relatively insignificant in the fight for clean air, with response rates bordering between five and six percent for these items. Placing the responsibility on private industry was most pronounced among the subgroup

which we previous defined as socially and politically conscious.

Our interest at this point is to determine to what extent one's concern over the pollution problem is reflected in one's attitude as a patron of metropolitan bus lines, and, even more important, to what extent that individual's support can be marshalled in favor of new developments in low polluting metropolitan bus transportation.

With the exception of the survey Scientific Analysis Corporation will conduct on the steam bus, none of the other surveys contain both items on pollution and on bus patron attitudes. Results from the pilot survey taken aboard AC Transit's steam bus in February 1972 suggested that passengers were keenly aware of pollution and its causes and felt that a steam powered bus would help reduce air pollution.

Over three quarters of the respondents for LAMAS III and BAS I "rarely or never" ride the bus, primarily because they drive their own cars. BAS I indicates that of five Bay Area counties, 82% to 96% of the residents studied in the four "commuter" counties (Alameda, Contra Costa, San Mateo, and Marin) reported they "rarely or never" ride the bus. San Francisco residents responded 39.9% to "rarely or never" riding the bus. As might be expected, frequency of riding the bus drops with increased education and income. Age as a control variable forms two clusters of bus riders; the 18 to 29 year olds and the 50 to 60 year olds and over, with the middle years being least represented. These findings are slightly obfuscated by the fact that BAS I is a study of a metropolitan center as well as several suburban areas. When controlling for geographic area of residence, one of the most salient variables is residence

in the city. If one lives and works in San Francisco, whether one rides the bus or not is less determined by one's social economic status and more by a matter of convenience. Whereas in Alameda County, social economic status is highly correlated with the use of the bus as a daily or frequent mode of transportation.

The reasons given for "not using the bus more often" were, in order of frequency as follows: use own automobile, no need for the bus, the bus is not routed for travel close to home, and the bus is too slow. LAMAS III reported 61.8% use their own automobile in comparison with BAS I which reported 71.8%. With the exception of "no need for " (36.8%) for BAS I, all other responses were below 27%. Generally it appears that the failure to ride the bus often is due to the fact that there is little need and not due to specific complaints. Complaints against bus riding (bus too noisy, unpleasant odor, too crowded) accounted for generally less than 5% of the responses per item.

Three quarters of the populations studied by both BAS I and LAMAS III stated that they had not heard about the development of a steam bus for use in their city. The reported ignorance for BAS I (74.0%) and LAMAS III (81.5%) did not vary significantly among the various population subgroups. The publicity for the Brobeck and Lear Steam buses has increased considerably since these surveys were taken, and public knowledge is expected to be greater when the SAC steam bus survey is conducted in the spring and summer of this year.

Perceptions of the degree to which a wider use of steam buses would help reduce air pollution were somewhat diffuse for both studies. About

20% in both LAMAS and BAS felt that the reduction in air pollution would be "not much", and slightly over 75% of those surveyed were equally split between the categories "a great deal" and "some" reduction in air pollution. This spread continues to exist across population subgroups and when controlling for demographic differences. Optimistically, one can say that over 75% of those studied in the Los Angeles and San Francisco areas felt that the use of steam buses would lessen air pollution. Los Angeles was slightly more optimistic with 79.7%. However, there is one item missing from both of these surveys which would give greater meaning to this analysis. Initially, one should ask "what is the contribution of diesel buses to air pollution?" This item will be asked in the Scientific Analysis Corporation survey, but it was presented in a slightly different form in LAMAS II. As a "main cause for smog or air pollution", bus exhaust and truck exhaust were coded in the same category. Of those interviewed, 8.7% found trucks and buses to be a main cause. Considering that this percentage is rather low though in agreement with what experts tell us about the principal contributors to air pollution, we might infer that perceptions of a great reduction in air pollution through the elimination of the diesel bus, which in the first place is not a main contributor to the cause, is a little incongruous. In an interview situation, it seems that no matter how loquacious or taciturn, subjects would prefer to be optimistic. We are hoping for something more reliable on this item in the forthcoming Scientific Analysis Corporation survey.

Across the board for both studies and all population subgroups, over 80% stated that they would ride a bus powered by steam. This eagerness to "try it out" was slightly higher for residents of San Francisco than for

suburbanites, which might either attest to San Francisco's innovativeness or its willingness to make more tolerable the aspect of metropolitan public transportation to which residents get much more exposure.

