DIRECT
Operational Field Test Evaluation
Natural Use Study

Part 1: Subject Stated Response

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DIRECT NATURAL USE STUDY: PART I

SUBJECT STATED RESPONSE

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ABSTRACT

This report presents evaluation results from the Subject Stated Response portion (Part I) of the Natural Use Study of the DIRECT (Driver Information Radio using Experimental Communication Technologies) operational test sponsored by the Michigan Department of Transportation in conjunction with the Federal Highway Administration. DIRECT focused on simultaneous testing of four low-cost voice-based traffic information delivery systems that have a high potential for operational deployment: automatic highway advisory radio (AHAR), low power highway advisory radio (LPHAR); telephone. and Radio Data System in conjunction with a "Subsidiary Communications Authority" subcarrier (RDS/SCA).

The study addressed three evaluation questions regarding the aforementioned route-specific traffic information systems: 1) What do people think about the tested systems? 2) How do people behave in response to the tested systems? 3) How do choices induced by the systems affect trip characteristics? The focus of the effort was comparison of subject response to the various systems, and not comparison of subject response to various formats of traffic report messages. Thus, a standard format for messages was chosen prior to the study and the traffic message corresponding to each incident was fed in parallel to each of the systems.

A quasi-experimental natural use method was used to assess driver perceptions and preferences in response to the four tested systems. 174 commuters participated in the study: nominally 35 in a control group and 35 in each of 4 method groups, one for each tested system. Each subject drove a Project-supplied vehicle equipped with one system for eight weeks along I-75 to downtown Detroit as part of their daily commute. A baseline, consisting of commercial radio traffic reports, changeable message signs along the expressway, and television traffic reports, was available to all subjects. The subjects were randomly assigned to group and, to save project resources, divided into 7 periods of 25 each, with 5 from each group in each period. The data from all of the periods was pooled. Selection of subjects was primarily based on subjects' interest, reported use of the test corridor. and driving record. To control for variations in background conditions, subjects were assigned to cohorts that traveled through the test corridor at roughly the same time so that they likely encountered the same traffic conditions, including congestion, incidents. and weather. A detailed questionnaire on subject perception of travel and traffic information was administered to each subject both before and after their eight-week participation. Behavior data was also recorded through project tracking equipment and cellular phone call records, and incident/message data was recorded at the operations center as part of system operation. Analysis of the behavior and incident/message data are included in Part III of this report.

The evaluation focused on eliciting and comparing subject perception on a number of measures regarding the performance and benefit of the information-delivery systems. The most outstanding feature is that subjects appear quite satisfied with and reliant on commercial radio as a traffic information system and were less than satisfied with all of the DIRECT systems. Primarily, subjects perceived the DIRECT systems to be much less reliable than commercial radio. That is, the DIRECT systems were perceived as not having operated as they should have, or, in other words. system implementation did not live up to system promise. Given the perceived low level of reliability for the DIRECT systems, the results for the other measures examined are difficult to interpret. That is. the fact that subjects perceived the implementation of the DIRECT systems to be unreliable likely had a negative influence on their perception of the quality of the other measures. Nevertheless, the DIRECT systems, even as implemented, were rated as higher than commercial radio on measures such as "route specific","available on demand", and "catches ones attention", with the RDS/SCA system being slightly to somewhat better than the other systems tested on a number of measures. In fact, a fair percentage of the RDS/SCA subjects reported that, overall, they liked the RDS/SCA system better than commercial radio, in spite of the low overall perception of the reliability of the system implementation. These perceptions would clearly improve once the DIRECT systems are implemented at a level of reliability that meets with subject satisfaction. In the

meantime, a method of compensating for the impact that the lack of system reliability had on subject response to the questions has been devised and is described in Part II of this report.

A bright spot in the study from the vantage point of the potential viability of the systems tested is that subjects reported a strong belief that the DIRECT traffic information system they used could be improved to the point that it completely meets their needs for traffic information, In fact, subjects rated each of the four information-delivery systems tested as much more positive in this regard than either changeable message signs, television, or even commercial radio, with which they appear quite satisfied. The one-time fee that subjects report being willing to pay for a traffic information system that completely meets their needs is $117. However, on the order of 15% to 20% of subjects would not pay anything, even for a system that meets all their traffic information needs.

In addition to insight into the value of the four information delivery systems tested, the study reveals subject thoughts on traffic information issues that are more general in nature, and perhaps of significantly greater importance. One key issue involves the relationship between “new” traffic information services and existing services, especially traffic information provided via commercial radio. At the outset of the DIRECT Project, some thought that some form of new service could potentially supplant or supersede commercial radio as a source of traffic information. Contrary to this notion, the study revealed that drivers very much appreciate and rely on commercial radio as a source of traffic information. Moreover, anecdotally, many drivers appreciate radio-based traffic reports as a source of entertainment and a means to satisfy their curiosity about what is happening throughout the metro area, even if that information has no direct bearing on their own commute.

Nevertheless, drivers do find some fault with commercial radio-based traffic information and have suggested a variety of ways to improve the usefulness of this information. Drivers think commercial radio systems should be more timely. In many instances, the typical radio traffic information update once every 10 minutes is insufficient because critical route-choice decisions must be made within a short time frame at the outset of a commute trip. Drivers also want more information specific to their personal route of travel. Radio information, however, can only provide information on the top few incidents throughout a metropolitan region. Many smaller incidents go unreported, even though they are a cause of significant delay and inconvenience for drivers who encounter them. Drivers also want traffic information to suggest alternate routes around a traffic problem. Again, this is a task that is not easy for a generic broadcast system to accomplish. In short, drivers want traffic information that is customized to address their personal needs. As an aside, drivers also want better advice about the expected length of a delay; this requires better traffic data, which would be equally useful to current and new systems.

These arguments lead to a conclusion that a personalized route-specific interrupt or “push” system could be a valuable and readily accepted complement to commercial radio traffic information. A strictly “on-demand” system is likely not sufficient because it requires constant sampling on the part of the consumer to ensure that no “late-breaking” incident is missed. Nevertheless, in addition to an interrupt capability, customers might also like the ideal information system to be available on demand so as to alleviate consumer concerns that no traffic report might mean that the system is not working instead of that there is no incident to report. At a minimum, some sort of “system active” signal that can be readily checked by the consumer is needed. This concern will likely diminish, however, as the technologies and implementations become more mature, i.e., reliable, and customers become confident of that reliability. A system such as just described could provide personalized reports and diversion advice on all incidents that might affect an individual’s travel. Based on the questionnaire data, subjects in the study would likely be quite satisfied with such a system. However, even when using an information system with these qualities, drivers might only change their trip infrequently. Nevertheless, consumers may welcome such a system as of great value in reducing uncertainty regarding traffic conditions and the stress due to this uncertainty. None of the four information-delivery systems tested in DIRECT provide all of the proposed features. However, the RDS/SCA system appears to be the most easily modified to meet the identified needs.

DIRECT NATURAL USE STUDY: PART I

SUBJECT STATED RESPONSE

BACKGROUND

Many Advanced Traveler Information Systems (ATIS) approaches, like vehicle navigation and route guidance, are expensive and therefore inaccessible to a large portion of the driving public. In contrast, methods using existing equipment and infrastructure, or less expensive designs, are more likely to be accessible and subsequently used by drivers. Thus, these methods are likely to have a larger and more immediate impact on driver behavior and traffic management practices. In an effort to address this issue, the Michigan Department of Transportation (MDOT), with the Federal Highway Administration, sponsored an operational test called DIRECT: *Driver Information Radio using Experimental Communication Technologies.*

DIRECT focused on low-cost voice-based communications systems that can provide the driver with route-specific traffic information. In addition to providing the basic service at a minimal incremental cost to the traveler, the test systems were required to have a high potential for operational deployment. Systems selected include: Automatic Highway Advisory Radio (AHAR), Low Power Highway Advisory Radio (LPHAR); Phone, and Radio Data System in conjunction with a "Subsidiary Communications Authority" subcarrier (RDS/SCA). Each of these systems, which were implemented by MDOT and operated by MDOT in conjunction with Metro Networks, is described in more detail in Appendix A. Note that AHAR and RDS/SCA have an automatic interrupt feature, whereas the LPHAR and Phone systems require driver action.

The University of Michigan Intelligent Transportation Systems Research Laboratory was responsible for the evaluation of the DIRECT project. The evaluation is unique because it tested the four competing low-cost traffic information methods simultaneously. Moreover, the four systems, which represent elements of the potential "first wave" of traffic information systems, were evaluated against a traffic information baseline provided via existing conventional commercial AM-FM radio, expressway-based changeable message signs, and television. The emphasis of the evaluation was on the comparative value of the tested methods in terms of travel benefits, technical performance and projected costs, driver distraction and safety, and associated institutional issues. More specifically, the evaluation examined DIRECT via five research areas: Natural Use, Simulation and Modeling, Technical Performance and Cost, Human Factors, and Institutional Issues. This report represents Part I of a three-part description of the results of the Natural Use Study Evaluation.

OBJECTIVE AND METHOD

The primary objective of the Natural Use component of the DIRECT evaluation was to assess and compare cognitive response of subjects (drivers) to the tested information delivery systems (e.g., satisfaction with the systems, willingness to pay for the systems, perceived reliability of the systems, perceived improvement of travel due to the systems, etc.). The study also sought to assess behavior of subjects in response to the tested information delivery systems (e.g., seeking out information, diversion) and objective measures of the outcome of behavior on trip characteristics (e.g., travel time). Thus, the Natural Use Study objective was to address three evaluation questions regarding route-specific traffic information as deployed in the field:

1) What do people think about the tested information and delivery systems?
   - Do drivers find the systems easy to use?
   - Do drivers find the information useful-does it reduce uncertainty and frustration, or help them make trip choices?
   - Do drivers believe the system is an improvement over traditional sources of information?
   - How much would drivers be willing to pay to have their vehicle equipped with such devices to receive such information?

2) How do people behave in response to the tested information and delivery systems?
   . Do drivers listen to the information?
   - If so, do drivers change their travel behavior in response to the information?
   - If so. in what way do drivers change their travel behavior in response to the information-do they cancel their trips, reschedule, take an alternate route, divert while en-route, etc.?

3) How do choices induced by the delivered information affect trip characteristics?
   - Does travel time change if the systems are used?
   - Is less congestion encountered if the systems are used?
   - Are more turns encountered if the systems are used?

From the study objective it is clear that the focus of the effort was comparison of subject response to the various information delivery systems, and not comparison of subject response to various formats of traffic report messages. Thus, a standard format for messages was chosen prior to the study and the traffic message corresponding to each incident was fed in parallel to each of the information delivery systems.

A quasi-experimental natural use method was used to assess driver response. The idea underlying a natural-use study is that consumer use and attitudes vis-a-vis a new and innovative product or service evolve as the consumer gains experience with the product or service. First impressions are, of course, important from marketmg and use standpoints. However, the consumer will only come to appreciate the advantages and disadvantages of a product after using the product over time and under conditions representative of those for which the product or service was designed. Because of these possibilities, evaluations of stated and observed behavior made prior to providing the consumer with sufficient product experience may inadequately describe driver experience over time. Therefore, the evaluator must allow a representative sample of the target market population to use the product or service over a sufficient period of time, under natural conditions, prior to making conclusions. This study focused on the longer-term natural use behavior, which was evaluated by allowing each subject to drive a vehicle equipped with one of the four aforementioned information delivery systems for a relatively extended period of time while observing their behavior and asking their perceptions and opinions vis a vis the system.

Table 1 shows the quasi-experimental design used for the study [Campbell and Stanley, 1963]. The study is quasi-experimental because the incidents that subjects experience are actual highway incidents and thus not controlled as they would be in a true experiment. As the table shows, the evaluation was designed as a series of periods of "groups" of subjects, each using a different information delivery system. A control group was included against which results from each of the technology conditions could be compared. Of course, all subjects could access commercial radio and television traffic reports and any existing changeable message signs on the expressway. The subjects in each of the test groups were intended to be identical to subjects in all other groups in all other periods so that subject response from each group could be summed to gain a much larger total response. This method was chosen because 1) it allows for addition of groups if needed due to whatever reason to attain adequate sample size and 2) it minimizes project equipment cost, by limiting the number of subjects being supplied with project-equipped vehicles at any given time.

Table 1: Design of the Natural Use Study

Period (j = 1 to J)			Traffic Information System (i = 0 to 4)				
Period	Duration	Task	Control	AHAR	LPHAR	Phone	RDS/SCA
1	1-2 weeks k_1 weeks	Vehicle distribution & driver orientation Subject Natural Use (evaluation survey both before & after)	n_{01}	n_{11}	n_{21}	n_{31}	n_{41}
	...	...	...	...	...	...	...
J	1-2 weeks k_J weeks	Vehicle distribution & driver orientation Subject Natural Use (evaluation survey both before & after)	n_{0J}	n_{1J}	n_{2J}	n_{3J}	n_{4J}
			$N_0=\Sigma n_{0j}$	$N_1=\Sigma n_{1j}$	$N_2=\Sigma n_{2j}$	$N_3=\Sigma n_{3j}$	$N_4=\Sigma n_{4j}$
Study duration: About $\Sigma (k_j+2)$ weeks			Total Number of Subjects in Study: $N=\Sigma N_i$				

Early in the design process, the project sponsor recommended that the evaluation team include an "expanded" fleet in the evaluation design. The objective of the expanded fleet was to significantly increase the number of subjects experiencing the tested systems, without significantly increasing project costs. To keep costs down, the expanded-fleet design calls for subjects to use their own vehicles, involves only a subset of the five information delivery systems (four tested systems plus control), and includes a much more limited evaluation than implemented with the more controlled "base" fleet. As of the writing of this report, the expanded fleet had not yet been implemented so the results in this report cover only subject response for the "base" fleet.

IMPLEMENTATION

Given the design in Table 1, the next steps were 1) to develop the evaluation tools needed, 2) to determine the number and type of subjects needed to meet project objectives and to recruit and assign subjects to test conditions, and 3) to collect data. As mentioned earlier, the four systems tested are described in Appendix A.

Evaluation Tools

As previously noted, the goal of the Natural Use evaluation was to determine driver response (thoughts and actions) to messages reporting incidents via the four information delivery systems. Data indicating secondary effects, such as changes in travel time, were also desired. A variety of tools were used to pursue these evaluation goals.

Questionnaires and Interviews

A detailed questionnaire on subject perception of travel and traffic information was administered at the beginning of each subject's eight-week participation. Approximately one week into their experience, subjects were contacted via phone to elicit their response to a short series of carefully targeted questions. This "status call" contact also represented an opportunity for subjects to

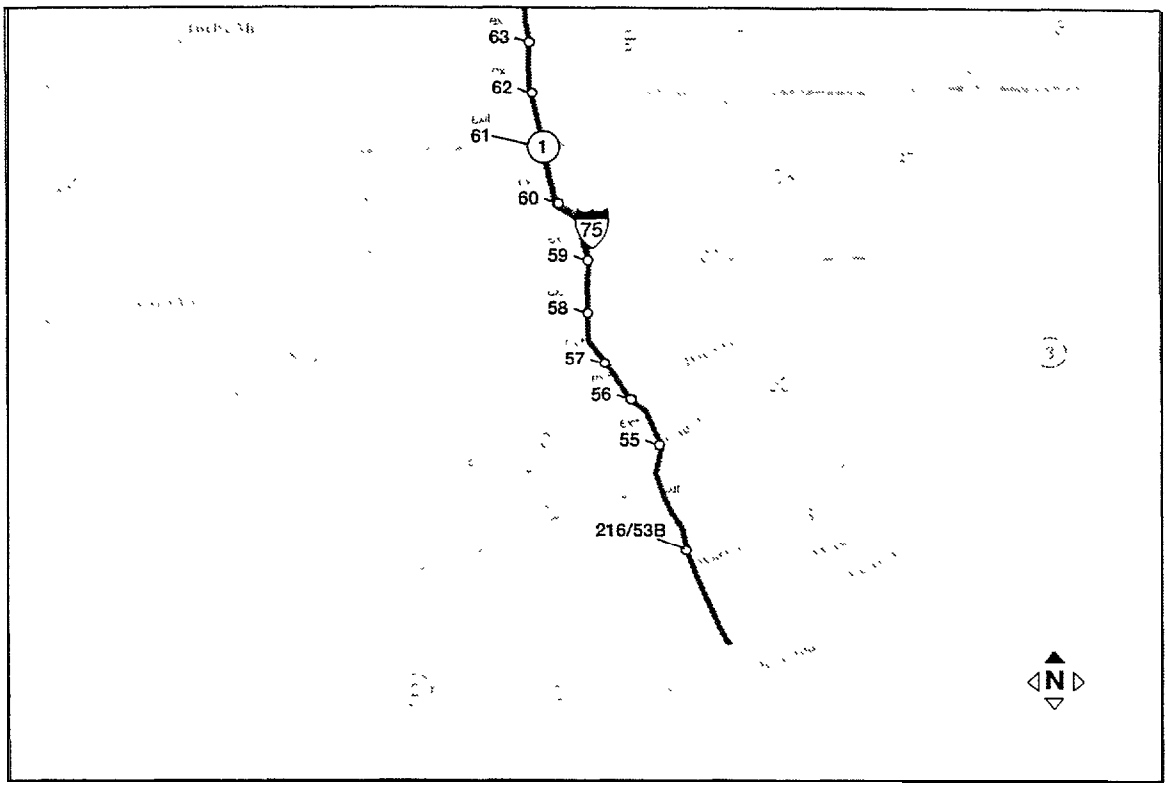


Figure 1: DIRECT Test Area

'able 2: Design of the Natural Use Study as Implemented

			Traffic Information System (i = 0 to 4)				
Period	Duration	Task	Control	AHAR	LPHAR	Phone	IRDS/SCA
1	1-2 weeks 8 weeks	Vehicle distribution & driver orientation Subject Natural Use (evaluation survey both before & after)	$n_{01}=5$	$n_{11}=5$	$n_{21}=5$	$n_{31}=5$	$n_{41}=5$
	...	...					
7	1-2 weeks 8 weeks	Vehicle distribution & driver orientation Subject Natural Use (evaluation survey both before & after)	$n_{07}=5$	$n_{17}=5$	$n_{27}=5$	$n_{37}=5$	$n_{47}=5$
			$N_0=35$	$N_1=35$ [a]	$N_2=35$	$N_3=35$	$N_4=35$
Total Duration: About 17 months			Total Number of Subjects in Study: N=175 (see a)				

[a] Due to recruiting difficulties, only 4 subjects were available in one of the AHAR periods and so the actual study included 174 subjects instead of the 175 shown.

describe their first impressions. Any problems encountered could also be reported, and hopefully solved, at that time. During the eight weeks, drivers were asked to write comments in a notebook that was provided in the vehicle. A second detailed questionnaire on the experience was administered at the termination of each subject's eight-week participation. The "Before" and "After" questionnaires for the control group were identical to those for the four "test" groups with the single exception that the control group after questionnaire did not ask any questions about the systems used in DIRECT, because the control group participants had not had any exposure to these systems. After completing their eight-week experience, each subject was thoroughly debriefed via telephone. Debriefing interviews followed a semi-structured interview process, including note taking by the interviewer.

Copies of the evaluation instruments used are included as Appendix B. The materials include:

Before Questionnaire
After Questionnaire (for AHAR, LPHAR, Phone, and RDS/SCA groups)
After Questionnaire (for control group)
Telephone Interview call script (after first week and at end of participation)

Instrumented Vehicles & Incident Databases

To make strong statements about driver behavior, the evaluator must be able to actually observe the stimulus and response, in contrast to relying solely on drivers' self-reports. To this end, the traffic messages distributed in the project, which were generated at the Michigan Intelligent Transportation Center in downtown Detroit, were entered into a time-stamped database as they were generated. Driver behavior was also tracked during the study. Specifically, in-vehicle equipment recorded a time trace of the radio frequencies to which each driver tuned the in-vehicle entertainment radio. The records of cellular phone use were also archived. The evaluation also observed driver behavior (response) through vehicle-location technology that uniquely identified each project vehicle. Specifically, each vehicle's position was time-stamped at five-second intervals, on average, as it traveled within the test area during commute hours. This data provided an accurate time-trace of the route each driver chose. In addition to the 25 vehicles, two "spare" vehicles were equipped with tracking devices and all four information delivery systems. These vehicles were used to quickly replace an active project vehicle in the case of device failure or vehicle failure or accident. Analysis of the message and tracking data is included in Part III of this report.

Subjects

The issue of subjects is one of gaining an adequate congruence of traffic incidents and people. Thus. subject selection is intertwined with selection of a physical test area portion of the road network, which in turn has implications for the physical deployment of the tested information delivery systems. The technology deployment effort for the information delivery systems is described in the Technical Performance and Cost Evaluation Report (EECS-ITS LAB-DT98-004). Selection of the test area is described below in a discussion regarding subject sample size for the project, which is followed by introduction of subject recruitment, subject assignment, and subject orientation.

Sample Size

To increase statistical power, the evaluator wants to approach the test with a relatively large number of subjects. As sample size increases, the ability to detect differences between the response of drivers exposed to different information-delivery systems also increases. However, the key issue is *effective* sample size, which is based on the combined number of traffic incidents and number of subjects that encounter traffic messages related to these incidents while traveling on the network. It is not useful to have a large number of subjects traveling on the network if these subjects rarely

encounter a message, because there would be no incident-response behavior to evaluate. To increase the effective sample size, an evaluator can either increase the number of vehicles traveling on the test corridor (thus increasing the number of subjects encountering incidents to which they may react), or increase the duration of the test (thus increasing the number of incidents that each subject encounters). However, both options increase study cost, so sample size must be limited.

From the power analysis shown in Appendix C, which is based on estimates of mean difference between study measures to be collected from the five test groups, the evaluation team decided that a total sample size of 125 subjects, 25 per test group, was the bare minimum needed to meet the objectives of this study. A major consideration affecting this conclusion was selection of a test area. Specifically, an analysis of the congruent "availability" of both a sufficient number of traffic incidents, for which data is readily available, and drivers who might participate led the evaluation team to select the test corridor shown in Figure 1, i.e., the DIRECT Field Test was conducted along I-75 from just north of I-696 south to downtown Detroit. This portion of the expressway system has more than infrequent incidents, has a surveillance infrastructure consisting of underground loop detectors for the whole test region and video cameras in the downtown area. and is a major commute route to the large center of employment in downtown Detroit. Project-partner Metro Networks, who operated the messaging system from the Michigan Intelligent Transportation Center in downtown Detroit, also provided additional surveillance capability during the test. All the information-delivery systems were tested simultaneously along this same corridor in Southeast Michigan.

Once sample size was determined, the evaluation team could "fill in" the design from Table 1, as shown in Table 2, with 5 subjects in each of the 5 test groups in each of 5 experimental periods. One additional period, the sixth. was recommend to provide a margin of safety. As it turned out, due to system implementation difficulties, the systems were not operating during the first period, which was then renamed period zero and used as a pilot test. The second through forth periods, renamed first through third, also had significant implementation difficulties and so and two additional periods were added to the study to increase sample size. Thus, the completed study included a pilot period plus seven periods from which data was collected. As Table 2 shows, the evaluation occurred over approximately 17 months and included seven eight-week periods of 25 subjects each, for a total of 175 subjects. As noted, an additional 25 subjects were included in a pilot test. The eight-week duration was selected after a brief study of I-75 revealed that subjects most likely would encounter approximately three significant incidents during that time frame.