The item, "why would you not ride a bus powered by steam?" is of particular interest, because we wanted to test any element of fear. How many people would actually be afraid to ride a steam engine in these still pioneering days? It seems that not many of the respondents even considered this matter. Only 6.1% of BAS's and 1.3% of LAMAS III's total sample said they would be afraid to ride a steam bus. LAMAS III findings suggest that the main factor for maintaining this attitude is the extent of formal education. Of the few who admit to having this fear, five out of six had less than a high school education. All other reasons given for not riding a bus powered by steam had nothing to do with the fact that a steam engine is involved, but rather they stem primarily from objections to buses in general.

The BAS I questionnaire continues with four exclusive items not entirely suited for our purpose but which tell us that the majority of the subjects interviewed live within a few blocks of the nearest bus stop; their wait at the bus stop is minimal; and that, as a rule, people do not use the bus to shuttle between short distances when they are shopping, working or visiting.

Complete details of the breakdowns of the survey responses for the three surveys is provided in Appendices I through III.

TABLE I

Questionnaire Items

<u>Questionnaire Items</u>	<u>Surveys</u>			SAC Steam Bus Survey 1972
	IAMAS II Oct.-Nov. 1970	IAMAS III Mar.-Apr. 1971	BAS I May-June 1971	
What do you consider the three most serious problems these days?	X			X
Do you think air pollution or smog has reached a point where it is a danger for normal, healthy people?	X			X
What do you, personally, think are the main causes of smog or air pollution?	X			X
What can be done to reduce air pollution or smog?	X			X
How often do you ride the bus?		X	X	X
Why don't you use the bus more often?		X	X	X
Have you heard about using a bus powered by a steam engine in this city?		X	X	X
Do you think a wider use of steam buses would help reduce air pollution in this city a great deal, some, or not much?		X	X	X
Would you ride a bus powered by steam?		X	X	X
Why would you not ride a bus powered by steam?		X	X	X
How far is it to the nearest bus stop?			X	
Is there another bus stop nearby that you use more often?			X	
How long do you usually wait?			X	
Do you ever ride the bus between stores while shopping, at work, or visiting?			X	

LAMAS Sampling Design

The basic sampling design for the Los Angeles Metropolitan Area Survey (LAMAS) conducted by the Survey Research Center at UCLA is standard. Essentially, LAMAS II and LAMAS III were sampled in the same manner.

The required number of completed interviews for each survey was set at 1,000. These 1,000 interviews were clustered into 30 census tracts. The basic design was in five stages: (1) frame cells sampled, (2) census tracts within cells, (3) blocks within tracts, (4) household units -- street addresses -- within blocks, and (5) respondents randomly sampled from within a household.

The method used in this design is Prof. Raymond J. Jessen's "probability sampling with marginal constraints". The method effectively reduces the probability that an unrepresentative sample will be chosen by random means. Three "marginal constraints" or control variables were imposed on the design: (1) median income, (2) percent Black, and (3) geographic area. Each of the three control factors was then divided into ten approximately equal categories by computing deciles for each variable. In this way, ten categories for "percent Negro" were set up ranging from the first category of 0% to the tenth category of 100%. Likewise, ten categories for income were defined ranging from low to high, and ten geographic areas: Santa Monica, Inglewood, El Monte, Monrovia, etc. Once the ten categories were defined, a three dimensional 10 x 10 x 10 matrix was constructed and the 1,297 census tracts in Los Angeles County were sorted into their respective cells in the matrix. We call these cells "Frame Cells".

Out of the 1,000 frame cells defined, 447 were empty due to the fact that no census tract met the definition of the cell. The size of each frame cell was determined by the number of households within each tract, and the probability that a cell would be picked up in a sample was proportionate to the size of the cell. From the 553 remaining frame cells, 30 were chosen; three for each category of each "marginal constraint". Once the thirty cells were selected, the first stage of the sampling design was completed.

The second stage of the design involved choosing one census tract from each of the 30 cells. Again, the larger census tracts had a higher probability of being selected. In the third stage of the sampling, census blocks or city blocks were systematically selected with probabilities proportional to the number of household units per block. Household units (fourth stage) were selected systematically, with a fixed number to each block.

Due to the fact that there is a considerable difference in response rates between the three major ethnic groups -- Whites appear to have the highest rate, Blacks a lower rate, and Chicanos a very much lower rate -- a greater number of household units was sampled in those tracts which could be identified as predominantly Chicano or Black. This insured that the sample was representative of the County in terms of ethnic composition.

In the fifth stage, after initial contact with the household had been made, the interviewer, using a random selection table, determined who the respondent was to be from among the adult members of the household.

This sampling design insured that every household within Los Angeles County had an equal probability of being sampled, and that every adult member of each household had an equal probability of being selected as a respondent.

Regarding field procedures, interviewers were matched with tracts by ethnicity, so that in most cases blacks interviewed blacks, whites interviewed whites, and Spanish-surname respondents were interviewed by Mexican/Latin-Americans. Interviewers were required to make at least two call-backs at a household if the respondent was not at home on the first call. Non-response rates were greater for large apartment buildings and for Blacks. Chicanos and Anglos had nearly identical response rates. In LAMAS II, Chicanos responded better than expected, and the data had to be subsequently adjusted. Refusal rates did not differ between ethnic groups or types of dwelling units. It has been found in survey research that response rates in cities are lower than in suburbs, and the latter are lower than in small towns. This urban - rural difference was noticeably present in the LAMAS data.

BAS Sampling Design

The Bay Area Survey (BAS), conducted by the Survey Research Center at U.C. Berkeley, utilized a multistage, stratified probability sample similar to the LAMAS design. Methodologically, this affords each household in The Bay Area an equal probability of being included in the sample. The sample was drawn to represent the five county "San Francisco - Oakland Standard Metropolitan Statistical Area" as defined by the 1970 U.S. Census. The five county sample includes all portions of Alameda, Contra Costa, San Francisco, San Mateo and Marin Counties.

In the first step of the sampling process, the Bay Area was divided into 100 geographic strata defined by clusters of the 1970 census tracts. Subsequently, one census tract was chosen, by probability methods, from each strata. From each sampled tract, two city blocks (or block equivalents) were chosen and a full list of their housing units obtained. Using systematic random sampling, an average of 6.5 housing units were selected from each of the block listings. Respondent selection was then made by the interviewer, predesignated by random procedures from among the adult members residing in the household unit.

Of the initial 1,357 housing units drawn in the sample, 71 were found to be vacant. Interviews were completed with 1,018 of the remainder for a response rate of 79.2 percent.

To insure a sufficient number of interviews in each of several transportation corridors, of interest to two principal clients, the sampling frac-

tion varied somewhat for parts of the Bay Area. Final results were weighted to compensate for these disproportionate sampling procedures and also to provide a rough estimate of population numbers in 1,000's.

Interviews were conducted only with persons living in housing units. The survey did not include inmates of institutions and other persons living in group quarters, such as dormitories, military barracks, monasteries, etc. This is a standard practice for most studies in survey research.

APPENDIX I

Community Survey Responses

For LAMAS II

(October - November 1970)

LAMAS II

Question: In your opinion, what can be done to reduce air pollution or smog?

	TOTAL SAMPLE %	MALE %	FEMALE %
Careful study	8.1	7.1	8.7
Car pools	6.1	5.8	6.4
Control chemicals	34.7	38.7	32.4
Control burning	5.6	6.3	5.2
Eliminate gas engine	17.9	21.7	15.6
Educate public	5.8	6.9	5.2
Enforce, pass laws	17.3	24.2	13.3
Filters, smoke control	16.6	16.5	16.8
Control car exhaust	34.5	35.7	33.9
Move industry	7.4	8.5	6.7
Rapid transit	16.2	18.1	15.1
Other	20.0	22.0	18.5
Don't know	17.4	10.7	21.6

LAMAS II

Question: In your opinion, what can be done to reduce air pollution or smog?

	Less than High School %	Some High School %	High School Graduate %	Some College %	College Graduate %	Post Graduate %
Careful study	2.2	9.2	10.2	9.7	13.8	6.7
Car pools	2.6	9.9	7.4	5.9	7.7	2.2
Control chemicals	22.9	36.8	34.5	41.9	47.7	42.2
Control burning	6.6	7.2	4.6	4.3	7.7	4.4
Eliminate gas engine	14.1	16.4	18.7	18.8	21.5	28.9
Enforce, pass laws	11.0	13.2	18.7	23.7	30.8	11.1
Educate public	4.8	6.6	6.7	6.5	1.5	6.7
Filters, smoke control	12.8	18.4	18.0	20.4	15.4	8.9
Control car exhaust	20.7	32.9	36.6	44.1	43.1	46.7
Move industry	8.4	5.9	6.3	10.2	7.7	2.2
Rapid transit	9.7	15.1	15.8	17.7	29.2	31.1
Other	11.9	16.4	22.5	23.7	26.2	28.9
Don't know	37.0	13.8	15.1	7.5	4.6	4.4

LAMAS II

Question: What do you, personally, think are the main causes of smog or air pollution?