Subject Recruitment

The evaluation design called for subjects to drive project-supplied vehicles along the test corridor of Figure 1 as part of their daily commute. The study focused on subjects who commute daily to downtown using I-75 southbound. Selection of subjects was primarily based on subjects' interest, reported use of the test corridor, and driving record (in order to participate, drivers had to be deemed "safe" by MDOT). The goal was to recruit subjects on the basis of their time of travel through the test corridor so that they likely encountered the same traffic conditions, including congestion, incidents, and weather. Specifically, the objective was to select subjects so that they would encounter as many of the same incidents as possible, to which they may respond. This design provided a degree of assurance that variations in traffic, and weather, only had minimal impact on the comparison of subjects' response to the systems tested.

The subjects were recruited from companies with significant numbers of employees in downtown Detroit. After obtaining the permission, and in some instances assistance, of the appropriate authority within each company, a short driver-recruitment survey describing the project was distributed to potential subjects. The objective of this survey was to identify interested and available subjects who commute via I-75. The driver license number of interested persons was requested for a driving-record check and approval.

Subjects were not paid for participation because it was thought that, and turned out to be true that, the use of the project-supplied vehicles for eight weeks should be sufficient incentive for subject recruitment and sufficient reward for retention. Subjects were responsible for fueling the vehicles. Routine maintenance and the "insurance" responsibility for the vehicles were provided by MDOT.

Copies of the subject recruitment materials used are included as Appendix D. The materials include:

- Press release for driver recruiting
- Publicity poster for driver recruiting
- Newspaper articles for driver recruiting
- Brochure
- DIRECT Information Sheet to Answer Questions Posed by Potential Participants
- Driver Recruitment Questionnaire

Subiect Assignment

If a subject forms an opinion or acts on the basis of accessing information through multiple avenues, it is impossible to determine which avenue produced the cognitive or behavioral change. Thus, to avoid bias in the data, participants were assigned to use only one information delivery method. The exception to this rule was the baseline, consisting of commercial radio traffic reports, changeable message signs along the expressway, and television traffic reports. The baseline was available to all subjects and was the only "information-delivery system" available to the control group. Subject assignment to system group was randomized. Unfortunately, given that real traffic incidents were involved, the study could not randomize the type and location of incidents that subjects encountered.

The process of assigning subjects to method is outlined in Appendix E. In principle, the appropriate number of individuals from the pool of recruited subjects were randomly assigned to either the control group or to one of the four technology conditions (one of the four traffic information delivery systems) for the current period. The assignment process was repeated each period and subjects were recruited on an on-going process throughout the duration of the project. In practice, as subjects were recruited, it became apparent that a wide spread in time of travel was the rule. Therefore, a prime consideration in subject assignment became arrival time at the I-75 and I-696 interchange during the morning commute. Departure time on the return commute was also considered, however, greater variance among subjects on this measure made return time a less reliable, and thus secondary, selection criterion. In short, the 25 subjects in each period were divided into five cohorts that traveled at roughly the same time, but with about half an hour between cohorts. The first cohort arrived at the I-75 and I-696 interchange at about 6:30 am, the second at around 7:00 am and so on. Five subjects were assigned to each cohort, one per information system. In spite of this less than ideal assignment process, post-study analysis showed subject assignment to be fairly random in terms of gender, age, income, and education.

Subiect Orientation

In order to assure quality data, subjects were oriented to the information-delivery system that they would use during the project. This orientation occurred during transfer of project vehicles to the subjects, which usually took place on the Saturday preceding the eight-week period. As part of the orientation. subjects were given contact information for various problems that might arise and also informed of the "rules" for use of the MDOT-supplied vehicle. In addition, subjects were required to sign a participation agreement form.

Copies of the subject orientation materials used are included as Appendix F. The materials include:

- Vehicle Hand-off Procedures
- Welcome letter
- Method descriptions

AHAR transmitter map
LPHAR light & transmitter map
Car washing instructions
RDS radio instructions
MDOT letter giving permission to drive project vehicle
Driver Participation Guidelines & Agreement Form
Driver notebook instructions
Vehicle return letter
Thank you letter

Data Collection

As implied by the evaluation instruments introduced above, considerable amounts of data were collected through the Natural Use Study. These data are primarily of three types: stated response data elicited from drivers, behavior data recorded through project tracking equipment and cellular phone call records, and incident/message data recorded at the operations center as part of system operation. The body of this part of the report, Part I, is organized around analysis of the stated-response data. Appendix G provides a summary of this questionnaire data. The raw questionnaire data is described in Appendix H. Part II of this report describes some further analysis of the response data. Analyses of the tracking and incident/message data are included in Part III.

RESULTS

The study was designed so that the data from each of the periods could be pooled to provide a larger subject base from which to draw conclusions. Therefore, the data was first checked, using Analysis of Variance (ANOVA) of the mean response to each question across the seven periods, to verify that indeed no significant difference by period existed. The analysis shows that subject response did vary by period for a number of questions. This was true for subjects in each of the five test groups and for the combined pool of all subjects. However, no consistent, explainable pattern to the differences could be identified across periods and so the data from all periods was pooled for the remainder of the analyses.

A major study objective was to determine if subject response to the Before and After questionnaires of Appendix F varied by test group, i.e., because of the information-delivery system that they used during their eight week experience. This possibility of differences by method in the data was checked using Analysis of Variance (ANOVA) of the mean response to each question across the five test groups. From Appendix G, which provides the “F Prob.” From the ANOVA analyses, it is evident that a large majority of the F values are high for the Before questions, indicating a good probability that subjects in each group answered the questions in roughly the same manner. This is reasonable in that the subjects had no knowledge of any of the systems being tested at the time they were filling out the Before Questionnaire, and so, if subjects were in fact randomly distributed across test groups as desired, system assignment could not affect Before Questionnaire response. The fact that a large majority of the F values are also high for the After questions indicates that participation in DIRECT had little impact on subject response. The significant exception to this situation is subject response to the questions that specifically address the information-delivery systems tested, in which case subject response does differ by system.

A number of the after questions asked subjects to gauge how their behavior in terms of travel and information use had changed from before to after their eight-week experience. The control group was included to help identify whether or not any changes were due to due to general participation in the study, or non-study events, or due to the use of the tested information-delivery systems. Another mechanism used to identify such potential changes was to repeat a number of the Before questions in the in the After Questionnaire. A difference value for each before-after pair was

calculated for each subject on a question by question basis and compared using a t-test. Again, few significant changes from the mean before to after response were evident, indicating no great impact of the experience on subject behavior.

In spite of the above discussion, which might lead one to think that no results were obtained from the study, a good amount of information has been gleaned from subject responses to the questionnaires. This data is presented and explained in the following sections titled subjects, route choice, traffic information, and perceptions of DIRECT. The source of the data is identified by a "B#" for before questions and an "A#" for after questions. In the case that a B# and A# are both given, this indicates that the question was asked twice. If one of the identifiers is underlined, then that is the response plotted. Also, for clarity, and in light of the fact that in most cases the before and after response to repeated questions was essentially the same, the figures provided in this report for the most part show only the before response or the after response, as appropriate, and not a combination or juxtaposition of the two response sets. Also, a number of figures plot mean subject response on the vertical axis using a scale of 1 to 5. Unless otherwise noted, the five-point scale used is l-Strongly Disagree, 2-Somewhat Disagree, 3-Neither, 4-Somewhat Agree, and 5-Strongly Agree. These plots also refer to the 95% CI (Confidence Interval) around the mean, which is an expression of the certainty of the mean value given the variance in the data.

Subjects

174 commuters participated in the Natural Use portion of DIRECT. As evident from the implementation of the study, the subjects came from a convenience sample of commuters on I-75. That is. the study is not based on a random sample of commuters in Detroit, or even on a random sample of commuters on I-75. Nevertheless, within the significant constraints of subject availability vis-a-vis travel time, etc., described in the implementation section and Appendix D, an attempt was made to assign subjects randomly to the five information-delivery system groups.

Analyses were performed to determine the extent to which the randomization effort was successful. The primary factors considered in this task were age, gender, education, income, and temperament, as judged by the Keirsey Temperament Sorter [Keirsey and Bates, 1984]. The results of these analyses do indicate that participants in the study were randomly distributed among methods on all of the aforementioned measures. Subject data was also divided into age-gender and education-income combinations, e.g., females in their forties and males in their twenties; analyses of these data also showed no significant differences between methods. Again, these results do not indicate that the subjects were necessarily representative of the broader commuting population, for which the study did not collect statistics, but rather that the subjects who participated in the study had in fact been randomly distributed across test groups with respect to age, gender, education, income, and temperament. Thus, any observed significant differences between test groups with respect to these factors can likely be attributed to true differences in response to the systems tested, i.e., most likely can not be attributed to a lack of randomness in the subject assignment process.

The gender and age division of this group is shown in Table 3. The education and income levels are shown in Tables 4 and 5, respectively. The average of responses shows subjects reporting that they drive on the order of 14,000 miles per year (B70). Subjects also described the (average) general condition of their commute as follows:

- heavy traffic that flows steadily but slower than the speed limit (B3),
- . 43 minutes in duration (B4/Al),
- having an unexpected delay slightly less than 1 or 2 days a week (B5/A2), and
- having unexpected delays of about 14 to 15 minutes in length (B6b/A3b).

Other measures describing the subjects, such as the level of stress they feel when driving and so on, are presented in the data summary of Appendix G.

Table 3: Subject Age and Gender Distribution [a,b] (Determined from subject recruitment process)

Age	Gender		Total
	Female	Male	
20s	10 (5.8%)	11 (6.4%)	21 (12.2%)
30s	21 (12.2%)	21 (12.2%)	42 (24.4%)
40s	35 (20.3%)	35 (20.3%)	70 (40.7%)
50s+	12 (7.0%)	27 (15.7%)	39 (22.7%)
Total	78 (45.4%)	94 (54.7%)	172 (100.0%)

'Data unavailable for 2 subjects. 'Percentages do not sum exactly due to rounding error.

Table 4: Subiect Education Distribution [a b] (B83)

Highest level of education completed	Number (% of total)
Less Than High School Diploma	0 (0.0%)
High School Diploma (or equivalent)	6 (3.5%)
Some College	47 (27.2%)
Bachelor's Degree	50 (28.9%)
Some Graduate School	23 (13.3%)
Graduate Degree	47 (27.2%)
Total	173 (100.0%)

'Data unavailable for 2 subjects. 'Percentages do not sum exactly due to rounding error.

Table 5: Subiect Total Household Income Distribution [a] (B84)

Total family gross income	Number (% of total)
Less than $20,000	1 (.6%)
$20.000 to $39.999	9 (5.5%)
$40.000 to $59.999	27 (16.6%)
$60.000 to $79,999	42 (25.8%)
$80.000 to $99.999	40 (24.5%)
$100.000 to $119,999	23 (14.l%j
$ 120.000 to $139.999	16 (9.8%)
$ 140.000 or more	5 (3.1%)
Total	163 (100.0%)

[a] Data unavailable for 12 subjects.

One quite interestin g, but, without further study, inexplicable observation concerns subject temperament. The evaluation sought to determine whether or not subject temperament, as determined by the Kensey-Bates Temperament Sorter [Keirsey and Bates, 1984] had any effect on Subject response. This method classifies people into four broad categories: Sensing-Perceiving (SP). Sensing-Judging (SJ), Intuitive-Thinking (NT), and Intuitive-Feeling (NF). The SP wants "to do as he wishes when he wishes". SJs "exist primarily to be useful to the social units they belong to". The NT wants "competencies, capabilities, abilities, capacities, skills, ingenuity - repertoire". The NF is engaged in "the search for self '. The interesting observation in the study is that. whereas the distribution of the four types in the general population is roughly 38% SP, 38% SJ, 12% NT. and 12% NF, the distribution among subjects in the study was 3.3% SP, 86.1% SJ, 3.3% NT. and 7.3% NF. Why were there so many SJs in the test? Many hypotheses can be put forth: perhaps most of the people on the freeways (I-75 at least) are SJs; perhaps SJs are more likely to find out about a test such as DIRECT; perhaps SJs are more likely to participate in a test such as DIRECT; or perhaps the jobs downtown are predominantly suited to SJs, or maybe SJs are less burdened by longer commutes than people of other temperament types. Unfortunately, this question, which could have importance for the manner in which traffic information is presented, cannot be answered without further study.

Route Choice

A key aspect of travel is that of selecting a path over which to travel from trip origin to destination, i.e., route choice. From Figures 2a and 2b it is clear that travel time is a key factor influencing route choice. Factors that can greatly influence travel time, and also add stress to driving, such as level of congestion and presence of construction, also play an important role in the route choice process. Other interesting observations from the data regarding route choice include:

- roughly half of subjects report that they usually take an alternate route in order to avoid unexpected delay on their commute (B6a/A3a),
- about 16 minutes is the longest reported delay (beyond that normally expected) that subjects report being willing to tolerate during their commute before switching from their usual route to an alternate route (B13a/A4), and
- a little over 12 minutes is the amount of time that subjects report having to expect to save in order to switch from their usual commute route to an alternate route (B13b/A5).

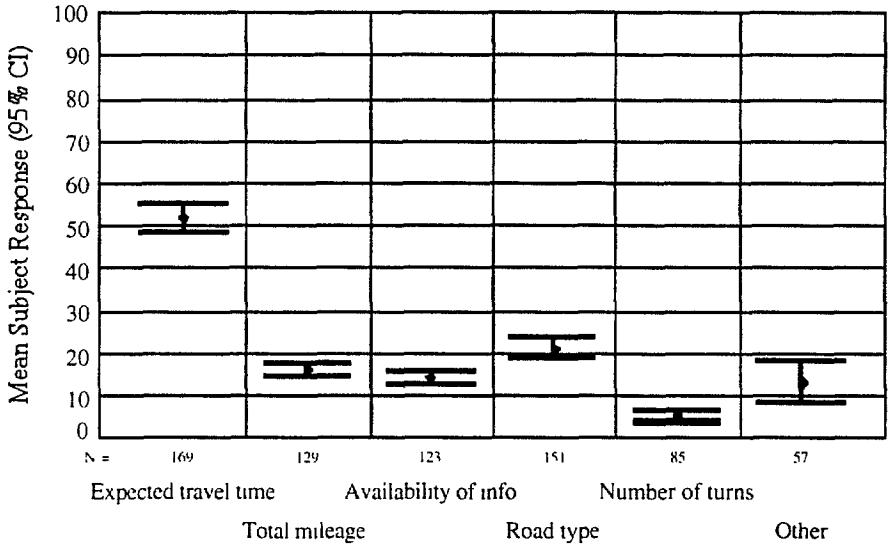


Figure 2a: If more than one route is available between your home and work, what factors do you consider in choosing between routes? (A6)

A special form of route choice is the willingness of drivers to divert from their chosen route, i.e., select a new or alternate route, given changes in traffic conditions. The study asked subjects how willing they were to use alternate routes for their commute (B12/A11). Mean subject response was 1.7, which is much closer to 1-"Very Willing" than to 2-"Somewhat Willing". Only 1 subject selected "would not take" an alternate route. Moreover, subjects on average knew of slightly more than 3 alternate routes for their commute (B10/A9). Only a few, less than ten, subjects reported knowing of no alternate routes for their commute. As shown in Figure 3, subjects found out about these routes primarily through personal experience and from personal contacts. Many subjects also reported using a map to find alternate routes. Interestingly, but perhaps not surprisingly, few subjects found out about alternate routes from traffic reports.

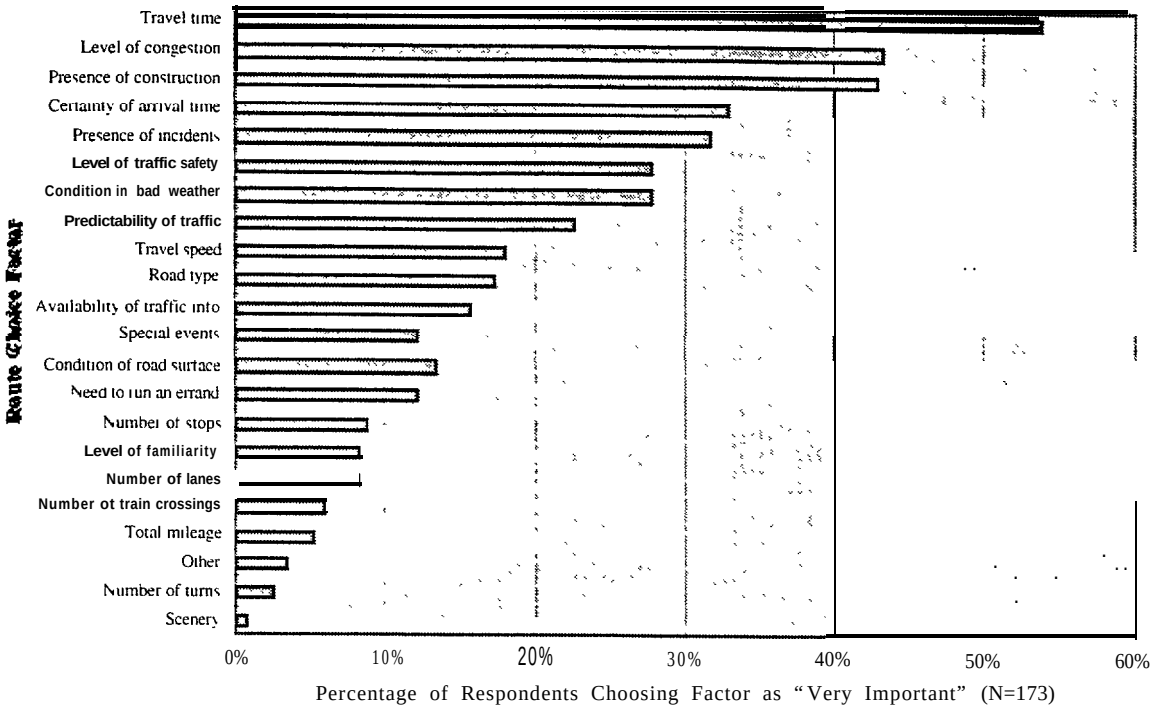


Figure 2b: If more than one route is available between your home and work, what factors do you consider in choosing between routes? (B 1)

When it came to actually taking an alternate route, as shown in Figure 4, availability and familiarity of alternate routes were key to the diversion decision as were the remaining distance and expected travel time on the original route and the time savings expected due to the diversion. Subjects also responded that on average they took an alternate route slightly more than four times in the 8 weeks preceding the questionnaire (B 14/Al2). They also reported using about 1.5 different routes (B 15/A 13). However, a considerable number, on the order of a quarter of participants, had not used an alternate route in the 8 weeks previous to the question. Interestingly, slightly more subjects diverted on the way from work-to-home than on the way from home-to-work. A number of, as yet untested, hypotheses could be put forth to explain why subjects might divert more in the afternoon. For example, traffic conditions might worse in the afternoon when subjects were on the way home, or subjects might be more likely to have other activities in the afternoon, and so on. Subjects who took at least one alternate route as part of their commute were asked how much time they thought they usually saved (in comparison to traveling on the original route) (B 17/A15). The mean response fell between the response categories of "saved 5 min or more but less than 10 min" and "saved 10 min or more but less than 15 min". When those who did divert were asked to what extent they agreed or disagreed with the statement, "In general I am satisfied with the outcome when I take an alternate route", the mean response fell between "Somewhat Agree" and "Neither Agree Nor Disagree", but closer to "Somewhat Agree" (B l6/A14). Note again, that the responses reported here were essentially the same for both the Before and After studies.

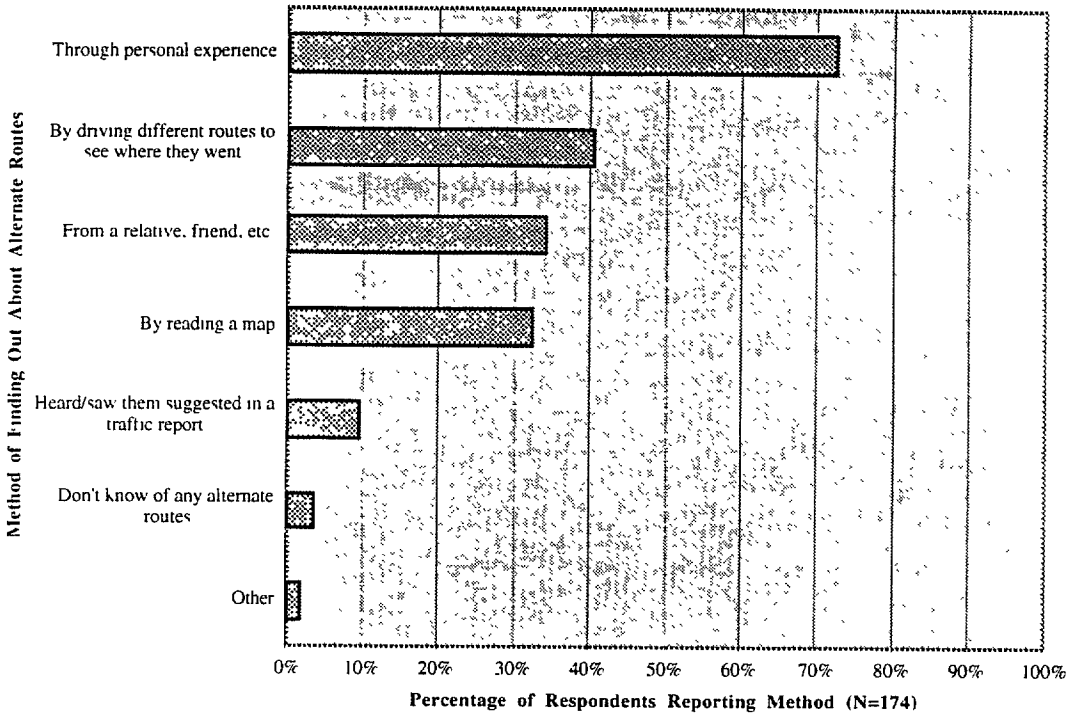


Figure 3: How did you find out about these alternate routes for your commute? (B11/A10)

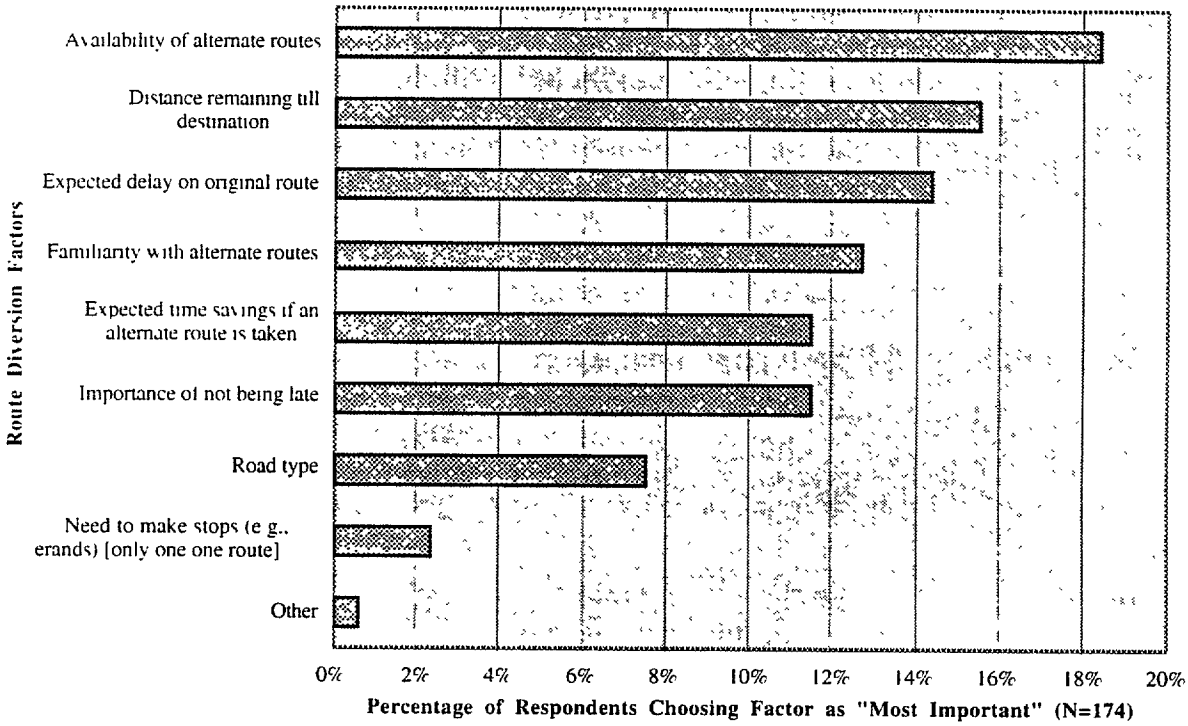


Figure 4: If you encounter unexpected delay after you start driving on your commute, what 3 factors do you consider most important in deciding whether or not to leave your usual route and take an alternate route instead? (B2)

Traffic Information

A basic premise of this study was that traffic information can play a strong positive role in the everyday commute of individuals. The survey asked a number of questions to improve understanding of what customers really desire in a traffic information system. For example, the study asked subjects to select from a list the five most important things that they might want a traffic information system to do for them and then rank those five items from most important to fifth most important. Figures 5a and 5b show the items that subjects ranked most important and in the top three in importance, respectively. Information on unexpected heavy traffic, construction, and diversion advice were each selected by about 19% of subjects as the most important piece of information. These were closely followed by a desire to hear about unexpected delay and incidents. The picture changes slightly when the items selected as the top three most important are considered: incidents top the list with about 82% of subjects selecting this information, which is closely followed by a desire to find out about unexpected delays. Interestingly, in response to another question, 57.6% of subjects reported that they would want a traffic information system to provide them with information relevant only to where they want to go whereas 42.4% of the subjects wanted information for the whole metro area (B21/A17).