	TOTAL SAMPLE %	MALE %	FEMALE %
Aircraft	15.2	16.7	16.9
Auto Exhaust	67.2	74.3	75.0
Burning Trash	1.8	1.5	2.3
Bus or Truck Exhaust	8.7	9.3	10.0
Diesel Trucks	3.4	4.5	3.4
Industry and Factories	56.9	63.6	63.1
Oil Refineries	15.5	22.1	14.1
Other	29.2	24.5	17.5
Don't know	5.5	3.9	7.5

LAMAS II

Question: What do you, personally, think are the main causes of smog or air pollution?

	<u>EDUCATION</u>					
	Less than High School	Some High School	High School Graduate	Some College	College Graduate	Post Graduate
Aircraft	10.1	15.7	21.3	19.0	16.1	20.5
Auto Exhaust	73.6	68.6	75.2	79.8	78.6	75.0
Burning Trash	1.0	2.1	2.0	3.1	1.8	2.3
Bus or Truck Exhaust	8.2	11.4	11.8	8.6	10.7	2.3
Diesel Trucks	1.9	5.0	5.1	1.2	10.7	2.3
Industry and Factories	59.1	63.6	63.8	65.0	69.6	65.9
Oil Refineries	12.5	19.3	17.7	20.9	23.2	9.1
Other	14.4	14.3	21.7	25.8	23.2	34.1
Don't know	10.6	7.9	5.1	3.1	1.8	0.

LAMAS II

Question: Do you think air pollution or smog has reached a point where it is a danger for normal, healthy people?

	TOTAL SAMPLE	MALE	FEMALE
Yes	84.9	87.6	87.9
No	7.5	7.9	7.6
Maybe	4.4	4.5	4.5
Don't know	2.9		
TOTAL	963	355	577

LAMAS II

Question: Do you think air pollution or smog has reached a point where it is a danger for normal, healthy people?

	<u>AGE</u>				
	18 - 29 %	30 - 39 %	40 - 49 %	50 - 59 %	60 & Over %
Yes	86.1	89.6	90.3*	86.4	86.5
No	9.4	6.8	5.9	7.9	8.6
Maybe	4.5	3.6	3.8	5.7	4.9
TOTAL	223	192	186	140	185

LAMAS II

Question: Do you think air pollution or smog has reached a point where it is a danger for normal, healthy people?

	<u>EDUCATION</u>					
	Less than High School %	Some High School %	High School Graduate %	Some College %	College Graduate %	Post Graduate %
Yes	87.1	88.6	90.0	85.4	84.6	88.6
No	4.1	6.7	7.7	11.4	10.8	9.1
Maybe	8.8	4.7	2.2	3.2	4.6	2.3
TOTAL	217	149	271	185	65	44

LAMAS II

Question: Here is a card listing some problems that people talk about. I would like you to look through these and select the three you think are most serious these days.

	TOTAL SAMPLE %	MALE %	FEMALE %
Unemployment	64.0	62.1	65.4
Traffic	12.6	14.3	11.6
Air Pollution	52.6	53.6	52.3
Crime & Violence	55.5	50.5	58.7
Poverty	18.3	19.0	18.0
Adequate Housing	11.3	4.6	6.8
Quality of Schools	16.5	18.1	15.6
Public Transport.	11.8	12.4	11.6
Property Tax	39.6	41.5	38.6
Race Relations	18.5	19.2	18.1

LAMAS II

Question: Here is a card listing some problems that people talk about. I would like you to look through these and select the three you think are most serious these days.

	<u>AGE</u>				
	18 - 29	30 - 39	40 - 49	50 - 59	60 & Over
Unemployment	67.1	65.2	65.4	62.8	59.4
Traffic	13.2	12.6	13.6	7.6	15.1
Air Pollution	62.7	52.5	47.6	49.7	49.0
Crime & Violence	40.4	53.5	60.7	60.7	67.2
Poverty	19.3	17.2	16.8	17.2	20.3
Adequate Housing	14.5	10.6	13.1	9.0	8.9
Quality of Schools	18.9	23.7	17.8	13.8	6.8
Public Transport.	9.6	7.6	11.0	15.9	17.2
Property Tax	30.3	39.9	42.4	49.7	41.1
Race Relations	28.5	17.7	13.1	14.5	15.1

LAMAS II

Question: Here is a card listing some problems that people talk about. I would like you to look through these and select the three you think are most serious these days.

	<u>EDUCATION</u>					
	Less than High School	Some High School	High School Graduate	Some College	College Graduate	Post Graduate
Unemployment	70.4	66.0	66.2	60.5	53.0	46.7
Traffic	18.1	16.3	11.3	7.0	7.6	11.1
Air Pollution	47.8	49.7	53.5	55.7	65.2	53.3
Crime & Violence	67.3	60.8	53.2	45.9	48.5	46.7
Poverty	21.7	17.0	15.8	17.8	19.7	22.2
Adequate Housing	13.3	12.4	11.6	9.7	9.1	6.7
Quality of Schools	9.3	13.1	17.3	20.5	24.2	33.3
Public Transport.	11.5	10.5	10.2	18.4	6.1	11.1
Property Tax	30.5	42.5	45.4	41.1	34.8	42.2
Race Relations	14.6	14.4	16.5	23.8	30.3	26.7

LAMAS II

Question: Here is a card listing some problems that people talk about. I would like you to look through these and select the three you think are most serious these days.

	<u>ETHNIC BACKGROUND</u>				
	Black	Mexican American	White	Oriental	Other
Unemployment	82.3	73.5	57.8	28.6	100.
Traffic	7.3	20.5	9.9	21.4	0.
Air Pollution	21.9	48.6	59.7	64.3	100.
Crime & Violence	62.5	62.7	51.5	64.3	0.
Poverty	14.6	24.9	16.0	28.6	0.
Adequate Housing	19.8	15.7	8.1	7.1	0.
Quality of Schools	24.0	10.4	17.5	21.4	50.0
Public Transport.	11.5	8.4	13.6	14.3	0.
Property Tax	31.3	27.7	46.1	42.9	0.
Race Relations	27.1	11.6	20.4	7.1	50.0

APPENDIX II

Community Survey Responses

For LAMAS III
(March - April 1971)

LAMAS III

Question: Why don't you use the bus more often?

	TOTAL SAMPLE %	MALE %	FEMALE %
Use own auto	61.1	64.4	59.2
Use friend/relative's auto	7.6	3.2	10.1
Bus not close to home	11.2	11.6	11.0
Bus not routed for travel needs	25.1	30.4	22.0
Bus too expensive	4.2	4.8	3.9
Bus too slow	8.0	9.6	7.1
Wait for bus is too long	15.3	20.8	12.2
Bus too noisy	0.9	2.0	0.2
Bus has unpleasant odor	2.2	2.8	1.8
Bus too crowded	2.0	2.4	1.8
General dislike for bus	4.5	5.2	4.1
No need for bus	17.7	15.6	18.9

LAMAS III

Question: Why don't you use the bus more often?

	<u>AGE</u>				
	18 - 29 %	30 - 39 %	40 - 49 %	50 - 59 %	60 & Over %
Use own auto	65.4	65.4	63.6	63.5	47.7
Use friend/relative's auto	7.3	7.5	0.	3.1	17.7
Bus not close to home	5.8	13.5	19.5	13.5	8.5
Bus not routed for travel needs	17.8	25.6	38.1	36.5	13.1
Bus too expensive	4.2	3.0	4.2	5.2	5.4
Bus too slow	34.0	6.8	10.2	7.3	5.4
Wait for bus is too long	14.7	14.3	22.0	14.6	11.5
Bus too noisy	16.7	3.0	0.	1.0	0.
Bus has unpleasant odor	4.2	0.8	3.4	1.0	0.8
Bus too crowded	3.1	3.8	0.8	0.	1.5
General dislike for bus	5.8	5.3	6.8	2.1	2.3
No need for bus	15.2	12.8	17.8	16.7	27.9

LAMAS III

Question: Why don't you use the bus more often?

INCOME

	Under \$4000 %	\$4000- 6999 %	\$7000- 8999 %	\$9,000- 11,999 %	\$12,000- 19,999 %	\$20,000 & over %
Use own auto	55.5	64.6	71.7	69.1	86.7	31.3
Use friend/relative's auto	10.3	6.1	3.3	1.8	2.2	0.0
Bus not close to home	10.8	14.1	5.0	12.7	17.8	6.3
Bus not routed for travel needs	21.1	23.2	30.0	41.8	31.1	56.3
Bus too expensive	58.6	4.0	5.0	5.5	2.2	6.3
Bus too slow	6.4	9.1	11.7	14.5	8.9	6.3
Wait for bus is too long	13.1	14.1	30.0	21.8	13.3	18.8
Bus too noisy	0.5	3.0	0.0	1.8	0.0	0.0
Bus has unpleasant odor	2.3	0.0	6.7	3.6	0.0	0.0
Bus too crowded	1.3	5.1	6.7	0.0	0.0	0.0
General dislike for bus	4.1	2.0	10.0	7.3	4.4	6.3
No need for bus	20.1	17.2	13.3	12.7	13.3	12.5

LAMAS III

Question: Why don't you use the bus more often?