The study also asked many other questions regarding traffic information. The results from a few of these questions are highlighted here. Figure 6 shows that subjects tune into traffic information primarily for two reasons: habit and observation, e.g., seeing bad weather or slowing traffic. Figure 7 reveals that 60% of subjects think that both government and private companies should provide traffic information, roughly 30% think that private companies alone should provide the information, and that only about 8% think that government alone should provide such information. One should not read too much into this response, however, as the data might have been significantly different if the question were whether or not the government should invest in disseminating information that had already been collected through taxpayer support; a question that should be asked as part of further study. The same argument might apply to the data to Figure 8, which indicates that the majority of respondents thought that traffic information should be funded primarily by those who are using it.

Another valuable piece of information obtained from the subjects, and shown in Figure 9, shows that roughly one quarter of subjects consider the most important thing that the government should be doing with transportation tax dollars is building/improving roads. Assisting motorists in need is considered most important by slightly less than a quarter of subjects. About one in six subjects chose improving traffic information as most important and another sixth chose improving transit/rideshare. A plot of the top 3 most important investments follows essentially the same pattern. except that clearing incidents faster increases in importance and surpasses improving transit/rideshare, which decreases in importance. Clearly traffic information should be a priority for government, but taking care of the road network is even more important.

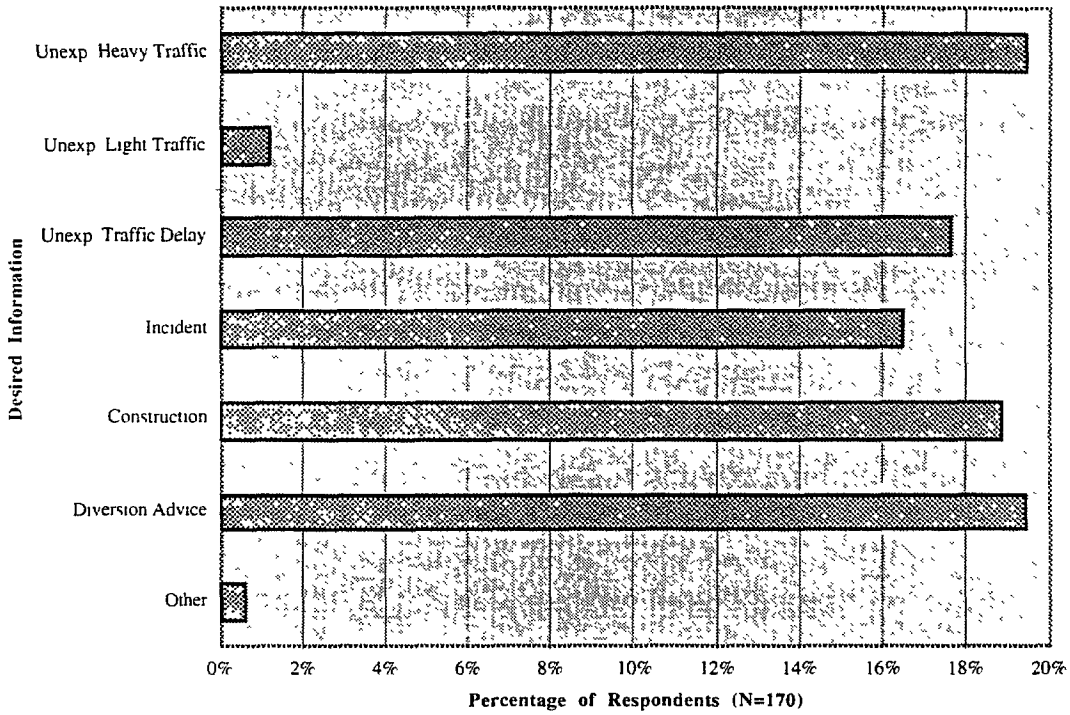


Figure 5a: What is the most important thing that you might want a traffic information system to do for you? (B20/A16)

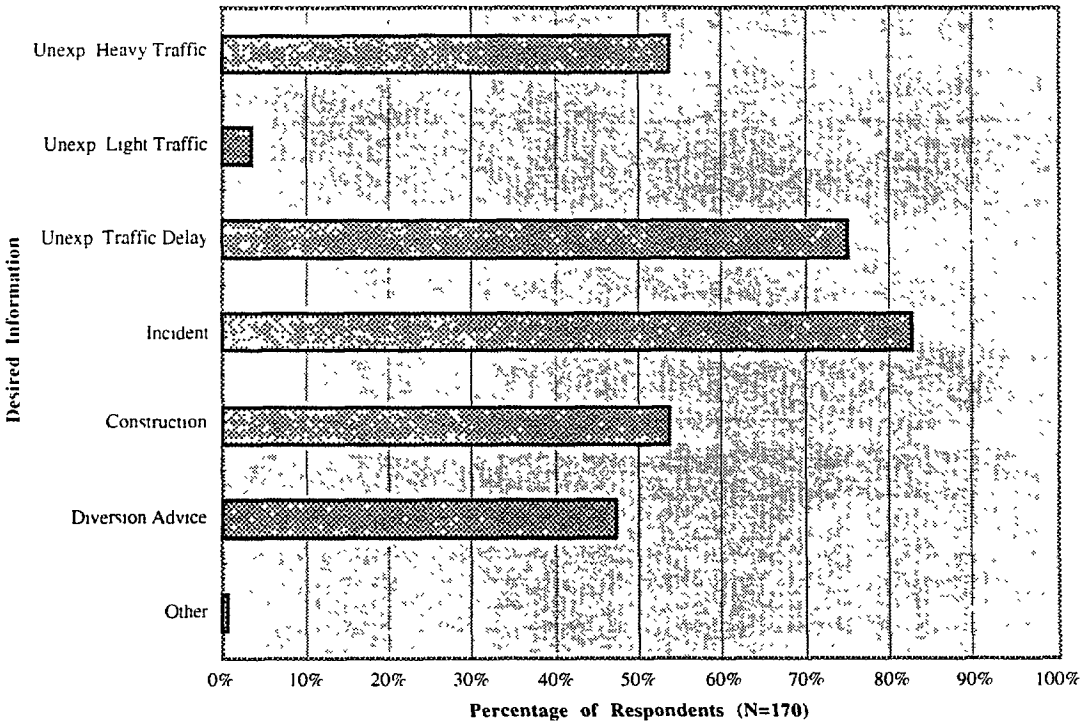


Figure 5b: What are the top three most important things that you might want a traffic information system to do for you? (B20/A16)

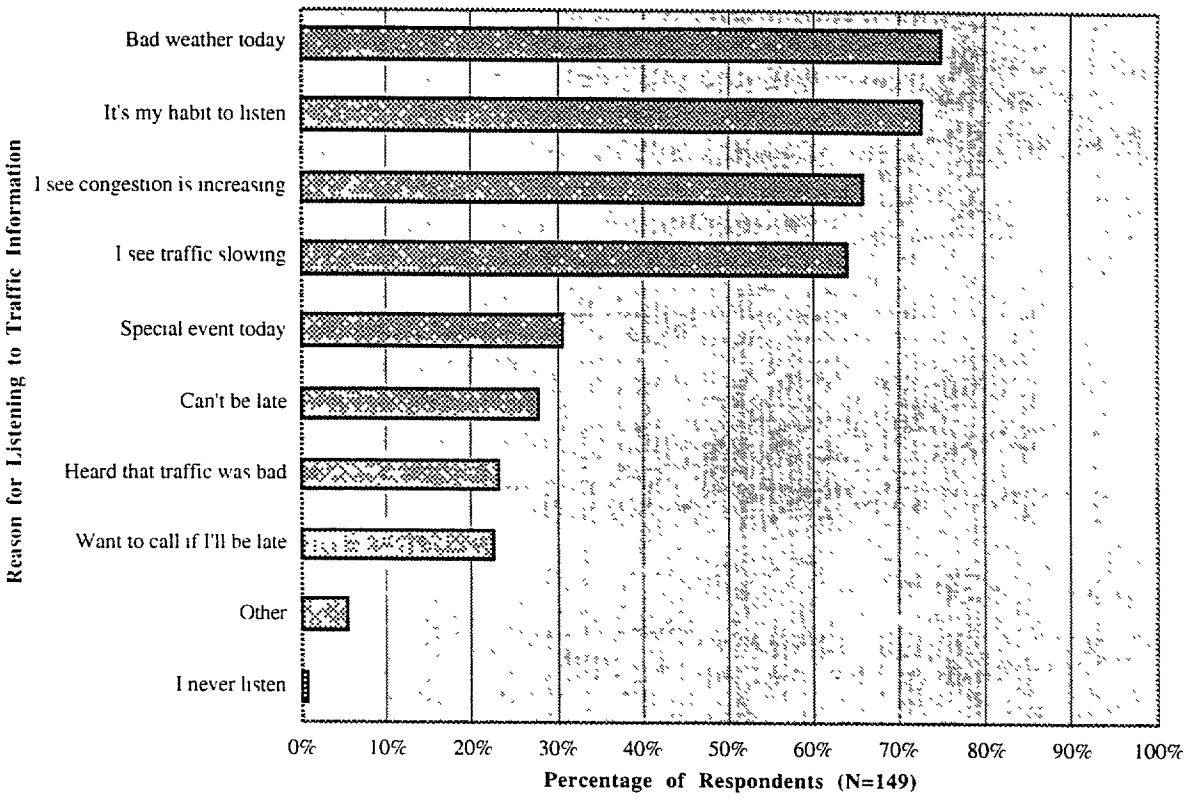


Figure 6: During your commute, what might make you think to listen to traffic information? (B18)

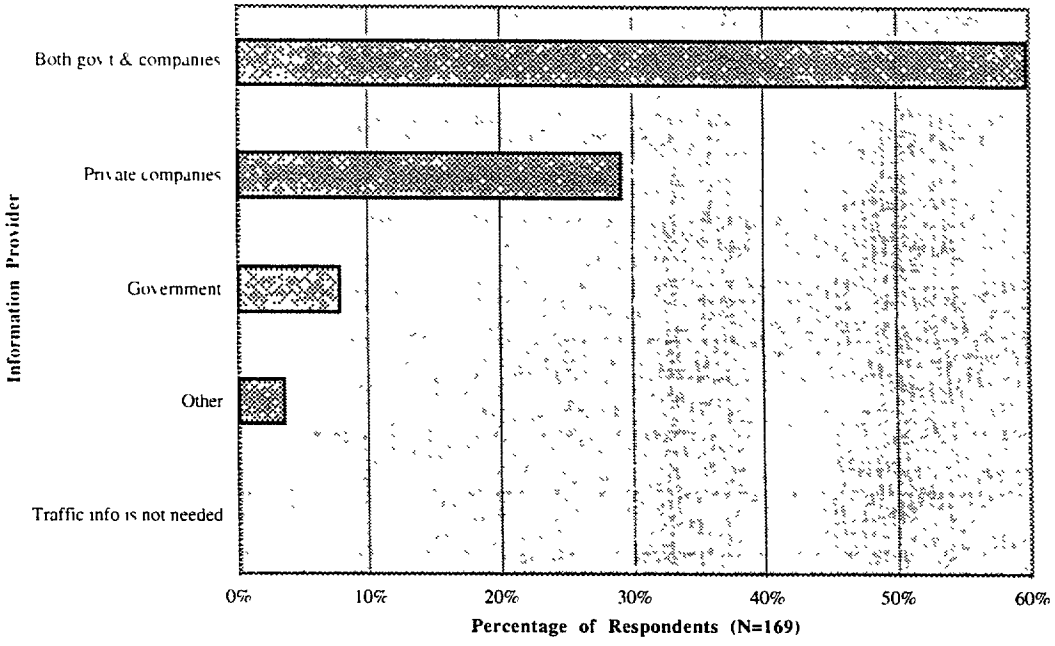


Figure 7: Who should provide traffic information? (B23/A19)

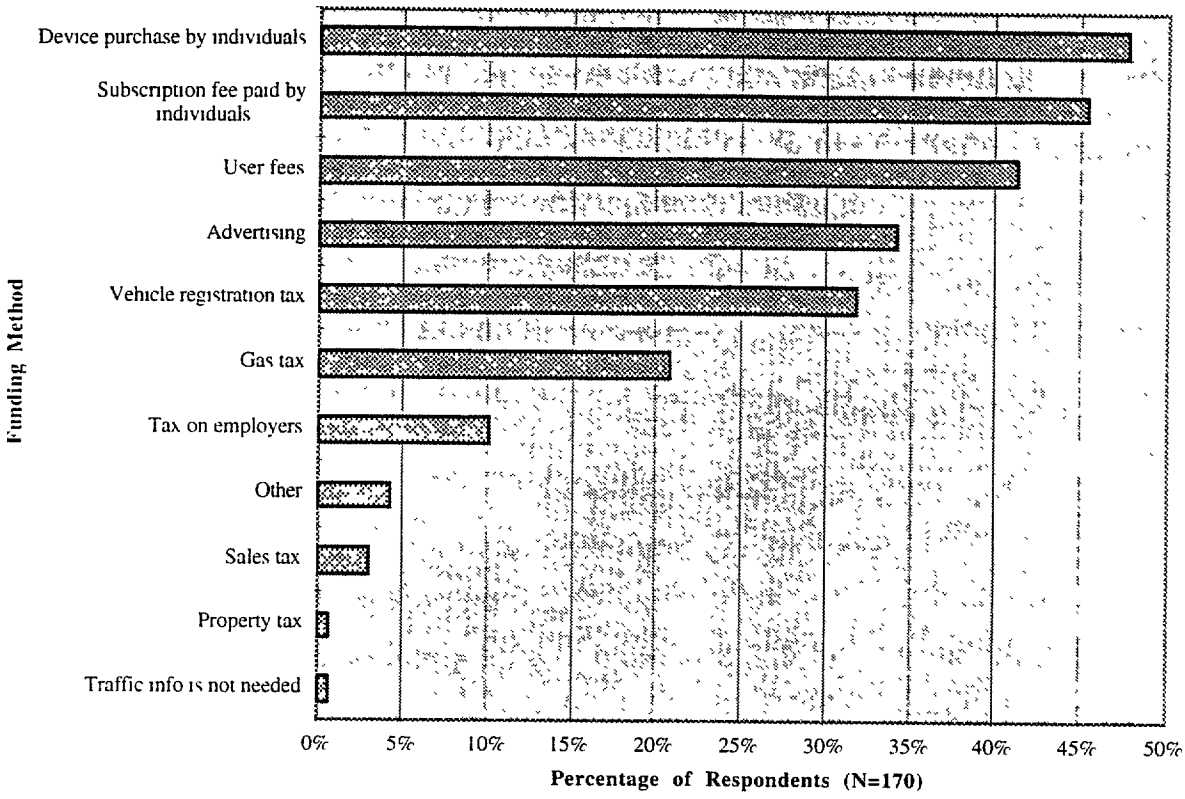


Figure 8: How should traffic information be paid for? (B24)

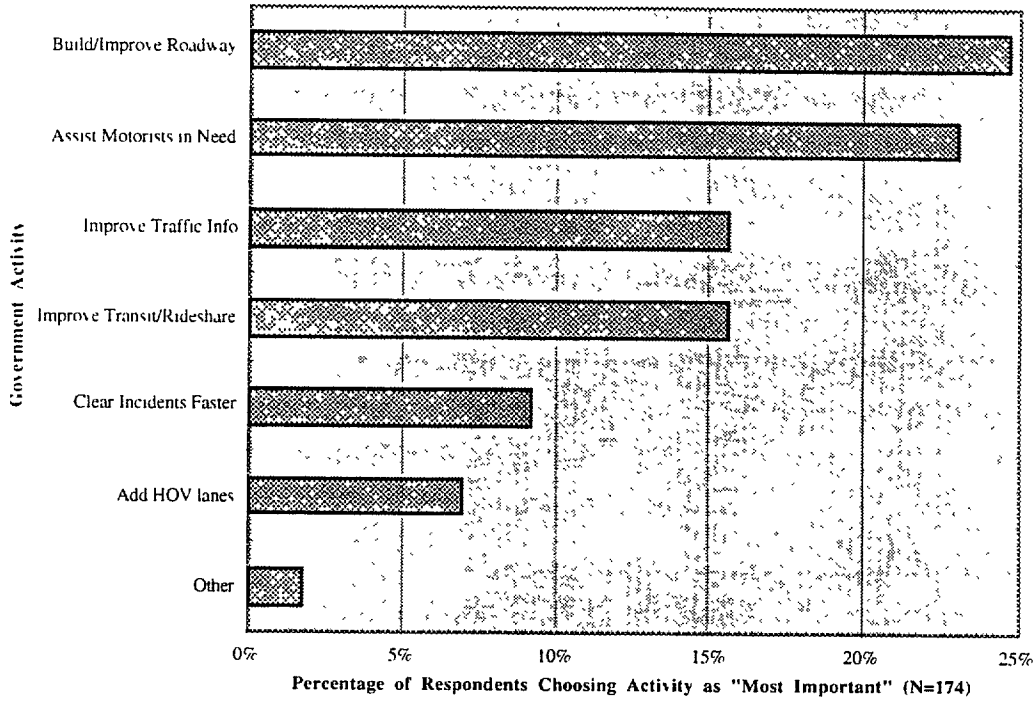


Figure 9: What is the most important thing that the government should be doing with transportation tax dollars? (B25)

How subjects use traffic information is just as important as what they think of it. Therefore, the study asked a number of questions to determine subject use of information. A summary of subject response to these questions is given in Figures 10 through 14. Each of these figures refers to subject's home-to-work commute during the 8 weeks of the test.

Clearly evident from Figure 10 is that the subjects consistently use commercial radio to access traffic reports. Only about one third of subjects typically access television traffic reports with a slightly higher number using changeable message signs. Subjects used the systems tested in DIRECT at a high level during the test, which can be expected given that this was a test. but to a lesser degree than commercial radio. Figure 11, which shows the reported frequency with which subjects use traffic information, presents a picture quite analogous to that in Figure 10.

Figure 12 shows the response subjects give when asked for which portion of their trip that they use the traffic information system. Radio use is equally divided between "only during the trip" and "both before and during the trip". Reported use of the Phone system in DIRECT followed a similar pattern but with a slight preference for "both". AHAR, LPHAR, and RDS/SCA subjects for the most part reported using the system "only during the trip". This response is reasonable for AHAR and LPHAR given that the systems are only available to subjects while they are traveling through the test area. The RDS/SCA system was such that subjects in this group could have received messages before starting their trip, provided that their home was within the radio coverage area and also provided they went out to their car to listen and then came back in, which is not very likely. (If subjects stayed in their car and left on the trip they probably reported that they used the information during the trip as opposed to before the trip). In a mature RDS/SCA system, the technology needed to access the radio reports would probably be included in home-use radios so that people could receive the traffic reports before starting their trip. From these responses, it seems that subjects wish to have traffic information available to them prior to going out to the car and starting their trip.

In spite of this, Figure 13 reveals an average subject response that states that subjects do not rely on traffic information when deciding to leave home. Even the highest rated system, commercial radio, only merited a response between "did not rely on at all" and "did not rely on very much". Perhaps the information may only rarely provide a message of sufficient importance to cause a driver to alter their routine departure time. Nevertheless, although the information does not appear to affect the departure decision, it may well provide a benefit to drivers through reducing uncertainty regarding traffic conditions and also help them in other ways, such as in choosing a route.

Figure 14 may support the latter hypothesis in that it reveals that subjects are somewhat more likely to rely on a traffic information system(s) when choosing their route before starting their trip than they are to change their departure time. The response otherwise follows that for Figure 13 and the highest response is still close to the "did not rely on very much" category.

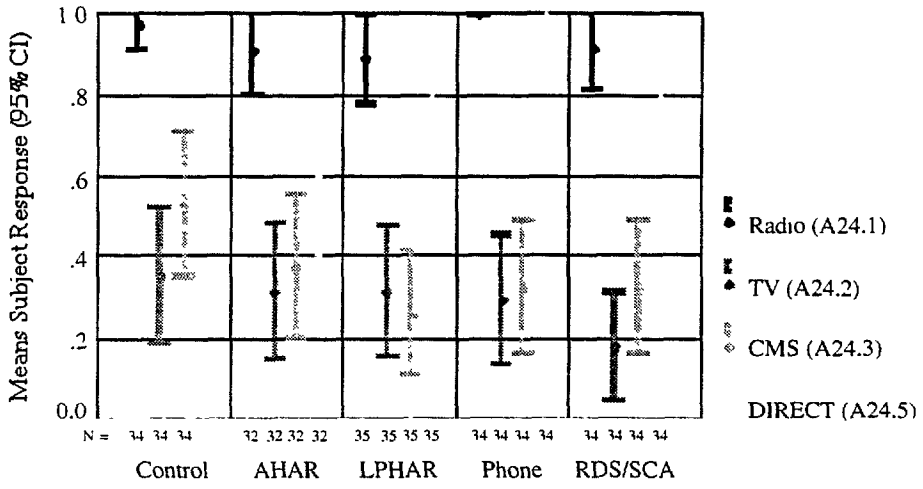


Figure 10: Which traffic information system(s) did you typically use? (B26/A24)
[0: did not use; 1: did use]

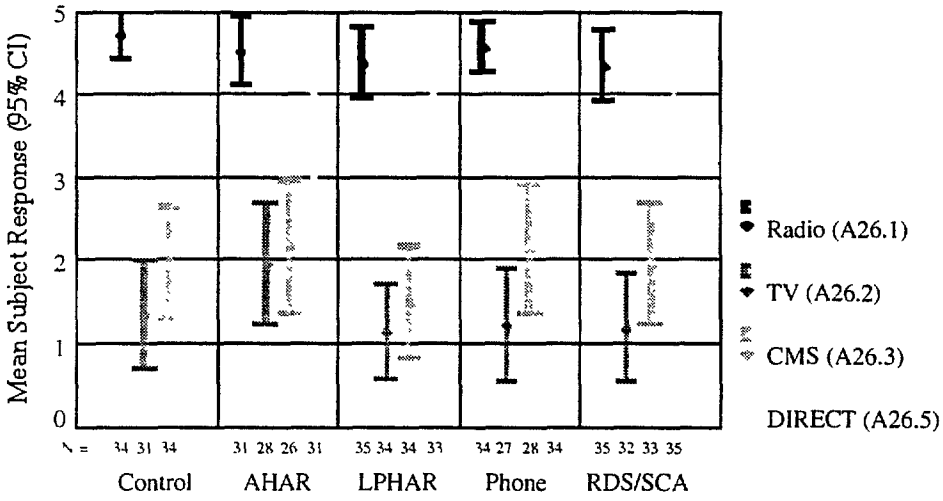


Figure 11: How would you describe your typical use of traffic information system(s)? (B29/A26)
[0: did not use; 1: used less than once a week; 2: used 1 time a week; 3 used a few times a week;
4 used 1 time a day; 5 used 2 or more times a day]

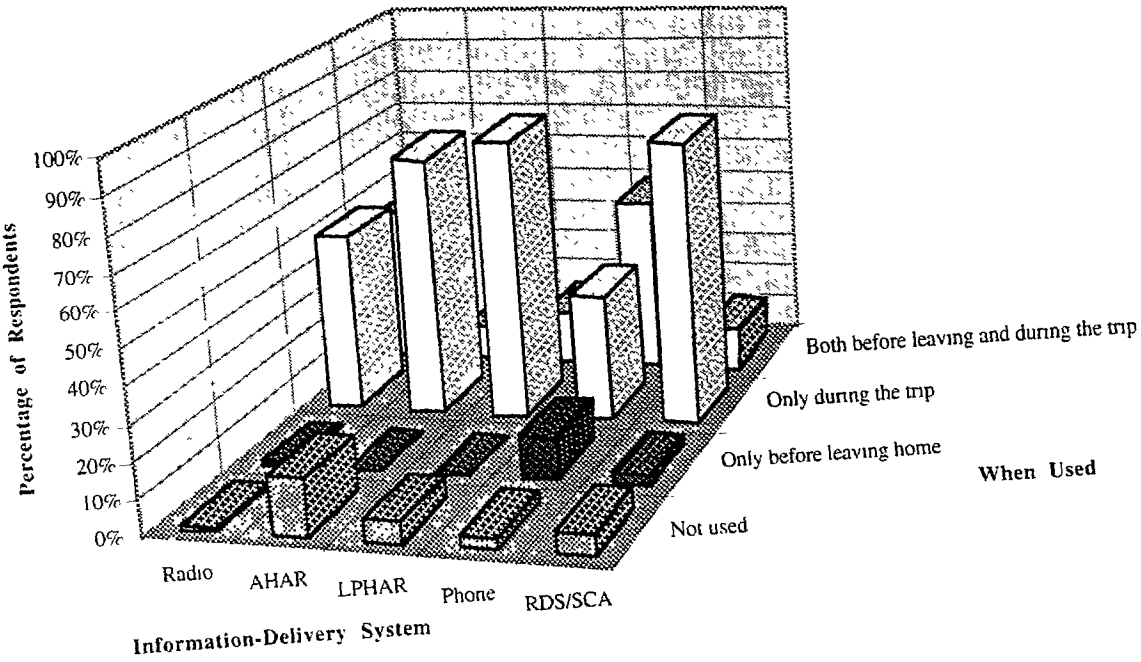


Figure 12: When did you typically use traffic information system(s)? (B28/A25)

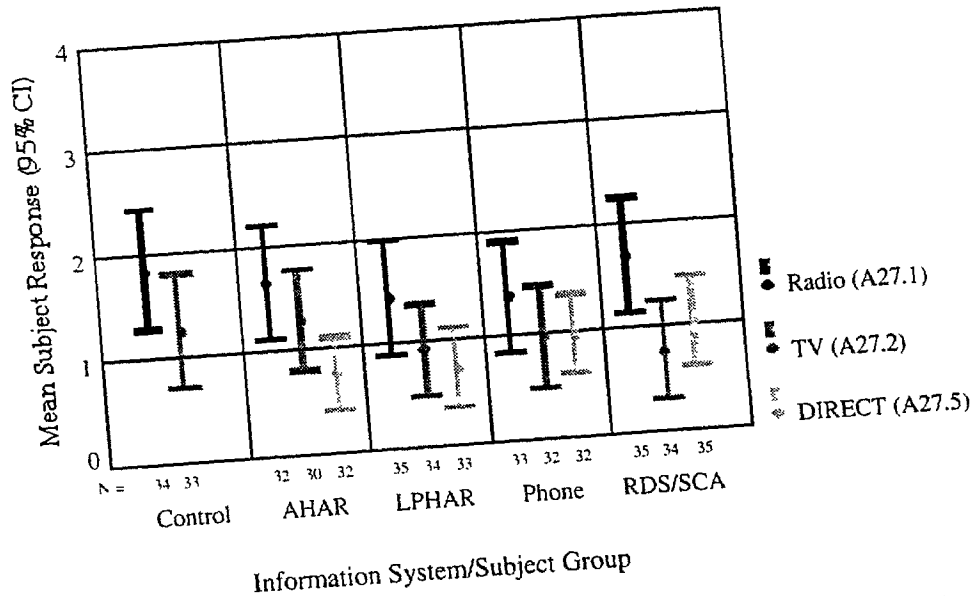


Figure 13: To what extent did you rely on traffic information system(s) in deciding when to leave home? (B30/A27)

[0: did not use; 1: did not rely on at all; 2: did not rely on very much; 3: rely on somewhat; 4: rely on very much]

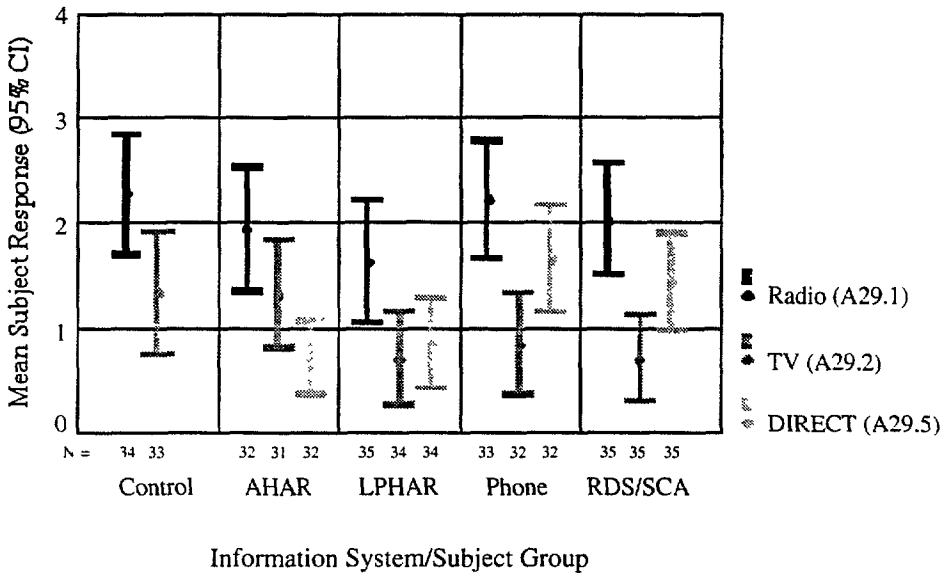
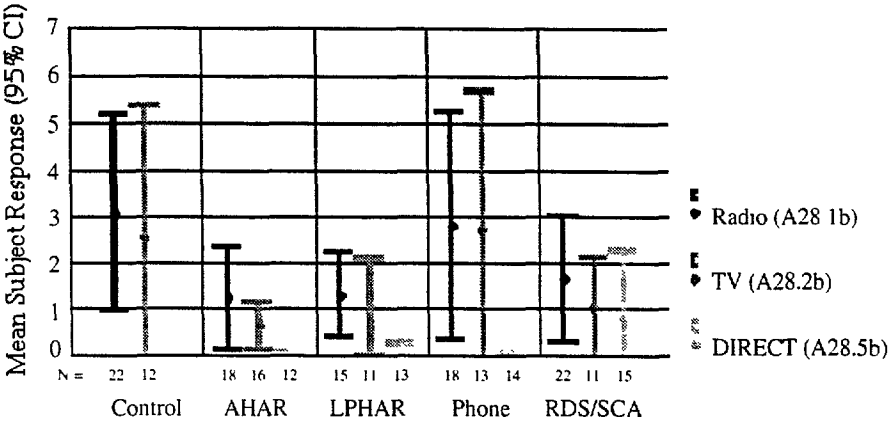


Figure 14: To what extent did you rely on traffic information system(s) when you chose a route before leaving home? (B32/A29)
[0: did not use; 1: did not rely on at all; 2: did not rely on very much; 3: rely on somewhat; 4: rely on very much]

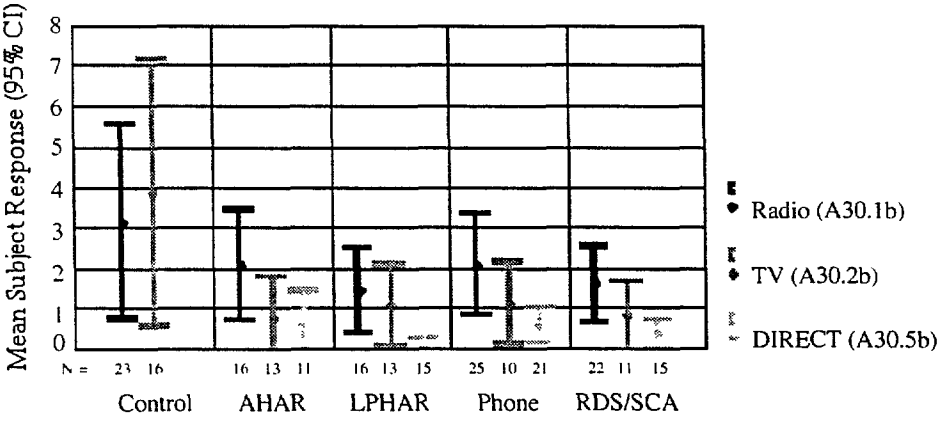
An important aspect of "using" traffic information is any changes in travel behavior that might arise from that use. Therefore, the study asked a number of questions, in addition to those reported in Figures 13 and 14, to determine subject behavior in response to traffic information. A summary of subject response to these questions is given in Figures 15 through 18. As above, these figures refer to subjects' home-to-work commute during the 8 weeks of the test. Since these figures deal with changes in behavior, an additional piece of information is provided at the bottom of each figure; the number of subjects who did not use the information-delivery system in question. As evident from the figures, in response to a number of questions a significant number of subjects reported having not used that system for that purpose. Since the mean responses shown in the figures are for only those who did use the relevant system, the actual average across subjects is much lower than shown in the figures. The use-don't use distinction was made in these figures to illustrate that although the average change in behavior for a population might be low, there might still be certain subsets of that population who will in fact change their behavior much more often. As shown in Figures 15 through 17, however, "much more often" in this case is still only a few times over the average 40-day participation in the test. In line with previous observations, the figures also show that commercial radio is the most influential of the available systems in changing behavior. Moreover, when subjects had access to one of the DIRECT systems, they still relied on commercial radio, although to a much lesser degree. This suggests that the DIRECT systems might be more of a complement to commercial radio traffic information, rather than a substitute. (Unfortunately, it might also indicate that the DIRECT systems were seen as unreliable.) One further observation, from Figure 18, is that subjects rarely cancel a commute trip because of a traffic information system. This is not unreasonable given the severe implications of canceling such a trip and the rarity of need for such action. Nevertheless, information could play a significant role in alerting travelers on those rare occasions when travel should be avoided.



subjects by method reporting: Didn't Use Radio= 12, 14, 20, 16, 13,

Didn't Use TV= 19, 14, 23, 20, 24; Didn't use DIRECT= NA, 18, 21, 18, 19

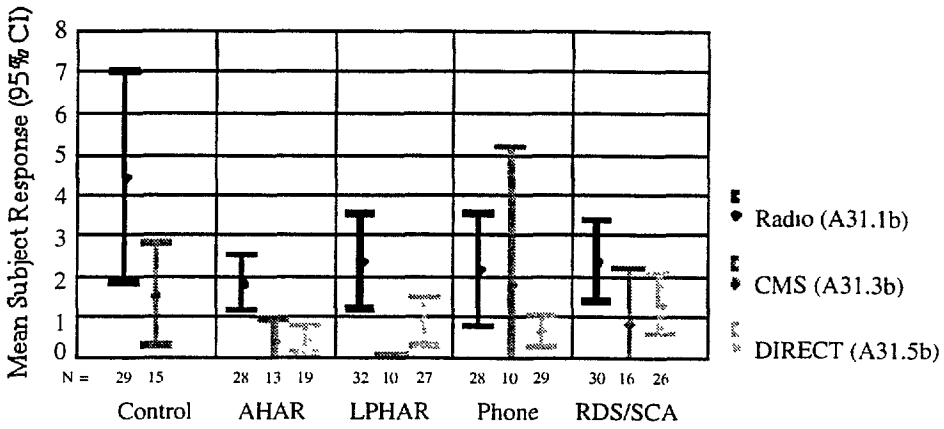
Figure 15: How many times did you change the time you planned to leave home because of a traffic information system? (B31/A28)



subjects by method reporting: Didn't use Radio= 10, 16, 19, 9, 13

Didn't use TV=17, 17, 21, 21, 24, Didn't use DIRECT= NA, 21, 19, 10, 20

Figure 16: How many times did you change your route before leaving home because of a traffic information system? (B33/A30)

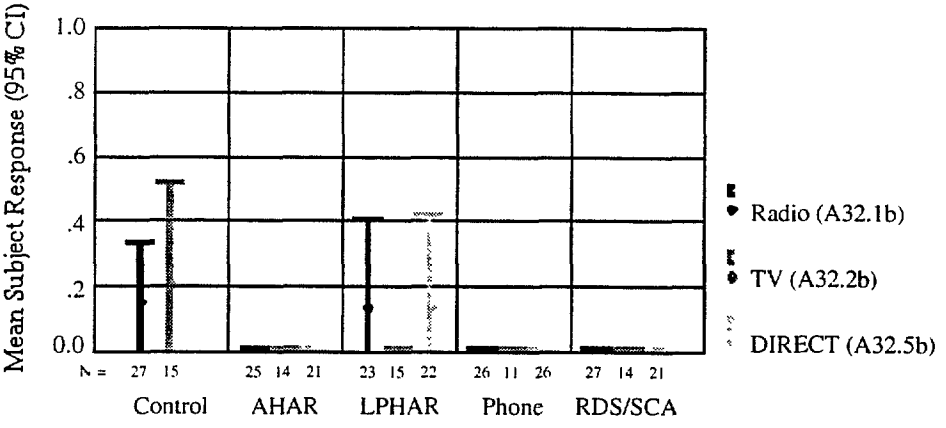


Information System/Subject Group

subjects by method reporting: Didn't use Radio= 4, 4, 2, 4, 4

Didn't use CMS= 17, 17, 21, 21, 15; Didn't use DIRECT= NA, 13, 6, 4, 9

Figure 17: How many times did you change your route during the trip because of a traffic information system? (B34/A31)



Information System/Subject Group

subjects by method reporting: Didn't use Radio= 7, 6, 12, 7, 8

Didn't use TV= 18, 16, 19, 20, 21. Didn't use DIRECT= NA, 10, 12, 6, 14

Figure 18: How many times did you cancel your commute because of a traffic information system? (B35/A32)
[0: did not; 1 did]

Perceptions of DIRECT

Through the evaluation questionnaires, subjects were asked a number of specific questions regarding DIRECT. In addition, subjects were invited to provide their thoughts regardmg DIRECT through a variety of other means including open-ended invitations to comment on the questionnaires, a driver notebook, and phone interviews. A summary of subject response to the questionnaires and subject comments are recorded in Appendix G. The “raw data” from the questionnaires is provided in Appendix H.

All in all, as shown in Figure 19, subjects felt that the tested information system they experienced was easy to use. However, as shown in Figure 20, the DIRECT systems were perceived as not having operated as they should have, i.e., system implementation did not live up to system promise. Perhaps as a result, Figure 21 reveals that a number of subjects reported being “very dissatisfied” with the DIRECT system that they used and the average response of this measure was quite low. Nevertheless, the discussion in this section will reveal that subjects felt that at least some of the tested information-delivery systems have significant potential, once the implementations are more mature. The discussion is divided into two parts: performance and benefit of the systems and comparison of the systems.

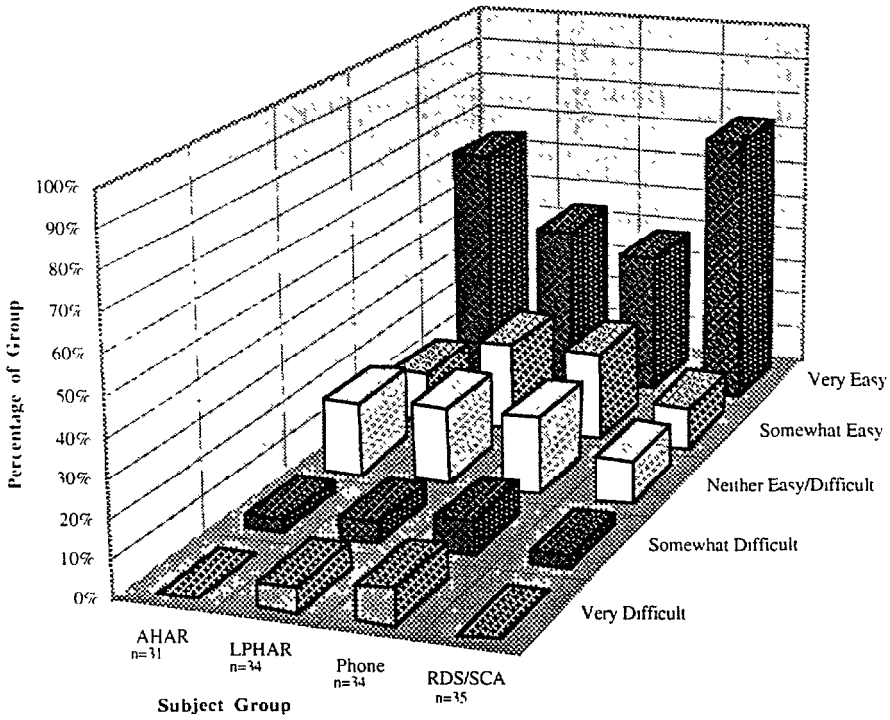


Figure 19: Which line best describes your experience in operating the DIRECT system? (A.56)

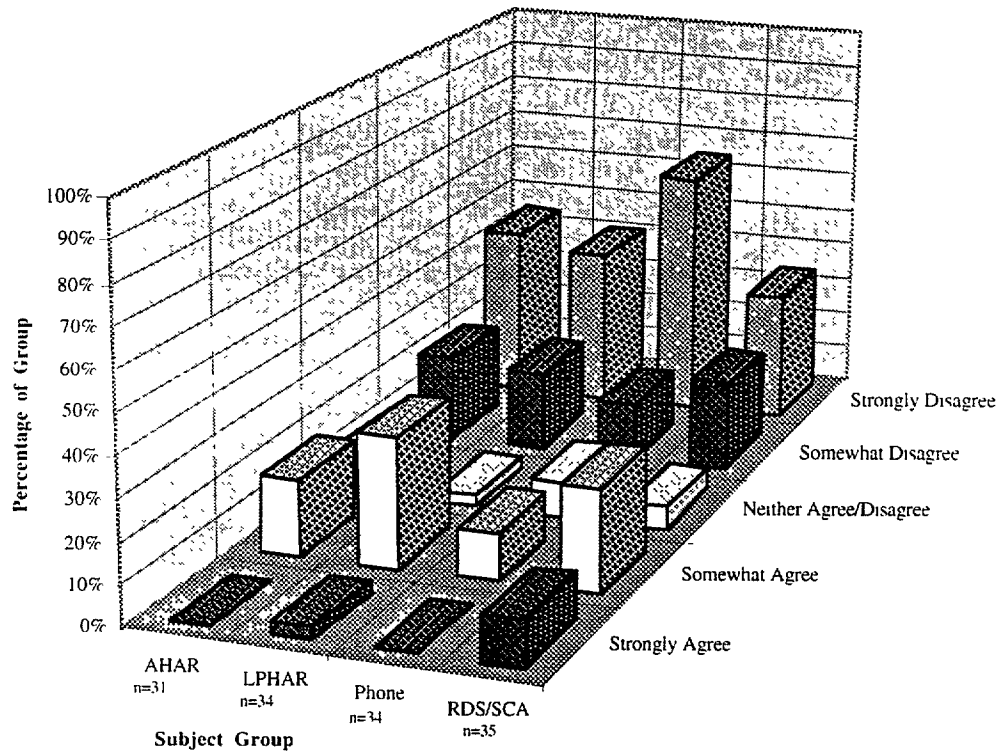


Figure 20: To what extent do you agree or disagree with the following statement: "Based on the information I was given, I believe the information system tested in DIRECT operated as it was intended to." (A55)