EDUCATION

	Less than High School	Some High School	High School Graduate	Some College	College Graduate	Post Graduate
Use own auto	34.9	57.5	66.3	70.9	76.1	61.9
Use friend/relative's auto	14.2	12.6	7.0	3.2	2.2	2.4
Bus not close to home	3.8	10.2	15.1	11.4	13.0	7.1
Bus not routed for travel needs	7.5	13.4	29.1	32.9	41.3	40.5
Bus too expensive	5.7	1.6	3.5	4.4	6.5	9.5
Bus too slow	3.8	9.4	8.5	8.2	13.0	7.1
Wait for bus is too long	8.5	12.6	19.6	15.2	13.0	26.2
Bus too noisy	0.9	1.6	0.0	1.3	2.2	0.0
Bus has unpleasant odor	0.9	1.6	2.5	3.2	2.2	2.4
Bus too crowded	0.0	4.7	3.0	0.0	4.3	0.0
General dislike for bus	3.8	3.9	5.5	4.4	6.5	2.4
No need for bus	28.3	24.6	13.1	15.2	13.0	7.1

LAMAS III

Question: Why don't you use the bus more often?

	<u>ETHNIC BACKGROUND</u>				
	Black	Mexican-American	White	Oriental	Other
Use own auto	44.0	46.0	67.7	75.0	54.5
Use friend/relative's auto	11.9	16.8	4.4	0.0	18.2
Bus not close to home	8.3	4.4	13.5	25.0	0.0
Bus not routed for travel needs	4.8	5.3	33.8	25.0	9.1
Bus too expensive	4.8	2.7	4.7	0.0	0.0
Bus too slow	11.9	5.3	8.0	25.0	0.0
Wait for bus is too long	10.7	8.8	18.0	0.0	9.1
Bus too noisy	2.4	0.9	0.6	0.0	0.0
Bus has unpleasant odor	0.0	0.9	3.0	0.0	0.0
Bus too crowded	3.6	1.8	1.9	0.0	0.0
General dislike for bus	0.0	4.4	5.5	0.0	0.0
No need for bus	21.4	23.0	15.9	0.0	18.2

LAMAS III

Question: Why would you not ride a bus powered by steam?

	TOTAL SAMPLE %	MALE %	FEMALE %
Afraid to	1.3	0.8	1.6
Use automobile	8.0	7.6	8.3
Bus not close to home	1.3	1.6	1.1
Bus not routed for travel needs	2.2	1.2	2.8
Bus too expensive	0.1	0.4	0.0
Bus too slow	2.2	4.0	1.1
Wait too long	1.3	2.0	0.9
Bus too noisy	0.3	0.8	0.0
Bus has unpleasant odor	0.1	0.0	0.2
Bus too crowded	0.7	1.2	0.5
General dislike for bus	3.4	3.6	3.2
No need for bus	5.8	4.4	6.7
Other	6.4	4.4	7.6

LAMAS III

Question: Why would you not ride a bus powered by steam?

	18 - 29 %	30 - 39 %	40 - 49 %	50 - 59 %	60 & Over %
Afraid to	2.1	0.7	0.0	1.0	1.5
Use automobile	7.3	11.9	10.2	6.3	5.4
Bus not close to home	0.5	2.2	1.7	2.1	0.0
Bus not routed for travel needs	2.1	3.0	2.5	2.1	0.8
Bus too expensive	0.5	0.0	0.0	0.0	0.0
Bus too slow	3.1	3.0	2.5	1.0	0.8
Wait too long	0.0	2.2	3.4	1.0	0.8
Bus too noisy	0.0	1.5	0.0	0.0	0.0
Bus has unpleasant odor	0.5	0.0	0.0	0.0	0.0
Bus too crowded	0.5	2.2	0.8	0.0	0.0
General dislike for bus	5.8	3.7	3.4	1.0	1.5
No need for bus	5.2	4.5	5.9	4.2	9.2
Other	4.7	8.2	4.2	7.3	8.5

LAMAS III

Question: Why would you not ride a bus powered by steam?

	EDUCATION					
	Less than High School %	Some High School %	High School Graduate %	Some College %	College Graduate %	Post Graduate %
Afraid to	2.8	2.4	1.0	0.6	0.0	0.0
Use automobile	6.6	8.7	8.5	8.9	8.7	4.8
Bus not close to home	0.0	0.8	2.0	1.3	2.2	2.4
Bus not routed for travel needs	0.0	3.1	2.0	2.5	6.5	0.0
Bus too expensive	0.0	0.0	0.0	0.6	0.0	0.0
Bus too slow	0.0	2.4	1.5	3.8	4.3	2.4
Wait too long	0.0	2.4	1.5	0.6	2.2	2.4
Bus too noisy	0.0	1.6	0.0	0.0	0.0	0.0
Bus has unplea- sant odor	0.0	0.8	0.0	0.0	0.0	0.0
Bus too crowded	0.9	1.6	1.0	0.0	0.0	0.0
General dislike for bus	0.9	3.9	3.0	5.1	2.2	4.8
No need for bus	7.5	7.1	5.5	5.7	2.2	2.4
Other	6.6	10.2	6.5	3.8	4.3	4.8

LAMAS III

Question: Have you heard about using a bus powered by a Steam Engine in this city?