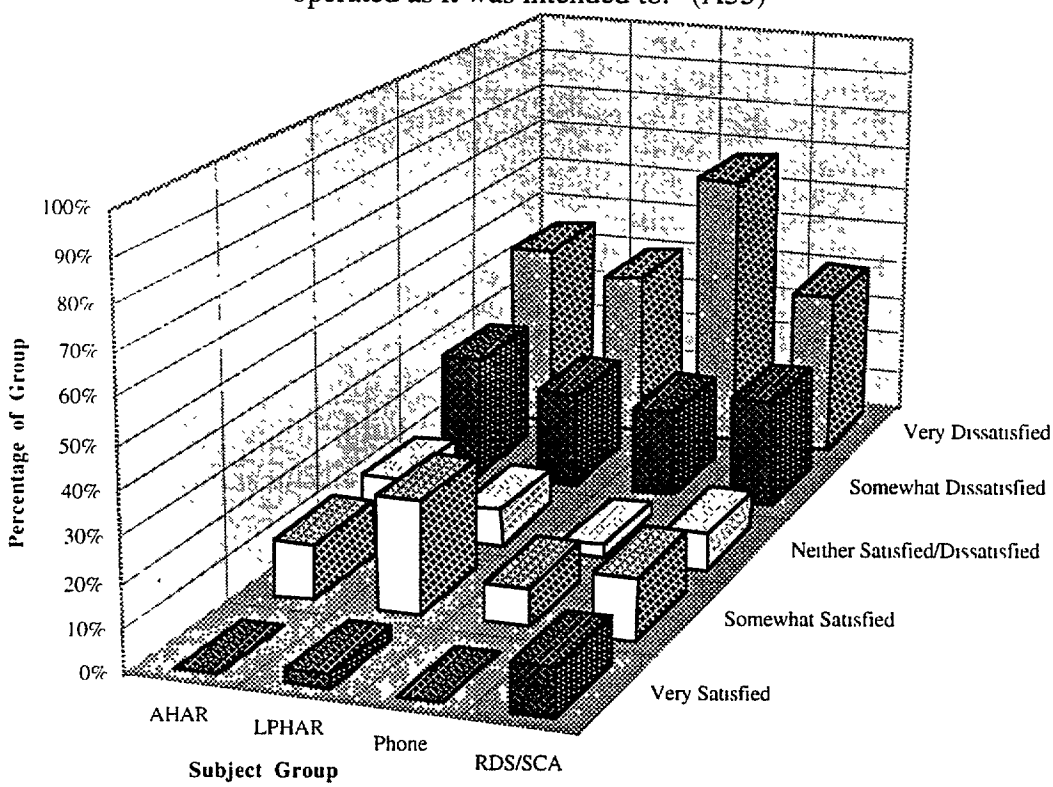


Figure 21: Overall, how satisfied were you with the DIRECT traffic information system available to you during the past 8 weeks? (A59)

Performance and Benefit of the Systems

Three sets of questions were foundational to the study in terms of determining subject perceptions regarding traffic information systems. The first set asked subjects to rate system performance, the second asked about the benefit of using the system, and the third asked about ways to improve the system under consideration. Unless otherwise indicated, the response categories in each case were: 1-Strongly Disagree, 2-Somewhat Disagree, 3-Neither, 4-Somewhat Agree, and 5-Strongly Agree. In the following figures, this scale implies that, with one exception that will be pointed out, "higher up" on the vertical axis is a more positive response, i.e., a more favorable rating of the system in question. Moreover, each plot will show the five test groups: Radio (for commercial radio, the prime source of information for the control group), AHAR, LPHAR, Phone, and RDS/SCA. The reader must keep in mind, however, that the latter four groups also had access to commercial radio. Moreover, all five groups had access to television traffic information and changeable message signs. All subjects in fact answered questions regarding these systems; subject thoughts about radio were asked both before and after, about TV and CMS only before, and about DIRECT systems only after. That is, the data set is of the form shown in Figures 22a and 22b, which present the average of a number of responses regarding the subject-perceived performance and benefit of traffic information provided via commercial radio, television, changeable message signs, and the four systems in DIRECT. Since these figures can in some sense make data interpretation difficult, the majority of figures in this section suppress the radio response for all but the control group and the TV and CMS response for all groups. Figures 22a and 22b do, however, reveal that subjects prefer traffic information via commercial radio to that from television, which is in turn preferred to information via changeable message signs.

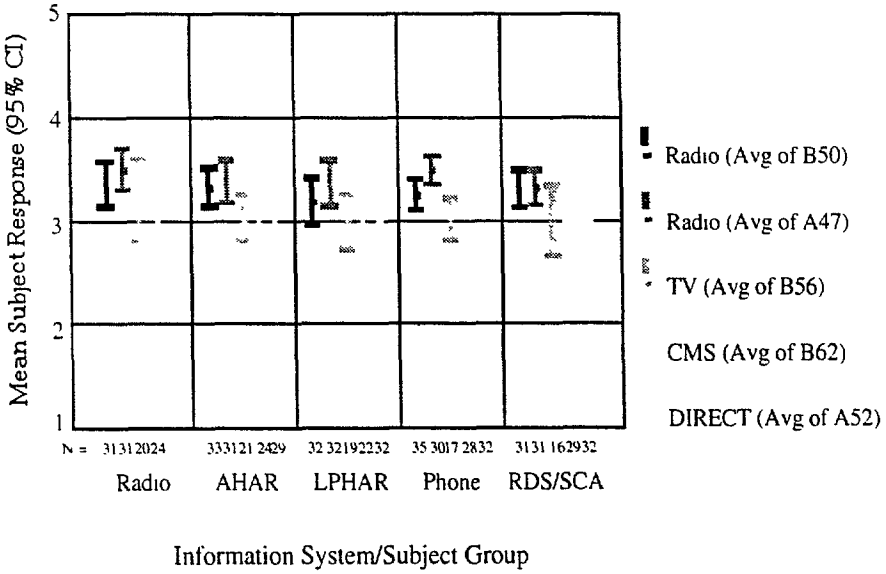


Figure 22a: "The Traffic Information System Performs Well"
[1-Strongly Disagree, 2-Somewhat Disagree, 3-Neither, 4-Somewhat Agree, and 5-Strongly Agree]

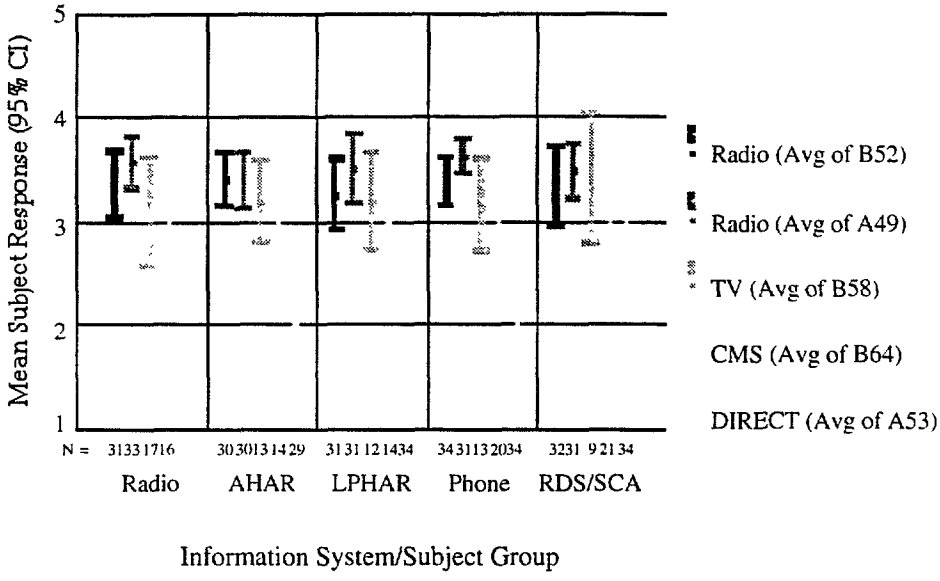
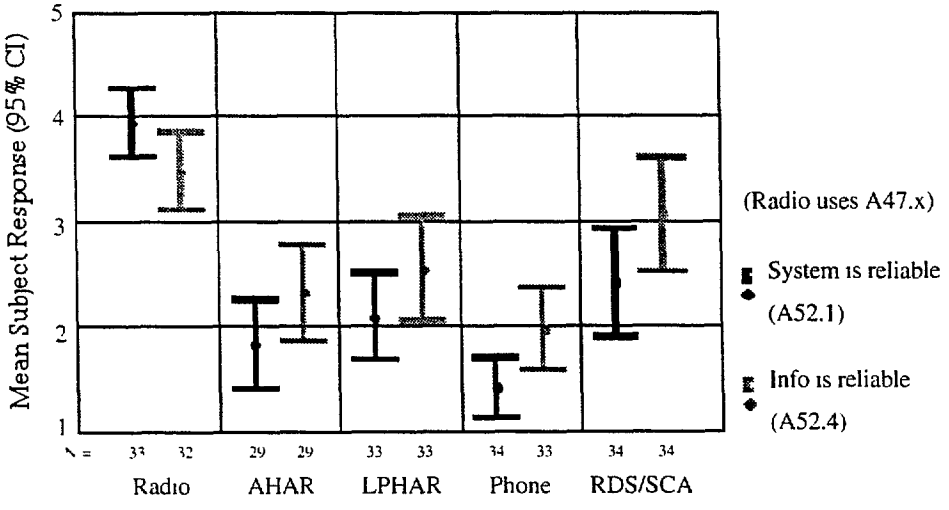


Figure 22b: "The Traffic Information System Produces Benefits"
[1-Strongly Disagree, 2-Somewhat Disagree, 3-Neither, 4-Somewhat Agree, and 5-Strongly Agree]

The first set of questions focused on eliciting subject perception regarding the performance of the information-delivery systems with respect to 15 measures, which can be divided into four factors as shown in Table 6. Subjects were asked to rely on their familiarity with the traffic information systems and indicate the extent to which they agreed or disagreed with each of the 15 measures of system performance as a fitting description of the systems (A47 for commercial radio, A52 for DIRECT systems). Subject response to the four factors (reliability, information content, information targeting, and human factors quality) is shown in Figures 23a, 23b, 23c, and 23d, respectively. The most outstanding feature of Figure 23a is that subjects perceived the DIRECT systems to be much less reliable than commercial radio. Similarly, Figure 23b shows radio to be perceived as better on most if not all information content measures. Figure 23c, however, shows that DIRECT is perceived as more route specific and available on demand than radio. Figure 23d has radio as much less distracting than the DIRECT systems but also less able to catch ones attention than AHAR or RDS/SCA. What does this mean? Given the perceived low level of reliability for the DIRECT systems, the results for the other measures are difficult to interpret. That is, the fact that subjects perceived the implementation of the DIRECT systems to be unreliable likely had a negative influence on their perception of the quality of the other measures. Nevertheless, the DIRECT systems, even as implemented, were rated as higher than commercial radio on measures such as "route specific", "available on demand", and "catches ones attention", with the RDS/SCA system being slightly to somewhat better than the other systems tested on a number of measures. These perceptions would clearly improve once the DIRECT systems are implemented at a level of reliability that meets with subject satisfaction.

Table 6: System Performance Factors

Factor	Measure; The traffic information system:	Phrase used in figures
Reliability	is reliable	(System is reliable)
	provides reliable information	(Information is reliable)
Information Content	includes all the info I need to know	(System has all info)
	provides accurate information	(Is accurate)
	gives the reason for delays	(Tells why)
	gives the expected length of delays	(Estimates delay)
	suggests appropriate alternate routes	(Suggests alt rtes)
Information Targeting	is specific to my commute	(Route specific)
	reports incidents soon after they happen	(Fast reports)
	presents reports frequently enough	(Frequent reports)
	provides information on demand	(On demand)
Human Factors Quality	is easy to use	(Easy to use)
	is convenient to use	(Convenient)
	catches my attention	(Catching)
	is distracting	(Distracting)



Information System/Subject Group

Figure 23a: Perceived System Reliability

[1-Strongly Disagree, 2-Somewhat Disagree, 3-Neither, 4-Somewhat Agree, and 5-Strongly Agree]

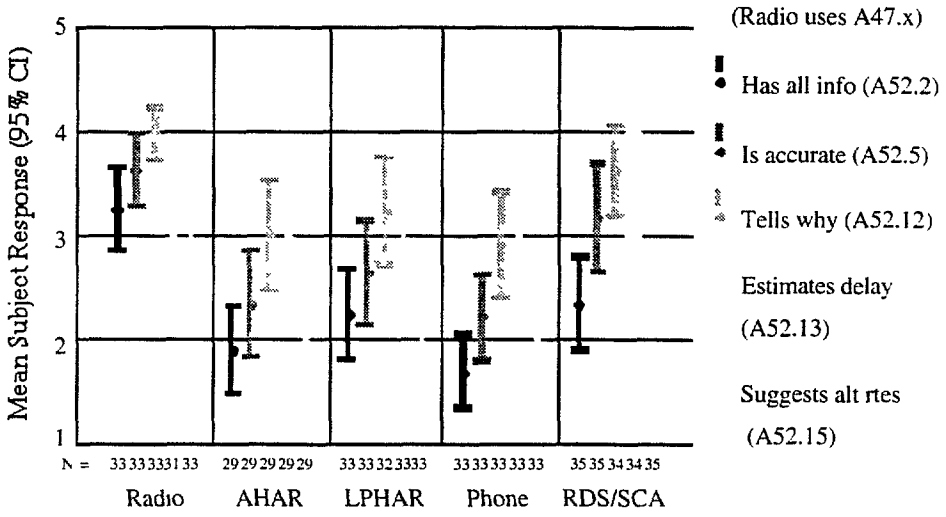


Figure 23b: Perceived System Information Content

[1-Strongly Disagree, 2-Somewhat Disagree, 3-Neither, 4-Somewhat Agree, and 5-Strongly Agree]

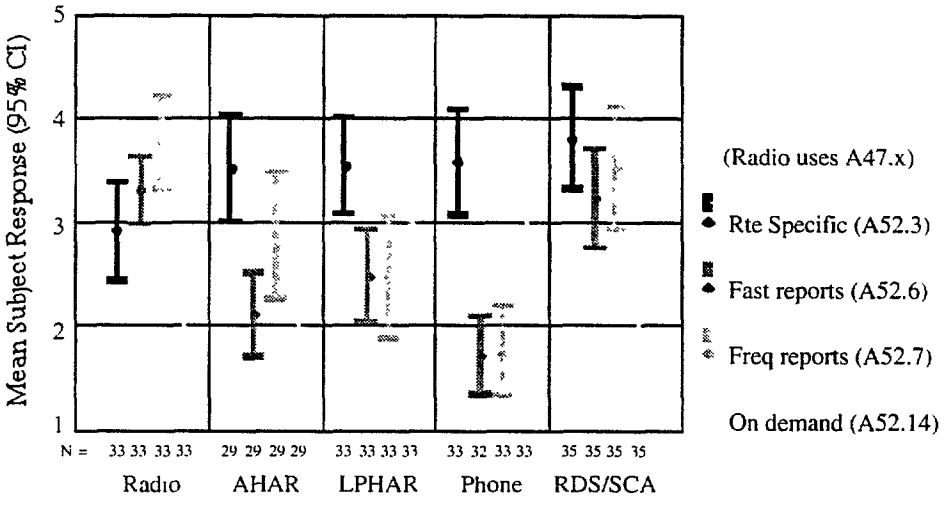


Figure 23c: Perceived System Information Targeting

[1-Strongly Disagree, 2-Somewhat Disagree, 3-Neither, 4-Somewhat Agree, and 5-Strongly Agree]

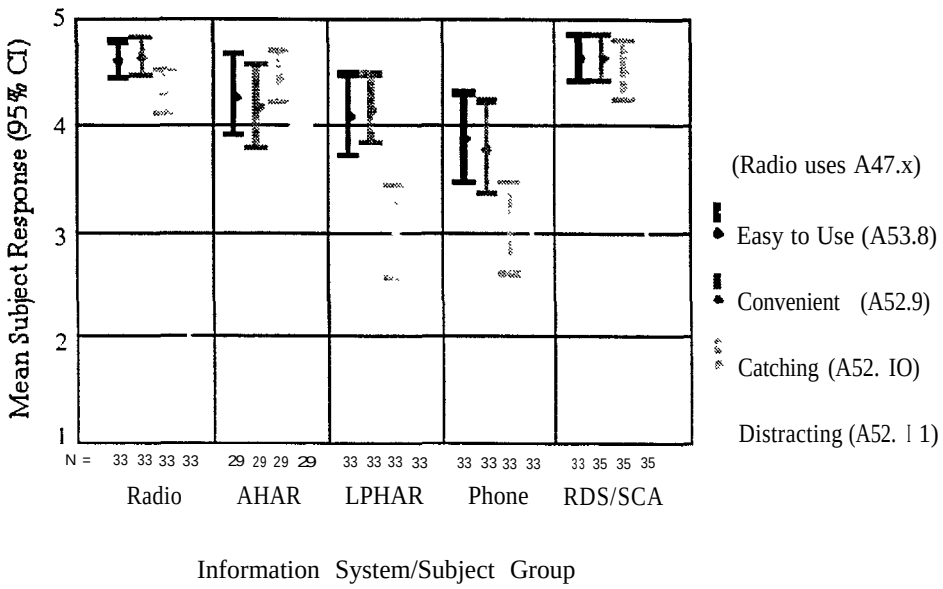


Figure 23d: Perceived System Human Factors Quality

[I -Strongly Disagree. 2-Somewhat Disagree, 3-Neither, 4-Somewhat Agree. and 5-Strongly Agree]
(For the Distracting rating only, a smaller number is better.}

The second set of questions focused on eliciting subject perception regarding the benefit of using the information-delivery systems with respect to 9 measures, which can be divided into two factors as shown in Table 7. Again, subjects were asked to rely on their familiarity with the traffic information systems and indicate the extent to which they agreed or disagreed with each of the 9 measures of system performance as a fitting description of the systems (A49 for commercial radio, A53 for DIRECT systems). Subject response to the two factors (affect and action) is shown in Figures 24a and 24b, respectively. Subjects appear quite satisfied with commercial radio as a traffic information system and are less than satisfied with all of the DIRECT systems. Again, subject perception that the DIRECT systems did not provide satisfactory benefits is likely tied to the perceived low level of reliability of these systems. Simply put, if I don't think a system works, then I'm unlikely to say that it provided me any significant benefits.

Table 7: System Benefit Factors

Factor	Measure; I found that using the traffic information system:	Phrase used in figures
Affect	satisfied my need for information	(Satisfied information needs)
	helped me make better tnp choices	(Helped my choices)
	made my commute less stressful	(Reduced trip stress)
	on the whole, improved my commute	(Improved my commute)
Action	reduced my drivmg time	(Cut trip time)
	made my driving time more certain	(Made trip time more certain)
	made my arrival time more certain	(Made arrival time more certain)
	helped me avoid congestion	(Avoid congestion)
	helped me avoid unexpected delays	, (Avoid delay)

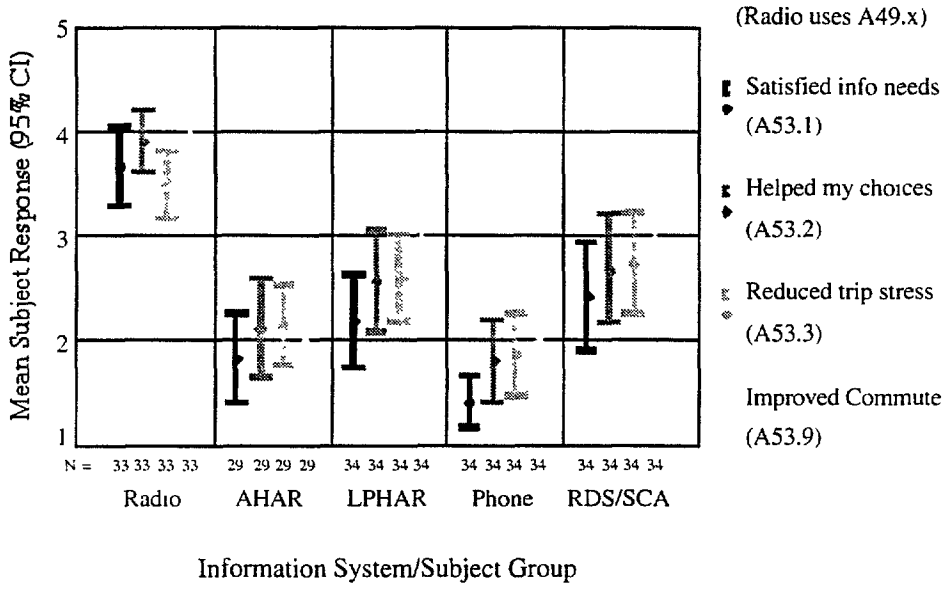


Figure 24a: Perceived System Affect Quality

[1-Strongly Disagree, 2-Somewhat Disagree, 3-Neither, 4-Somewhat Agree, and 5-Strongly Agree]

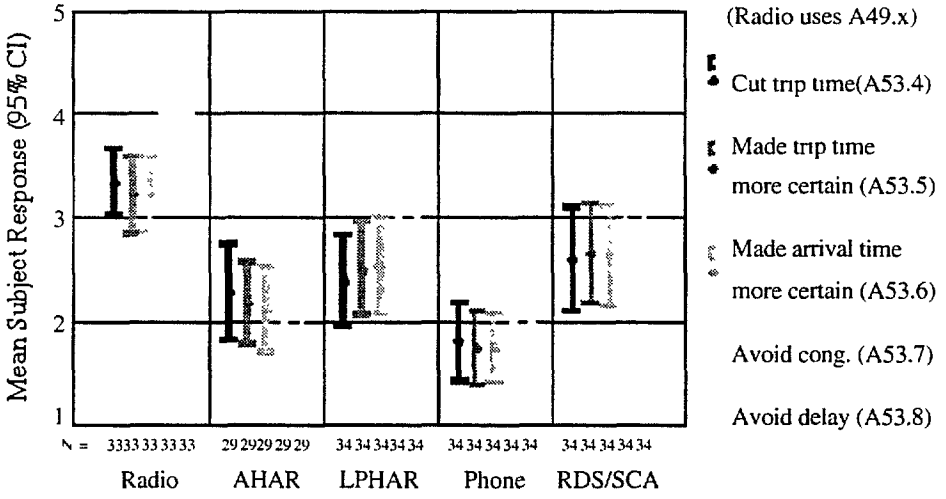


Figure 24b: Perceived System Action Quality

[1-Strongly Disagree, 2-Somewhat Disagree, 3-Neither, 4-Somewhat Agree, and 5-Strongly Agree]

The third set of questions focused on eliciting subject thoughts regarding the "most important things that would improve the traffic information system". Subject response to this question is shown in Table 8, where improvements selected by more than half of subjects within a group are highlighted in bold print. The first observation, again, is that the systems tested in DIRECT performed at a level of reliability that subjects were not satisfied with. Intuitively, this may well have a negative effect on all of the other responses. The primarily point of improvement, and thus dissatisfaction, that subjects reported with respect to commercial radio traffic information systems was that they should report incidents sooner. When implemented in a reliable fashion, the DIRECT systems, especially RDS/SCA with its regional coverage and interrupt capability, would have a distinct advantage on this point, because they report incidents as they occur and not just every 10 minutes or so.

Factor	Improvement	Radio	AHAR	LPHAR	Phone	RDS/SCA
Reliability	Improve system reliability	12%	66%	69%		**66%**
	Make info more reliable	36%	41%	49%	53%	37%
Information Content	Make info more complete	45%	28%	43%	41%	57%
	Make info more accurate	30%	44%	**51%**	**50%**	37%
	Give reason for delay	39%	6%	17%	12%	14%
	Give expected length of delay	**61%**	25%	31%	24%	29%
	Suggest alternate routes	45%	**50%**	34%	29%	**57%**
Information Targeting	Make info route specific	42%	25%	17%	3%	14%
	Report incidents sooner	**79%**	47%	40%	**53%**	29%
	Increase report frequency	39%	22%	29%	**59%**	26%
	Provide info on demand	42%	47%	26%	21%	**54%**
Human Factors	Make system easier to use	0%	0%	6%	15%	3%
	Make system more convenient	0%	3%	14%	9%	11%
	Make more attention getting	3%	0%	20%	0%	3%
	Make system less distracting	0%	31%	3%	0%	29%
Other	Other improvement	6%	25%	14%	24%	14%
	No improvement possible	0%	0%	0%	0%	0%

Comuarison of the Svstems

In addition to asking subjects to comment on the information-delivery systems individually, the After questionnaire also solicited direct comparisons of the various systems against commercial radio, television, and changeable message signs as baseline traffic information. The results of some of these comparisons are presented here,

First, subjects were asked if the DIRECT system they used was a significant improvement over existing traffic information systems. The answer, shown in Figure 25, was in essence “no” for commercial radio, but more indifferent for television and changeable message signs. Subjects similarly responded, as shown in Figure 26, that they did not prefer the DIRECT system they used to radio, but were less negative about the value of the DIRECT system when compared to television and changeable message signs.

When it comes to which traffic information system subjects like the best, Figure 27, or rely on the most, Figure 28, radio far surpasses all other systems. However, a fair percentage of the RDS/SCA subjects rated that system as the best in both of these categories, in spite of the low overall perception of the reliability of the system implementation.

The values that subjects are willing to pay to acquire the DIRECT systems are shown in Table 9. The values shown should not be relied on without carefully considering two facts. First, about a third of subjects did not respond to these questions and so the sample size, the Valid N, is low. Second, in a number of instances one or two people gave an extremely high value compared to other subjects, which, given the small sample size, skews the overall response. For example one person in the AHAR group said they would pay $500 as a one-time fee for the system, whereas most subjects would pay nowhere near that much. These “extreme” values in the data are evident from the high standard deviation values recorded in the table. The most interesting result shown in Table 9 is perhaps that over half of the subjects who did respond said the would not pay anything for the system they tested. Not surprisingly, the average likelihood to buy any of the DIRECT systems is low, as recorded in Figure 29.

However, Figures 30a and 30b are a bright spot in the study from the vantage point of the potential viability of the systems tested. These figures show that subjects reported a strong belief that the DIRECT traffic information systems could be improved to the point that they completely meet their needs for traffic information. In fact, subjects rate each of the four information-delivery systems tested as much more positive in this regard than either changeable message signs, television, or even commercial radio, with which they appear quite satisfied.

The values that subjects report being willing to pay for a traffic information system that completely meets their needs is reported in Table 10 and Figures 31a and 31b, where the figures show the median, interquartile range, outliers, and extreme cases of individual variables. Again, note the extreme values shown in the figures. Also, as shown in Table 10, on the order of 15% to 20% of subjects would not pay anything, even for a system that meets all their traffic information needs.

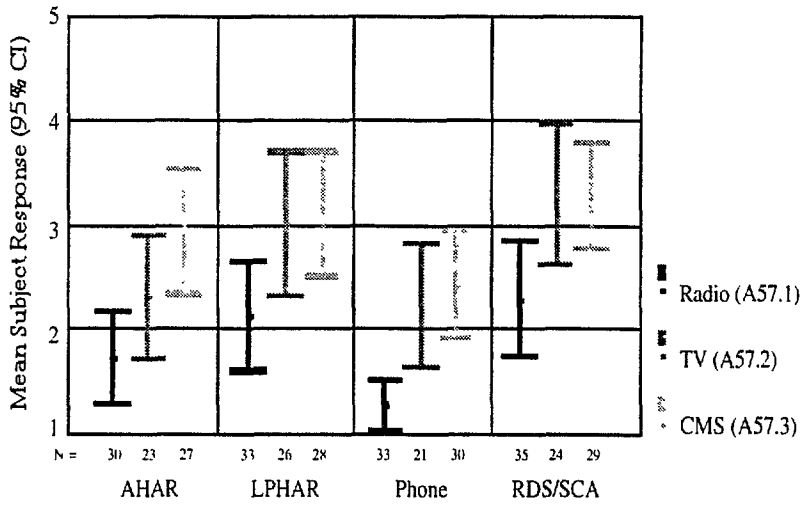


Figure 25: Overall, the DIRECT traffic information system is a significant improvement over (the listed) existing traffic information system. (A57)
[1-Strongly Disagree, 2-Somewhat Disagree, 3-Neither, 4-Somewhat Agree, and 5-Strongly Agree]

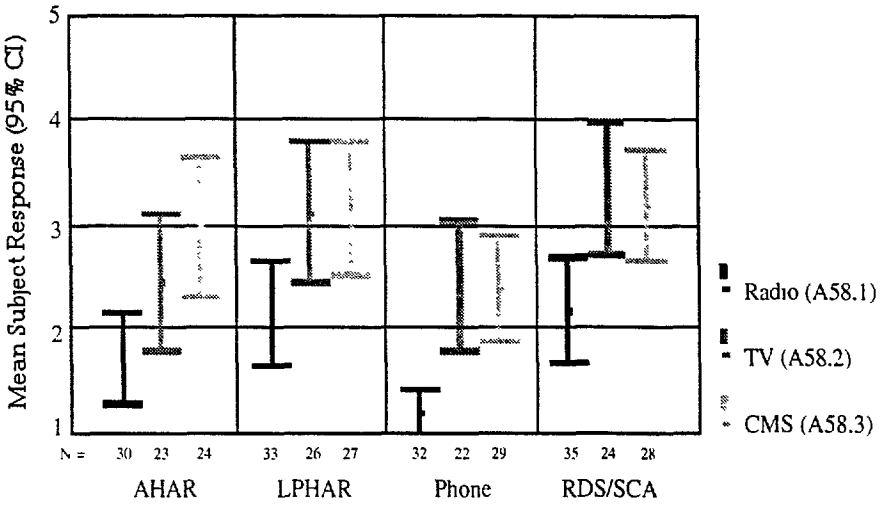


Figure 26: Overall, I prefer the DIRECT traffic information system to (the listed) existing traffic information system. (A58)

[1-Strongly Disagree, 2-Somewhat Disagree, 3-Neither, 4-Somewhat Agree, and 5-Strongly Agree]

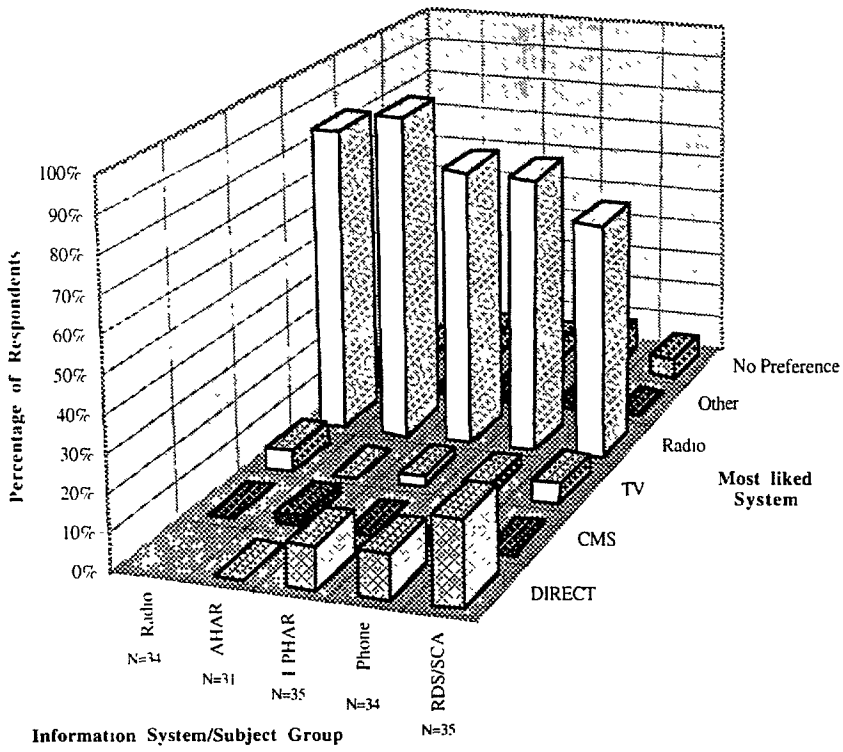


Figure 27: Which traffic information system do you like the best? (A45)

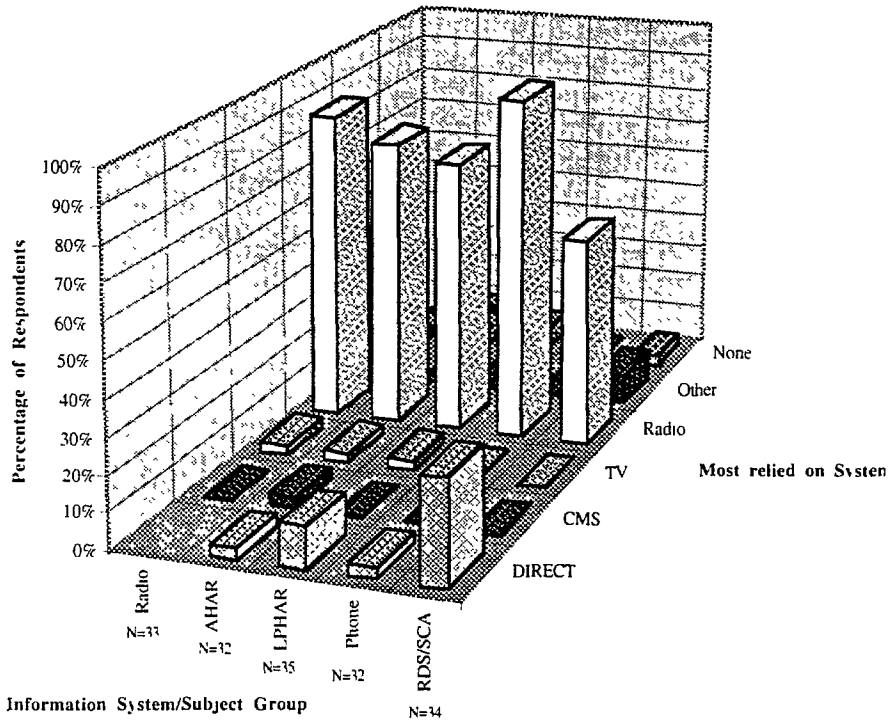


Figure 28: During the past 8 weeks, which traffic information system did you rely on the most in making decisions for your commute? (A44)

Table 9: How much would you be willing to pay for the DIRECT traffic information system available to you during the past 8 weeks? (A60)

Payment Method	Mean	Std Dev	Min	Max	Valid N	# who would not pay anything
One-time fee ($)						
AHAR	79.76	132.20	0	500	21	12
LPHAR	26.27	41.89	0	150	22	12
Phone	11.36	22.79	0	75	22	17
RDS/SCA	23.20	48.77	0	200	25	16
Annual fee ($)						
AHAR	28.81	41.05	0	100	21	12
LPHAR	12.00	19.83	0	60	20	13
Phone	11.09	24.59	0	100	23	16
RDS/SCA	14.28	21.04	0	60	25	15
Monthly fee ($)						
AHAR	3.00	4.83	0.00	15.00	21	13
LPHAR	2.31	5.12	0.00	20.00	18	12
Phone	1.43	3.16	0.00	10.00	21	16
RDS/SCA	1.56	2.55	0.00	10.00	25	15
Per-use fee ($)						
AHAR	0.45	1.15	0.00	5.00	20	15
LPHAR	1.22	4.70	0.00	20.00	18	15
Phone	0.32	1.09	0.00	5.00	22	19
RDS/SCA	0.05	0.21	0.00	1.00	22	21

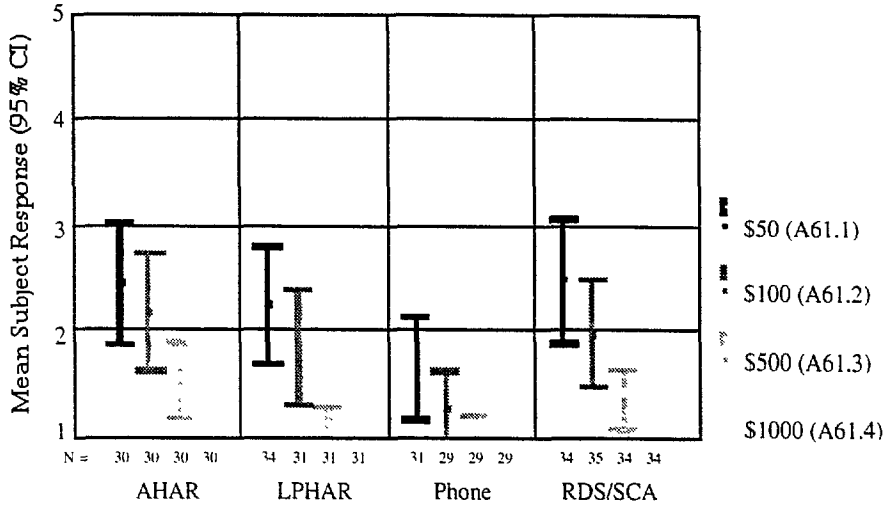


Figure 29: How likely is it that you would buy the DIRECT traffic information system available to you during the past 8 weeks if the total cost over the first two years was (the amounts listed)? (A61)
[1-Very Unlikely, 2-Somewhat Unlikely, 3-Neither, 4-Somewhat Likely, 5-Very Likely]

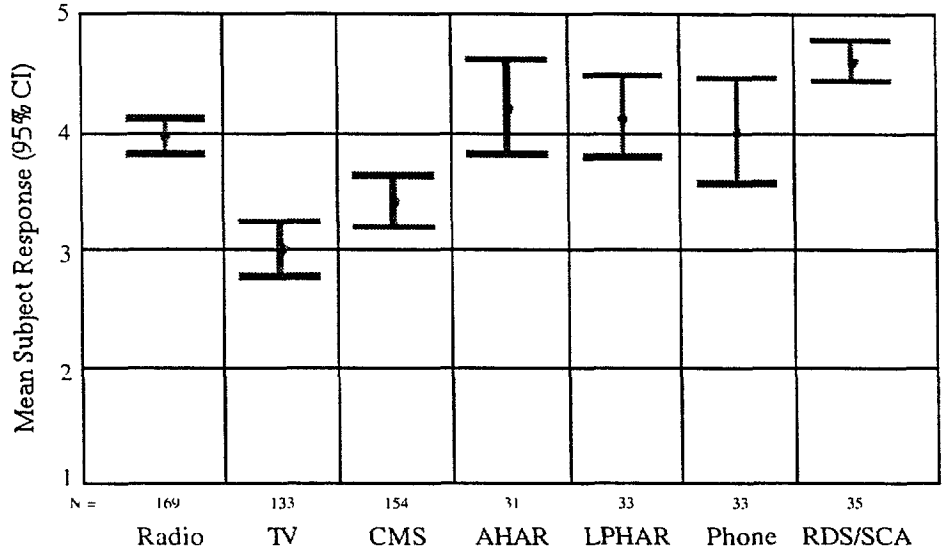


Figure 30a: To what extent do you agree or disagree with the following statement: "Traffic information systems could be improved to the point that they completely meet my needs for traffic information." View A. (A43/B45 for TV and CMS)
[1-Strongly Disagree, 2-Somewhat Disagree, 3-Neither, 4-Somewhat Agree, and 5-Strongly Agree]

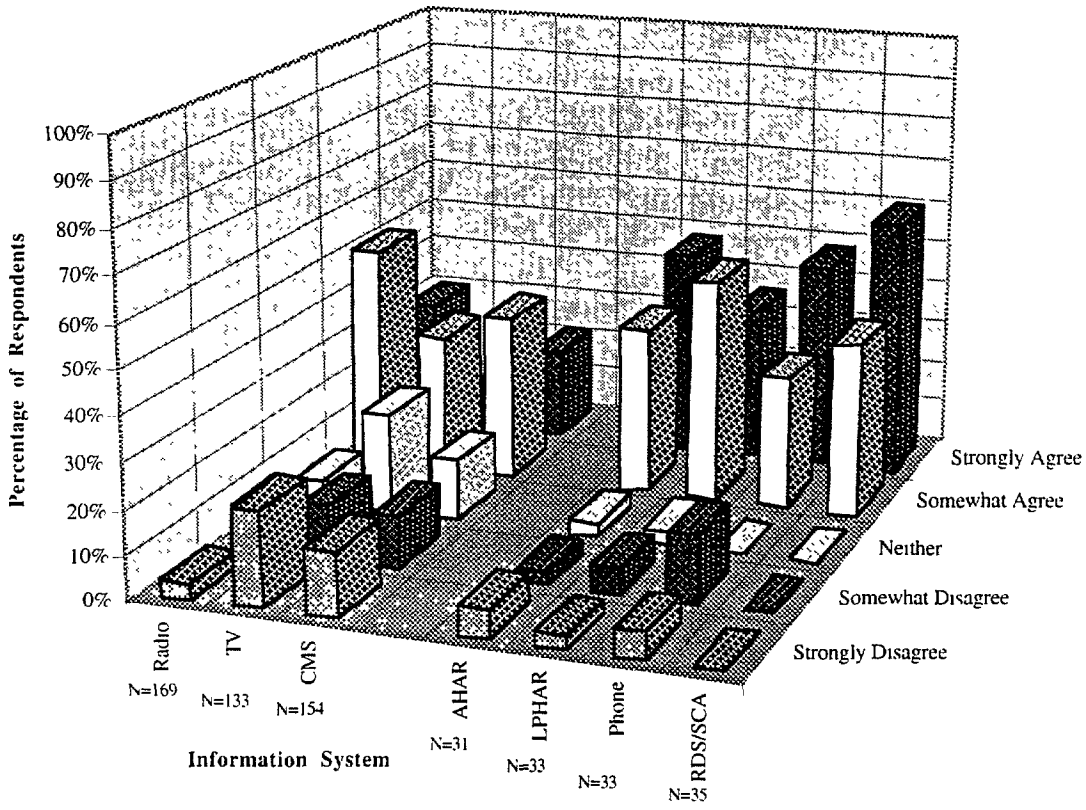


Figure 30b: To what extent do you agree or disagree with the following statement: "Traffic information systems could be improved to the point that they completely meet my needs for traffic information." View B. (A43/B45 for TV and CMS)

Table 10: How much would you be willing to pay for a traffic information system that completely meets your needs? (A18)

Payment Method	Mean	S.E. Mean	Valid N	# who would not pay anything
One-time fee	$117.01	$11.75	112	15
Annual fee	$55.93	$5.26	112	18
Monthly fee	$ 6.82	$0.61	116	18
Per-use fee	$1.28	$0.33	102	17

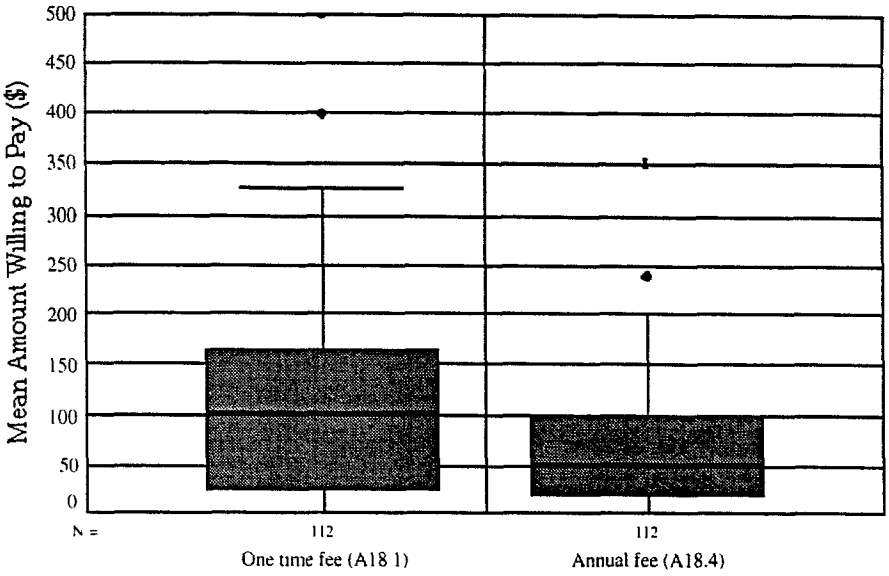


Figure 31a: One Time and Annual Fee Subjects are Willing to Pay for a Traffic Information System that Completely Meets their Needs (A18)

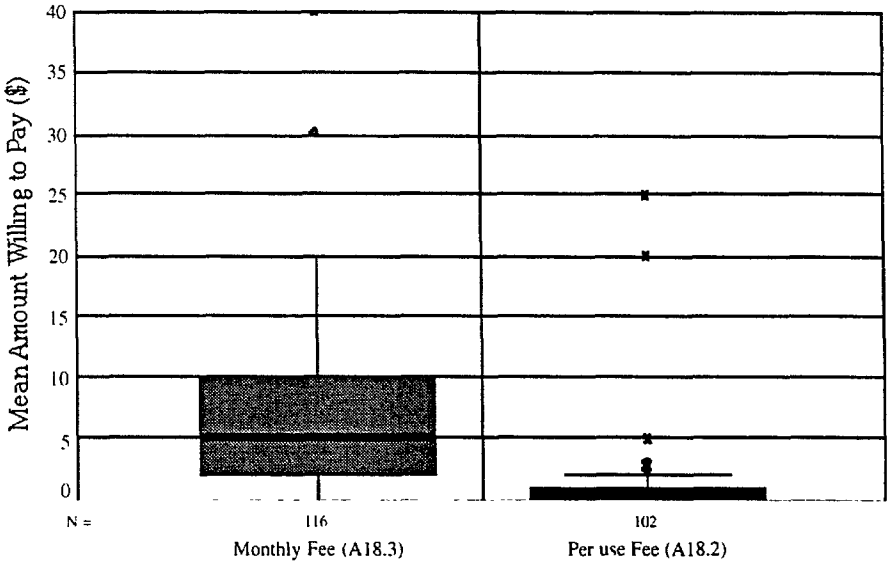


Figure 31b: Monthly and Per Use Fee Subjects are Willing to Pay for a Traffic Information System that Completely Meets their Needs (A18)

DISCUSSION

The DIRECT Natural Use Study set out to determine whether or not participants used the traffic information-delivery systems, acted on the basis of them, and experienced a better commute because of them. The results section has provided many aspects of the answers to these questions. The study produced some additional findings, which are brought out in this section of the report. The discussion is divided in three parts: before-after comparison of results, impact of system reliability on results, and implications of results for new information systems.