	TOTAL SAMPLE	MALE	FEMALE
Yes	18.5	26.0	14.2
No	81.5	74.0	85.8
TOTAL	(686)	(250)	(436)

Question: Do you think a wider use of steam buses would help reduce air pollution in this city a great deal, some, or not much?

	TOTAL SAMPLE	MALE	FEMALE
Great Deal	42.0	40.0	44.1
Some	37.7	31.4	44.1
Not Much	20.3	28.6	11.8
TOTAL	(138)	(70)	(68)

Question: Would you ride a bus powered by steam?

	TOTAL SAMPLE	MALE	FEMALE
Yes	85.1	84.5	85.5
No	14.9	15.5	14.5
TOTAL	(623)	(238)	(385)

APPENDIX III

Community Survey Responses

For BAS I

(May - June 1971)

BAS I

Question: Have you heard about using a bus powered by a steam engine in this city?

	TOTAL SAMPLE	MALE	FEMALE
Yes	26.0	34.7	18.1
No	74.0	65.3	81.9
Total	(1757)	(830)	(927)

Question: Do you think a wider use of steam buses would help reduce air pollution in this city a great deal, some, or not much?

	TOTAL SAMPLE	MALE	FEMALE
Great deal	39.2	39.0	39.6
Some	34.8	32.5	38.8
Not much	15.9	19.1	10.5
Don't know	10.1	9.4	11.1
Total	(456)	(288)	(168)

BAS I

Question: Do you think a wider use of steam buses would help reduce air pollution in this city a great deal, some, or not much?

	<u>Geographic Area</u>				
	Alameda	Contra Costa	San Francisco	San Mateo	Marin
Great deal	31.2	28.0	45.1	51.7	52.7
Some	45.1	42.8	17.4	33.6	29.8
Not much	16.6	17.8	20.2	8.0	13.2
Don't know	7.1	11.5	17.3	6.7	4.2
TOTAL	158	72	112	81	31

BAS I

Question: Would you ride a bus powered by steam?

	TOTAL SAMPLE	MALE	FEMALE
Yes	81.4	84.5	78.6
No	12.6	11.4	13.7
Don't know	6.0	4.1	7.7
TOTAL	(1757)	(830)	(927)

Question: Would you ride a bus powered by steam?

Geographic Area

	Alameda	Contra Costa	San Francisco	San Mateo	Marin
Yes	78.5	79.0	89.4	78.0	83.1
No	15.1	14.6	5.4	15.3	13.1
Don't know	6.4	6.4	5.2	6.7	3.9
TOTAL	594	310	421	315	118

BAS II

Question: Why would you not ride a bus powered by steam?

	TOTAL SAMPLE	MALE	FEMALE
Afraid to	6.1	3.3	7.9
Use automobile	42.5	51.5	36.7
Bus not close to home	3.4	5.0	2.4
Bus not routed for travel needs	6.8	7.9	6.0
Bus too expensive	.7	0	1.2
Bus too slow	4.6	7.8	2.5
Wait for bus is too long	5.3	10.6	1.8
Bus too noisy	.5	0	.6
Bus has unpleasant odor	1.0	0	1.4
Bus too crowded	2.0	2.6	1.6
General dislike for bus	16.9	20.4	14.6
No need for bus	38.1	37.4	38.6
Other	14.7	6.8	4.4
TOTAL	(327)	(128)	(198)

Question: Why don't you use the bus more often?

	TOTAL SAMPLE	MALE	FEMALE
Use own auto	71.8	76.3	67.7
Use friend/Relative's auto	4.2	2.4	5.8
Bus not close to home	19.1	17.6	20.6
Bus not routed for travel needs	26.7	30.0	23.6
Bus too expensive	5.1	4.9	5.3
Bus too slow	14.9	19.1	11.1
Wait for bus is too long	23.0	26.6	19.7
Bus too noisy	1.5	2.0	1.0
Bus has unpleasant odor	3.6	4.4	2.9
Bus too crowded	5.2	5.4	5.1
General dislike for bus	12.3	14.3	10.5
No need for bus	36.8	35.3	38.2
Other reason	8.4	8.6	8.3
Ill, handicapped, aged	3.6	1.4	5.6
Difficult with children, packages	5.3	2.0	8.3

	TOTAL SAMPLE %	MALE %	FEMALE %
Bus dirty, in need of repairs	1.3	1.3	1.3
TOTAL	(1544)	(738)	(806)

BAS I

Question: Why don't you use the bus more often?