Before-After Comparison of Results

A number of the questions presented in the results section were included in both the Before and After Questionnaires. A comparison of the average response to analogous items within those two questionnaires is in order. Given the result of the before/after analyses, the comments will be brief. Simply put, it is of significance that for the large majority of questions, the before-after difference in responses was small and not statistically significant. The few differences observed include:

. subjects report both using and relying on traffic information of all kinds somewhat more during the eight weeks of the study than during the eight weeks prior to the study. This observation is supported by questions A22 and A33, which directly ask subjects whether or not they accessed traffic information system(s) more during than before the test. The mean response was about 3.6. i.e., between a response of 3, for "About the Same as Before the Test", and a response of 4. for "More Than Before the Test". No consistent effect due to tested information-delivery method experienced was noted. Moreover, the observed differences are consistent with, and may well be due to, a heightened awareness on the part of subjects due to the act of participating in the study.

- Subjects report both knowing of and using somewhat more alternate routes during the study than prior to the study. Since the information-delivery systems tested, perhaps with the exception of the commercial information baseline, did not provide any information about alternate routes, this observed change in response is also likely simply due to the act of participating in the test.

- Subjects also reported slightly shorter travel time and somewhat fewer delays during the test than prior to the test. Unfortunately, no consistent effect due to methods was noted and no ready explanation for this effect is available.

- One interestmg finding was that the amount that subjects reported being willing to pay for "a traffic information system that completely meets your needs" was noticeably lower at the end of the test than it was at the beginning of the test. For example, the mean amount subjects were willing to pay as a one time fee decreased by about $39, from $156 to $117, a 25% decrease. A similar, though not identical, effect was evident for payment on an annual, monthly, or per-use basis. A variety of hypotheses could be put forth to explain this observed effect. Perhaps the most promising explanation being that subjects, through a combination of natural use of the tested information-delivery systems and increased thought about their information needs as a result of participating in the study, came to the conclusion that the baseline information services already meet much of their needs. Figures 32a and 32b, which describe subject before and after perceptions of commercial radio system performance and benefit, respectively, support this hypothesis by revealing that subject perception of the quality of traffic reports on commercial radio was noticeably higher at the end of the test than it was at the start of the test. Under this explanation, and since the baseline information services are "free", subjects would see less reason to pay for, and place less value on, additional information.

- One final piece of information of note, one that is a subject self-reported before-after comparison, comes from questions A23 and A34. Specifically, although subjects reported accessing traffic information system(s) more during than before the test, the also reported using television-based traffic information less during than before the test. This response, shown in Figure 33 (note the response categories listed there), could have implications for the "politics" of providing traffic information.

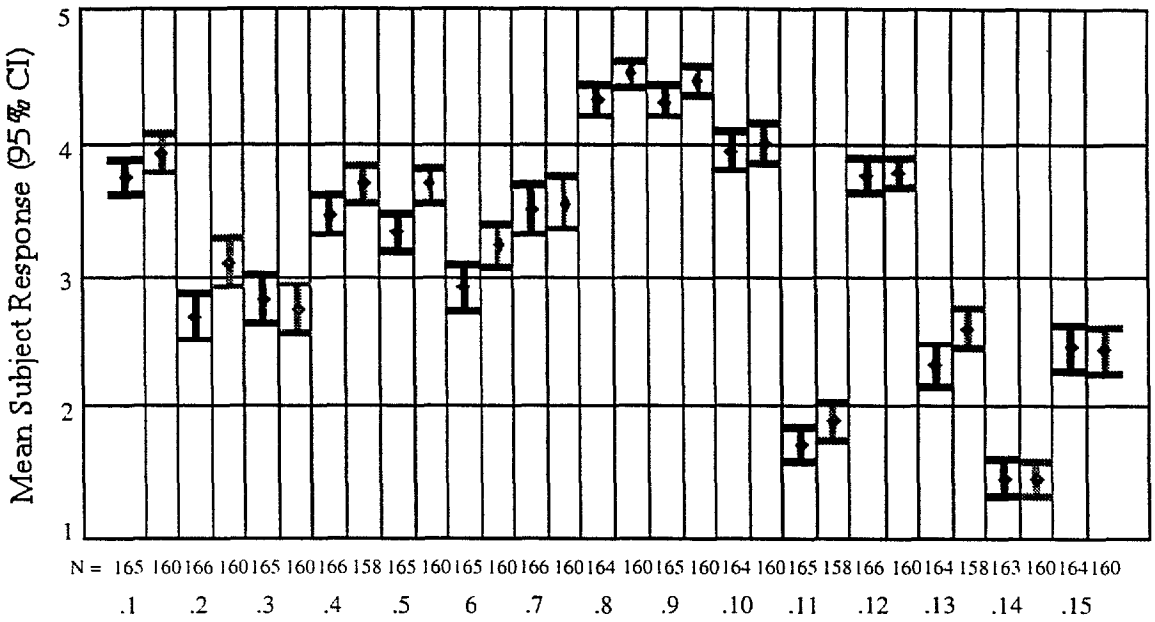


Figure 32a: Perceived Performance of the Commercial Radio Traffic Information System (B50 on left in each pair-black; A47 on right-gray) (Includes data from all subjects and is with respect to the 15 system performance measures described in the results section.)
[1-Strongly Disagree; 2-Somewhat Disagree; 3-Neither; 4-Somewhat Agree; 5-Strongly Agree]

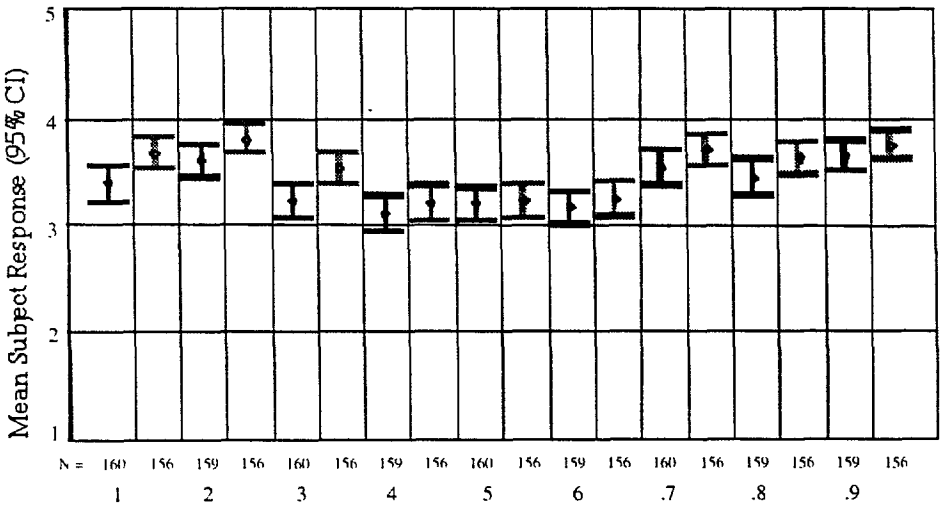


Figure 32b: Perceived Benefit of the Commercial Radio Traffic Information System (B52 on left in each pair-black; A49 on right-gray) (Includes data from all subjects and is with respect to the 9 system benefit measures described in the results section.)
[1-Strongly Disagree; 2-Somewhat Disagree; 3-Neither; 4-Somewhat Agree; 5-Strongly Agree]

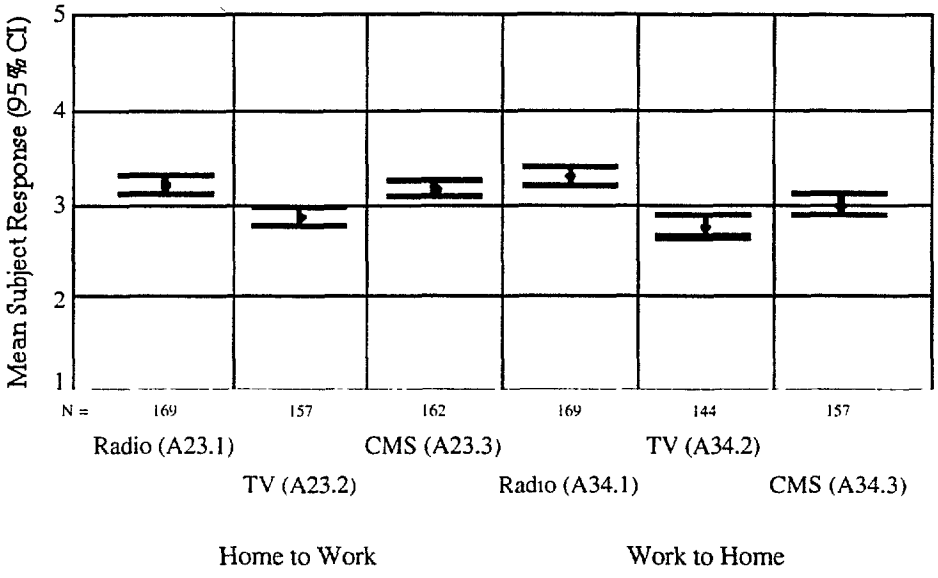


Figure 33: Reported Change in use of Information System

[Accessed System: 1-Much Less Than Before The Test; 2-Less Than Before The Test; 3-About The Same As Before The Test; 4-More Than Before The Test; 5-Much More Than Before The Test]

Impact of System Reliability on Results

As evident from subject response to the tested information delivery systems, the systems were perceived to be unreliable. The Technical Performance and Cost Evaluation Report (EECS-ITS LAB-DT98-004) supports this contention by showing that the tested information delivery systems did not operate as well as anticipated. The low level of reliability had a major effect on subject response to the questionnaires. This fact is evident from Figure 34, which plots subject perception of system reliability versus subject perception of system benefit, and the scale is as previously described. The figure clearly shows that benefit (the nine bars on the right within each category) is highly correlated with reliability (the leftmost bar within each category). This result is intuitive: if a product or system does not work well, then the benefit of using that product or service will be low. Figures 35a through 35d tend to support this contention. These figures plot the components of the aforementioned four major factors of perceived system performance (reliability, information content, information targeting, and human factors) against the arithmetic mean of the perceived systems benefits. Reliability is the main factor that appears correlated with systems benefit. The only other components that appear correlated with reported system benefit are the completeness and accuracy components of the information content factor, which are themselves secondarily related to reliability. If the evaluation team had foreseen that the reliability of the various systems would be less than desired, the evaluation would have addressed more general concepts and less specific experience in the questionnaires. Nevertheless, as described in the preceding section, the questionnaire data reveals significant difference in subject stated response by system experienced and the data does provide guidance as to what consumers want and how the systems could be improved. Moreover, a method of compensating for the impact that the lack of system reliability had on subject response to the questions has been devised and is described in Part II of this report.

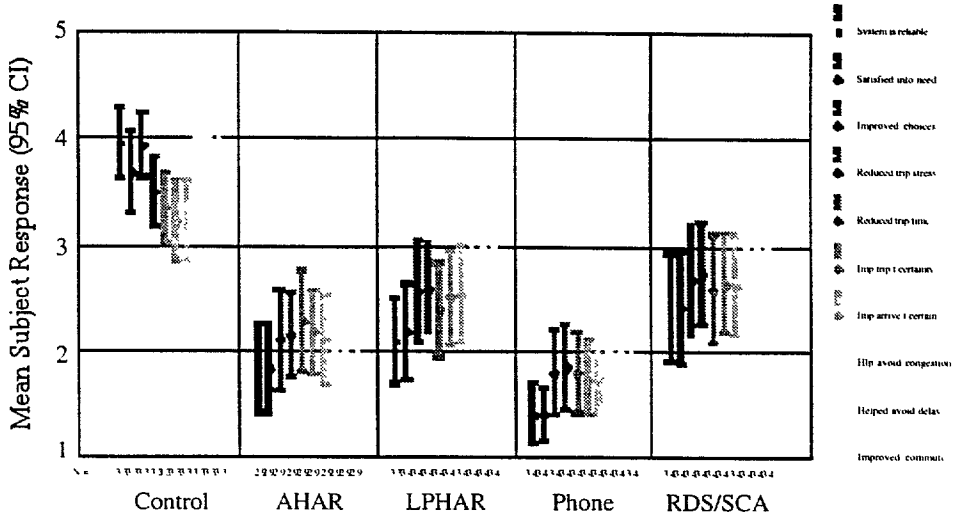


Figure 34: Perceived System Reliability vs. Perceived System Benefits
[1-Strongly Disagree; 2-Somewhat Disagree; 3-Neither; 4-Somewhat Agree; 5-Strongly Agree]

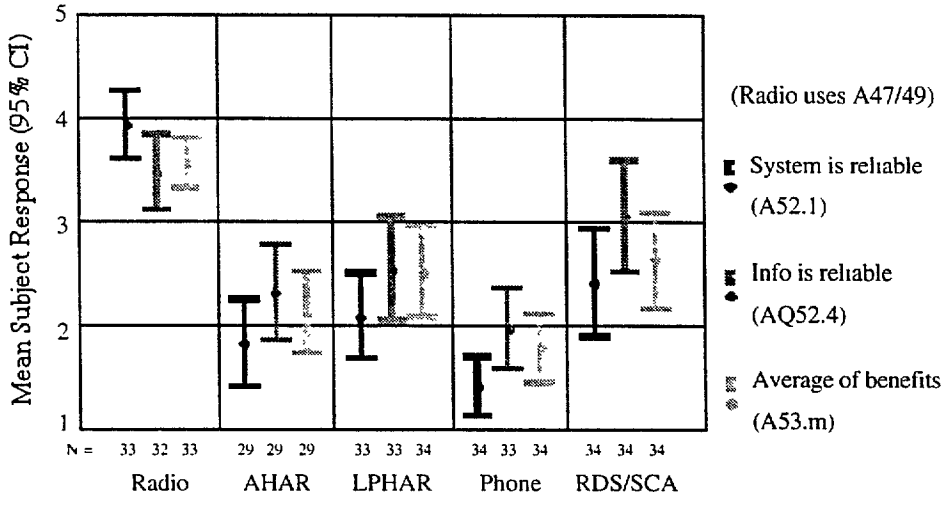


Figure 35a: Reliability Factor Components vs. Average of Benefit
[1-Strongly Disagree; 2-Somewhat Disagree; 3-Neither; 4-Somewhat Agree; 5-Strongly Agree]

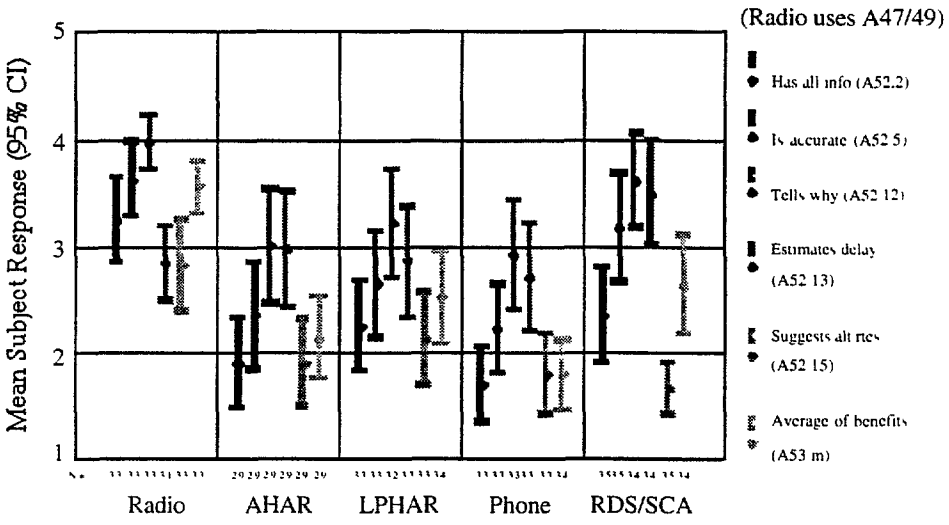


Figure 35b: Information Content Factor Components vs. Average of Benefits
[1-Strongly Disagree; 2-Somewhat Disagree; 3-Neither; 4-Somewhat Agree; 5-Strongly Agree]

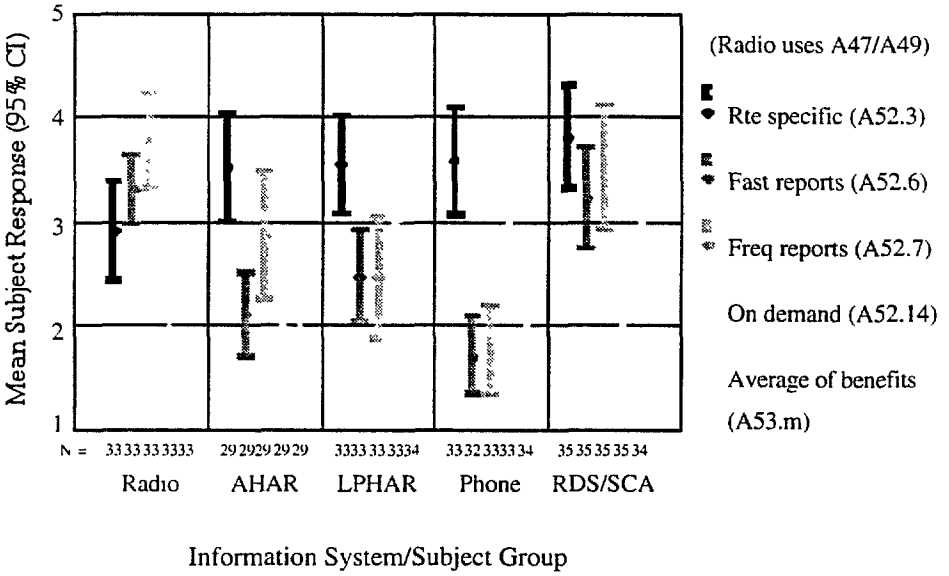


Figure 35c: Information Targeting Factor Components vs. Average of Benefits
[1-Strongly Disagree; 2-Somewhat Disagree; 3-Neither; 4-Somewhat Agree; 5-Strongly Agree]

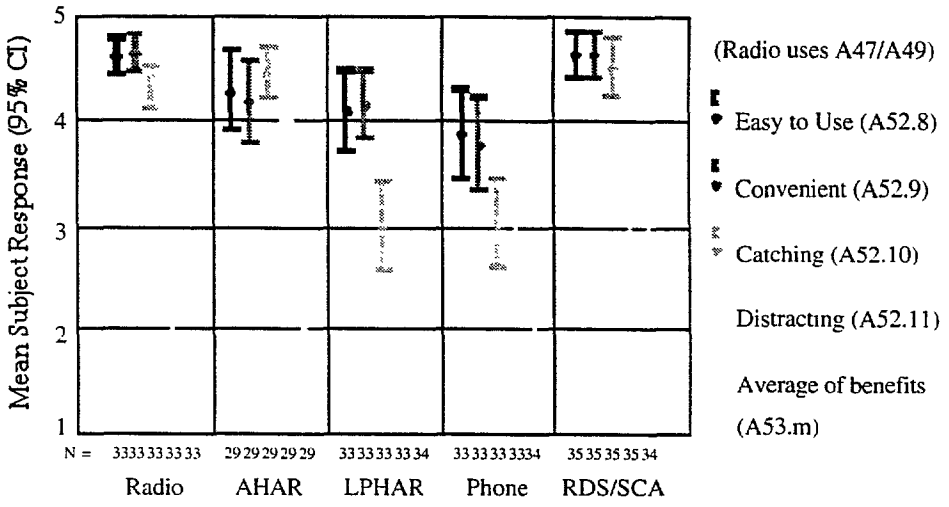


Figure 35d: Human Factors Factor Components vs. Average of Benefits
[1-Strongly Disagree: 2-Somewhat Disagree; 3-Neither; 4-Somewhat Agree; 5-Strongly Agree]

Implications of Results for New Information Systems

In addition to insight into the value of the four information delivery systems tested, the study reveals subject thoughts on traffic information issues that are more general in nature, and perhaps of significantly greater importance. One key issue involves the relationship between "new" traffic information services and existing services, especially traffic information provided via commercial radio.

At the outset of the DIRECT Project, some thought that some form of new service could potentially supplant or supersede commercial radio as a source of traffic information. Contrary to this notion, the study revealed that drivers very much appreciate and rely on commercial radio as a source of traffic information. Moreover, anecdotally, many drivers appreciate radio-based traffic reports as a source of entertainment and a means to satisfy their curiosity about what is happening throughout the metro area, even if that information has no direct bearing on their personal commute.

Nevertheless, drivers do find some fault with commercial radio-based traffic information and have suggested a variety of ways to improve the usefulness of this information. Drivers think commercial radio systems should be more timely. In many instances, the typical radio traffic information update once every 10 minutes is insufficient because critical route-choice decisions must be made within a short time frame at the outset of a commute trip. Drivers also want more information specific to their personal route of travel. Due to time constraints, however, radio information can only provide information on the top few incidents throughout a metropolitan region. Many smaller incidents, that are nonetheless a cause of significant delay and inconvenience for drivers who encounter them, go unreported. Drivers also want traffic information to suggest alternate routes around a traffic problem. Again, this is a task that is not easy for a generic broadcast system to accomplish. In short, drivers want traffic information that is customized to address their personal needs. As an aside, drivers also want better advice about the expected length of a delay; this requires better traffic data, which would be equally useful to current and new systems.

The above arguments lead to a conclusion that a personalized route-specific interrupt or "push" system could be a valuable and readily accepted complement to commercial radio traffic information. A strictly "on-demand" system is likely not sufficient because it requires constant sampling on the part of the consumer to ensure that no "late-breaking" incident is missed. Nevertheless, in addition to an interrupt capability, customers might also like the ideal information system to be available on demand so as to alleviate their concerns that no traffic report might mean that the system is not working instead of that there is no incident to report. At a minimum, some sort of "system active" signal that can be readily checked by the consumer is needed. This concern will likely diminish, however, as the technologies and implementations become more mature, i.e., reliable, and customers become confident of that reliability. A system such as just described could provide personalized reports and diversion advice on all incidents that might affect an individual's travel. Based on the questionnaire data, subjects in the study would likely be quite satisfied with such a system. However, even when using an information system with these qualities, drivers might only change their trip only infrequently. Nevertheless, consumers may welcome such a system as of great value in reducing uncertainty regarding traffic conditions and the stress due to this uncertainty. None of the four information-delivery systems tested in DIRECT provide all of the proposed features. However, of the four systems tested in DIRECT, the RDS/SCA system appears to be the most easily modified to meet the identified needs.

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Appendix A: Information Delivery Systems Compared in DIRECT

The DIRECT project, "Driver Information Radio using Experimental Communication Technologies," focused on the first wave of advanced traveler information systems (ATIS)-those low-cost systems with in-vehicle receivers for real-time driver information and with relatively limited in-vehicle processing. In DIRECT, the driver received voice messages that conveyed traffic information, such as incident, congestion, and road condition reports. For the project, near-term available methods were selected that showed promise of improving present delivery methods for exception traffic messages. Such improvements were seen as providing:

- route-specific versus area-wide information and
- on-demand versus periodic access to traffic information or
- automatic interrupt alerting for new incidents while en-route.