	<u>GEOGRAPHIC AREA</u>				
	Alameda	Contra Costa	San Francisco	San Mateo	Marin
Use own auto	69.3	76.7	64.7	76.0	77.0
Use friend/relative's auto	4.6	3.5	5.3	3.3	3.6
Bus not close to home	22.9	23.6	5.6	22.2	13.1
Bus not routed for travel needs	25.3	33.8	16.4	27.2	37.1
Bus too expensive	5.0	2.2	3.5	9.2	6.4
Bus too slow	18.4	11.3	14.3	13.4	12.7
Wait for bus is too long	24.1	23.0	25.3	18.2	25.3
Bus too noisy	1.8	1.0	2.5	0.9	0.0
Bus has unpleasant odor	2.5	4.1	3.9	3.7	7.2
Bus too crowded	6.1	3.7	10.3	1.7	3.0
General dislike for bus	14.4	15.0	8.8	10.2	8.9
No need for bus	32.4	39.9	40.9	39.7	34.0
Other reason	7.1	6.4	17.8	4.5	8.6

	Alameda %	Contra Costa %	San Francisco %	San Mateo %	Marin %
Ill, handicapped	2.4	4.6	4.9	4.2	1.8
Difficult with chil- dren, packages	6.2	2.9	6.9	2.3	11.0
Bus dirty, in need of repairs	0.4	2.7	0.8	0.0	7.3
TOTAL	561	292	267	307	117

BAS I

(May - June 1971)

Question: How far is it to the nearest bus stop?

Geographical Location

	Total Sample	Alameda	Contra Costa	San Francisco	San Mateo	Marin
Less than a block	21.2	19.6	6.5	44.4	13.4	4.7
One block	16.2	20.4	11.2	23.9	6.4	7.3
Two blocks	13.1	13.1	8.8	18.8	11.8	7.0
Three blocks	9.3	9.5	10.6	5.7	11.4	12.2
Four to eleven blocks	15.6	13.4	15.7	6.2	20.6	47.3
One mile	8.0	5.9	15.9	0	13.4	12.3
Over one mile	8.9	6.8	21.9	0	14.1	3.0
Don't know	7.7	11.3	9.6	1.1	8.6	6.2
TOTAL	1757	594	310	421	315	118

BAS I

(May - June 1971)

Question: Is there any other bus stop that you use more often?

Geographical Location

	Total Sample %	Alameda %	Contra Costa %	San Francisco %	San Mateo %	Marin %
Yes	9.2	8.5	1.7	21.6	3.5	4.0
No	39.5	34.9	33.8	64.5	27.9	19.4
Never ride local bus	51.3	56.7	64.5	13.9	68.6	76.6
Don't know	0	0	0	0	0	0
TOTAL	1757	594	310	421	315	118

BAS I

(May - June 1971)

Question: How long do you usually have to wait for the bus?

Geographical Location

	Total Sample %	Alameda %	Contra Costa %	San Francisco %	San Mateo %	Marin %
No wait	20.7	23.3	32.3	15.4	10.8	53.3
3-4 minutes	2.4	2.1	1.8	3.2	1.8	0
5 minutes	11.4	10.1	5.8	15.7	6.9	4.7
6-9 minutes	4.9	2.9	5.9	7.8	0	0
10 minutes	16.8	13.8	7.2	22.7	15.4	11.3
11-14 minutes	2.6	3.2	1.2	3.6	0	0
15-29 minutes	26.7	26.8	12.3	26.9	44.1	17.2
30 minutes or more	7.0	10.4	16.8	2.4	6.1	0
Don't know	7.4	7.2	16.8	2.3	14.9	13.5
TOTAL	856	257	110	362	99	28

BAS I

(May - June 1971)

Question: Do you ever ride the bus between stores while shopping, at work, or visiting?

Geographical Location

	Total Sample	Alameda	Contra Costa	San Francisco	Matco	Marin
Yes, at least once in a while	9.6	8.5	3.9	20.0	4.5	5.7
No, but some local bus use	31.9	25.3	19.5	63.3	20.3	16.2
No, never ride buses	58.6	66.1	76.6	16.8	75.1	78.1
Don't know	0	0	0	0	0	0
TOTAL	1757	594	310	421	315	118

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