The DIRECT operational field test and evaluation focused on four of these lower-cost and innovative approaches including: low power highway advisory radio (LPHAR); automatic highway advisory radio (AHAR), telephone-based traffic information (Phone), and a Radio Data System combined with a "Subsidiary Communications Authority" subcarrier (RDS/SCA).

The emphasis of the evaluation was on the technical effectiveness of the system components and the comparative effects of the alternative systems on users. The value to the user and the system level effects of implementing these four technologies were central to the evaluation effort. This section describes each technology and how it was designed and implemented for this project. More detailed information describing design for the information-delivery systems to DIRECT is available in the 1994 Revised Implementation Plan: Phase II (January 18, 1994 from MDOT). For a description of systems operation see the Technical Performance and Cost Evaluation Report (EECS-ITS LAB-DT98-004).

ADVANCED TRAFFIC INFORMATION SYSTEMS AND PUBLIC VERSUS PRIVATE GOODS

Many approaches already exist for delivering traffic information and advice to motorists. Some of these systems are tailored to the needs of the consumer and may be supported through private investment while others have been tailored to the needs of public agencies in charge of managing the traffic system and largely financed through public investment.

Traveler information can fall at various points along the spectrum between a completely private good and a quasi-public good. While a complete discourse on the distinctions between public and private goods and what they imply for the development and financing of ATIS is beyond the scope of the evaluation activity, it is nevertheless a topic worth addressing in a general way. This topic provides the rationale for a public evaluation of these alternative systems and may help readers appreciate the subtle differences between the effects and financing schemes implied by the different systems.

Because drivers can benefit directly from information (changed travel plans, reduced frustration) and because they may be excluded if they do not pay for the service, some systems may operate effectively under a market allocation scheme. For example, a telephone call-in service can be marketed to consumers willing to pay for the benefits of the information. However, because of the external costs associated with traffic congestion, the public might benefit if consumers alter their travel behavior in response to information from private traffic services. For instance, if I am traveling along a congested corridor and decide to change my route based on information provided

by a private service, the other vehicles traveling along the congested route will benefit from the slight decrease in traffic. This is an example of where the market may allocate an information service that provides both private and public benefits.

At the other end of the public-private spectrum are the changeable message signs (CMS) to which all drivers have access and no one may be excluded. Because the information on the sign is available for all to see and use, it is difficult to obtain financing from consumer contributions. Basically, there is no practical market for goods or services from which those who do not pay cannot be excluded-why pay if you can get it for free? Yet the information provided by CMS may have an effect similar to the information provided by the phone call-in service-the individual may benefit through improved travel plans or through increased understanding of the traffic conditions, and the public may benefit from decreased congestion due to cumulative changes in individual trip-taking behavior.

Public Sector Initiated Technologies

Public agencies have an interest in communicating information about traffic problems to motorists. By informing the motorist of potential problems and by suggesting alternatives, the traffic manager may be able to redirect traffic into a pattern that minimizes the traffic impact of planned road construction and maintenance, planned public events, and unpredictable incidents. With these traffic management applications in mind, public authorities have experimented with motorist information services that are somewhat different from private sector initiatives. Perhaps the most common way to warn drivers is to use changeable message signs (stationary or mobile). The signs can be placed ahead of critical decision points, like before an exit to an alternative route, to enable the driver to divert if desired. In this sense the messages are tailored to the drivers on the affected road. However, all drivers passing the sign receive the same message. Some problems associated with changeable messages signs include: (I) limits on message length based on traffic speed and expected viewing time, (2) sign legibility, (3) difficulty of reaching drivers early on in their trips, and (4) if using mobile signs, the need to physically place the signs at the site, delaying message transmission of unplanned events and requiring considerable human resources.

In response to some of these limitations, public agencies have developed and implemented highway advisory radio (HAR), which reaches the driver with voice messages inside the vehicle. The standard HAR system involves the placement of one or more signs along a selected stretch of road. On top of the sign is a flashing light which, when activated, signals the driver to tune to a selected radio channel for information about traffic conditions. When the signal is not activated, traffic conditions are normal. There are two benefits of HAR over variable message signs-first, the message reaches the driver inside the vehicle and is not limited by the speed of traffic or the size of the sign; second, the messages are easily activated and modified to reflect current traffic conditions. Pius. the human resource requirements are small compared to moving a changeable message sign. Nevertheless, HAR retains the following disadvantages of changeable message signs: (1) the messages do not reach the driver prior to, or near the time of, departure, (2) the messages are not tailored to specific trips, and (3) the messages are delivered only at the relatively fixed site of the HAR transmitter.

The DIRECT project is deploying two forms of HAR for testing and evaluation: low power highway advisory radio (LPHAR) and automatic highway advisory radio (AHAR).

Low Power Highway Advisory Radio (LPHAR)

With LPHAR, the roadside transmitter uses an HAR frequency along with analog amplitude modulation to deliver (one-way) exception traffic information on “incidents ahead on this roadway” or incidents on “the roadway that intersects at this exit.” LPHAR is distinguishable from conventional HAR because it uses relatively low power (3 versus 10 watts) to illuminate a roadside

zone about 1 .O to 1.5 miles in length. While LPHAR offers the same basic communication features as HAR, it permits both a more definite area where the signal strength will be good and the installation of another transmitter as little as several miles away without interference. Like HAR, LPHAR requires a sign announcing the availability of the information. In this application flashing lights will inform project participants that there is a traffic situation ahead and they should tune to the radio for information. When no exception congestion exists no lights will flash. However, should participants tune to the frequency when no light is flashing, a standard "normal conditions" message will be heard. An attractive feature of LPHAR is that it operates on a standard radio frequency and does not require anything more than a standard automobile radio. Additionally. the frequencies for transmission have been allocated {on a secondary basis) across the nation. Some operating concerns with LPHAR are: (1) it requires either manual tuning or button pre-tuning and a "button-push" when passing a flashing sign; (2) providing a good signal over a specified "message zone" is often not an easy task; (3) an AM signal can experience unavoidable noise from nearby and distant thunderstorms; and (4) the infrastructure cost may be high.

Automatic Highway Advisory Radio (AHAR)

During the 1980s, the FHWA embarked on an effort to explore the delivery of relevant traffic information to a driver automatically (if the driver a priori chooses it). This requires a method of opening up the receiver to the traffic message, which must be directionally sensitive. While this effort used an "enable" transmitter placed ahead of the message transmitter, current conditions enable the function to be performed by the same basic technology as is currently used for Automatic Vehicle Identification. The AHAR system functions in the following way-a "reader" delivers a digital control signal to the passing vehicle. The control signal can also be accompanied by data which could relay the particular local vacant (broadcast PM) frequency on which the message itself can be heard. This would automatically tune the receiver to that frequency. If a non-broadcast frequency were used, then a new FM receiver would have to be introduced with this technique. For the driver, the effect is an automatic interrupt of exception traffic messages through the radio. No tuning is required. For this project, a 220 MHz frequency, specially acquired by the FHWA from the FCC, was used. Some operating concerns with AHAR are: (1) the infrastructure cost is relatively high; (2) the in-vehicle cost is relatively high because a new FM receiver is needed; (3) control circuitry is needed in the vehicle; and (4) an existing toll-tag could already be the in-vehicle receiver.

PRIVATE SECTOR INITIATED TECHNOLOGIES

Telephone call-in system (Phone)

This system uses the existing telephone infrastructure, specifically the cellular phone system under most use conditions, and the installed telephone base to provide drivers who use the system with current traffic information. The idea is to have the motorist call the traffic information service and, through a series of queries, obtain traffic information that affects his or her travel plans. Basically, by calling a single number, a (cellular) telephone subscriber can access a dynamic incident database through which route specific information can be obtained by dialing certain digits. The benefits of this system are that drivers can access the system at any point in their trip, and the information is targeted to the driver and relevant to the planned trip. As a method, cellular call-in allows drivers to receive information before they begin their trip, so they may alter their route at the start of their trip, rather than in the middle. A potential drawback is that message delivery is dependent on driver initiative; if the driver does not call, no information is received. Moreover, a call just prior to an incident will produce no information. Thus, in order to guarantee that incident information is received, the driver must occasionally "sample" the system by periodically calling; most people would find this to be a burden. (This activity could potentially be automated.)

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Radio Data System/Subsidiary Communications Authority Subcarrier (RDS/SCA)

[Note: The standards for the Radio Data System (RDS) and the Radio Broadcast Data System (RBDS) are quite similar and the terminology is used interchangeably in this context.] The Radio Data System (RDS) was combined with a Subsidiary Communications Authority Subcarrier (SCA) to form an RDS/SCA system designed to improve upon standard FM radio broadcasts by transmitting data on the FM "sideband''-the supplemental FM frequency allocated to a radio station. The system uses a sub-carrier at 57 KHz of any existing FM station to provide a digital signal, and hence enjoys a low infrastructure cost. The station then uses the sideband to transmit data to specially equipped RDS radio receivers, providing a one-way area-based digital communication link, of limited capacity, for exception traffic messages. The data may be encoded before transmission and decoded on-board the vehicle. The messages may also contain a vehicle location field to enable "intelligent" receivers to screen for relevant messages. The objective is to send concise data messages concerning current traffic problems in parallel with the standard entertainment broadcast. When filtered and decoded the messages can be complex and tailored to the driver and the trip.

In DIRECT, the traffic messages were delivered as audio. Since the RDS sub-carrier capacity is too limited to support audio, which would also have to be digitized for transmission via RDS, a means of transmitting the audio had to be found. The method chosen was to use the RDS as a switch to control the delivery of analog audio messages carried on another sub-carrier (at 76 KHz) from the same FM station. This means that the standard RDS radio had to be outfitted with an additional sub-carrier decoder (already available on a chip), with access to this signal interfaced with the control information on the RDS digital sub-carrier. This use of existing FM station capability (by using the sub-carriers) requires cooperation of FM radio stations; WDTR participated in DIRECT.

The use of FM sub-carriers has two advantages: (1) permitting examination of exception incidents before the trip, for route planning purposes, and (2) an automatic-interrupt alert service for new incidents en-route. The pre-trip Information is available on-demand anywhere in the FM station coverage area. With filtering, only messages specific to the route of interest are heard or interrupt the driver. Some operating concerns with RDS are: (1) the low capacity of the RDS digital sub-carrier (100 to 200 bps available), (2) the need for cooperation of FM stations, who might expect to be paid: (3) the potential conflict between the commercial announcement strategy of a station and a no-delay goal of announcing new incidents; (4) the impact of any non-100% reliability (error-rate) on introducing delay; and (5) cost of the in-vehicle entertainment radio. Regarding cost, however, the m-vehicle receiver for the RDS signal could be incorporated in the next-generation entertainment radio: that is, in addition to the AM/FM receiver now offered, the RDS radio would include the 57 KHz digital sub-carrier detector and a microprocessor. Some advantages of this receiver to the driver include the ability to request a specific type of programming in searching for a local station (news, country music, classical music, etc.), and to automatically receive alerts for emergencies or traffic incidents. The broadcasters would expect to benefit by having the call letters of their station appear on the radio's alphanumeric display. In Europe, over the span of a few years, the demand for entertainment radio absent these new features became so low that manufacturers no longer offer radios without the RDS feature. The SCA subcarrier support would, of course. be an additional cost.

SUMMARY

Table A. 1 summarizes how the information delivery methods being tested in the DIRECT project compare across system six features. Again, more detailed information describing design for the information-delivery systems to DIRECT is available in the 1994 Revised Implementation Plan: Phase II (January 18, 1994 from MDOT). For a description of systems operation see the Technical Performance and Cost Evaluation Report (EECS-ITS LAB-DT98-004).

Table A. 1. Comparison of DIRECT System Features

Features	AM-FM	AHAR	LPHAR	Phone	RDS/SCA
Manual Action by Driver	✔		✔	✔	
Automatic Driver Alert		✔			✔
Pre-Trip Access	✔			✔	✔
En-Route Access	✔	✔	✔	✔	✔
Route-Specific Messages		✔	✔	✔	✔
Standard Radio Sufficient	✔		✔	NA	

Appendix B: Evaluation Instruments

As part of the study design, subjects were asked many of the same questions both before and after their experience with DIRECT. The purpose of this approach was to determine whether or not use of a DIRECT mformation delivery system, or participation in the study. affected subject response. Given this design approach, a mapping of questions from the Before to After questionnaires is useful. Such a mapping is provided in Table B 1. The table is organized sequentially in terms of Before questions. with After questions being associated or not with the Before questions.

DIRECT EVALUATION SURVEY (Before)

Test Period: _____

Vehicle ID: _____

Please complete all parts of this survey: Be careful not to skip any question. or any page, unless directed otherwise. **Answer the auestions with the past 8 weeks in mind.**

Your opinions are extremely valuable in helping us assess the value of the traffic information systems being tested in DIRECT and should eventually help improve travel in the Detroit metropolitan area.

Your responses will be used solely for research. All responses on this form will be kept strictly confidential and you will remain anonymous in any public report. Your participation in this study is completely voluntary and you may withdraw at any time. You do not have to answer any questions you do not wish to answer or any questions that make you feel uncomfortable.

Thank you for your participation in DIRECT.

==========

The following questions ask about factors that affect your choice of route for your commute.

1. If more than one route is available between your home and work, what factors do you consider in choosing between routes? *(check one box in each row)*

		NOT IMPORTANT						VERY IMPORTANT
1	Expected travel time on each route	❑1	❑2	❑3	❑4	❑5	❑6	❑7
2	Expected travel speed on each route	❑1	❑2	❑3	❑4	❑5	❑6	❑7
3	Total mileage on each route	❑1	❑2	❑3	❑4	❑5	❑6	❑7
4	Expected level of congestion on each route	❑1	❑2	❑3	❑4	❑5	❑6	❑7
5	Predictability of traffic on each route	❑1	❑2	❑3	❑4	❑5	❑6	❑7
6	Availability of traffic information for each route	❑1	❑2	❑3	❑4	❑5	❑6	❑7
7	Certainty of arrival time using each route	❑1	❑2	❑3	❑4	❑5	❑6	❑7
8	Presence of incidents on each route	❑1	❑2	❑3	❑4	❑5	❑6	❑7
9	Presence of construction on each route	❑1	❑2	❑3	❑4	❑5	❑6	❑7
10	Number of train crossings on each route	❑1	❑2	❑3	❑4	❑5	❑6	❑7
11	Special events (e.g., ball game) on each route	❑1	❑2	❑3	❑4	❑5	❑6	❑7
12	Road type (expressway, major street, residential street) on each route	❑1	❑2	❑3	❑4	❑5	❑6	❑7
13	Number of lanes on roads on each route	❑1	❑2	❑3	❑4	❑5	❑6	❑7
14	Condition of road surface on each route	❑1	❑2	❑3	❑4	❑5	❑6	❑7
15	Condition of each route during bad weather	❑1	❑2	❑3	❑4	❑5	❑6	❑7
16	Number of turns on each route	❑1	❑2	❑3	❑4	❑5	❑6	❑7
17	Number of stops on each route	❑1	❑2	❑3	❑4	❑5	❑6	❑7
18	Level of travel safety on each route	❑1	❑2	❑3	❑4	❑5	❑6	❑7
19	Need to run an errand on one route	❑1	❑2	❑3	❑4	❑5	❑6	❑7
20	Level of familiarity with each route	❑1	❑2	❑3	❑4	❑5	❑6	❑7
21	Scenery on each route	❑1	❑2	❑3	❑4	❑5	❑6	❑7
22	Other (please specify):	❑1	❑2	❑3	❑4	❑5	❑6	❑7

2. If you encounter unexpected delay after you start driving on your commute, what 3 factors do you consider most important in deciding whether or not to leave your usual route and take an alternate route instead?
(check 3 Boxes, no more, no less)

____ ❑1 Availability of alternate routes
____ ❑2 Familiarity with alternate routes
____ ❑3 Road type (expressway, major street, residential street) on alternate routes
____ ❑4 Distance remaining till destination
____ ❑5 Expected delay on original route
____ ❑6 Expected time savings if an alternate route is taken
____ ❑7 Need to make stops (e.g., errands) that can't be reached from an alternate route
____ ❑8 Importance of not being late
____ ❑9 Other (please specify): _____

Now, please rank the 3 boxes checked in the preceding question in order of importance by writing a number from 1 to 3 on the line to the left of each of the 3 boxes checked in that question: 1 is most important, 2 is next most important, and 3 is third most important.

==========

The following questions ask about your usual home-to-work commute.

3. Which of the following best describes the usual traffic conditions on your usual route from ***home to work***? *(check one)***

- ❑1 Stop and go traffic
- ❑2 Heavy traffic that flows steadily but slower than the speed limit
- ❑3 Heavy traffic that flows steadily and continues at the speed limit
- ❑4 Moderate traffic
- ❑5 Eight traffic

4. On average, how many minutes does your usual ***home-to-work* commute take?** *(fill blank)*

_____ minutes

5. On average, how frequently does an unexpected delay occur on your usual ***home-to-work* commute?** *(check one)*

- ❑1 5 (or more) days a week
- ❑2 3 or 4 days a week
- ❑3 1 or 2 days a week
- ❑4 1 day every 2 weeks
- ❑5 1 day a month or less

6a. When an unexpected delay occurs on your usual ***home-to-work* commute, do you usually take an alternate route to avoid the delay?** *(check one)*

❑1 No ❑1 Yes

6b. When an unexpected delay occurs on your usual ***home-to-work* commute, how long. on average, is the delay?** *(check one; if you usually take an alternate route to avoid delays. check how long you think the delays on your usual route might have been)*

- ❑1 Less than 5 minutes
- ❑2 5 minutes or more but less than 10 minutes
- ❑3 10 minutes or more but less than 15 minutes
- ❑4 15 minutes or more but less than 20 minutes
- ❑5 20 minutes or more

7. Is your usual work-to-home route essentially the reverse of your usual ***home-to-work* route?** *(check one)*

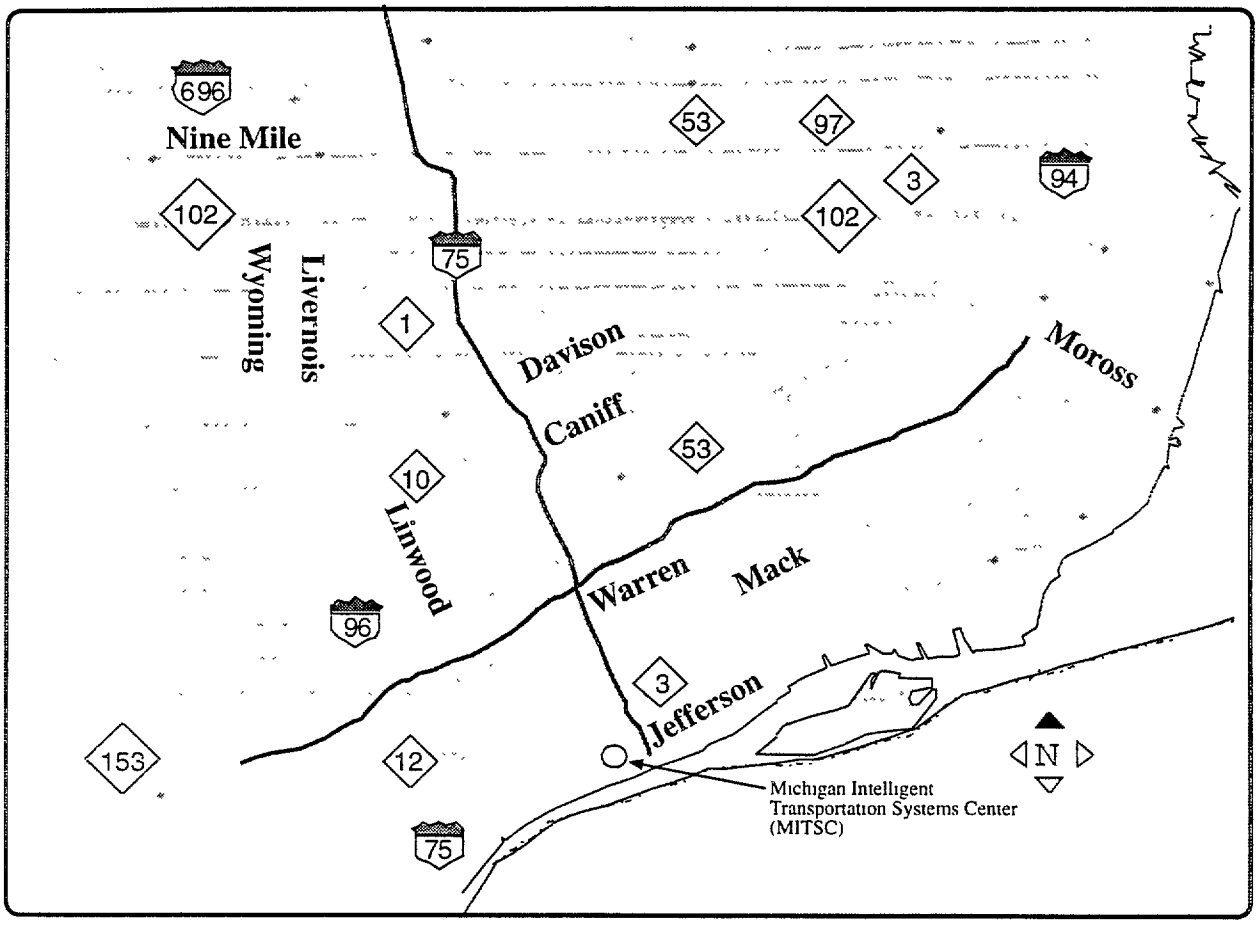
- ❑1 *No*
- ❑2 *Yes*

8. How important a role does habit play in your choice of route for your ***home-to-work* commute?** *(check one)*

- ❑1 Very Important
- ❑2 Somewhat Important
- ❑3 Not Very Important
- ❑4 Not At All Important

==========

The following questions ask about alternate routes for your commute. (An alternate route is a reasonably direct path that is significantly different from that which you usually take.) Please use the map below in answering these questions.



9. Within the area shown on the map, how familiar are you with alternate routes for your commute?
(check one box in each column)

Home-to-Work Commute	Work-to-Home Commute
❑1 Very Familiar	❑1 Very Familiar
❑2 Somewhat Familiar	❑2 Somewhat Familiar
❑3 Not Very Familiar	❑3 Not Very Familiar
❑4 Don't know of any	❑4 Don't know of any

10. Within the area shown on the map, how many alternate routes do you know of for your commute? *(answer both columns; write 0 if you don't know of any routes other than your usual route, write 1 if you know of one route in addition to your usual route, etc.)*

Home-to-Work Commute	Work-to-Home Commute
_____routes	_____routes

11. How did you find out about these alternate routes for your commute? *(check all that apply)*

- ❑0 Don't know of any alternate routes (only know my usual route)
- ❑1 From a relative, friend, or coworker, etc.
- ❑2 Through personal experience over a long time
- ❑3 By driving different routes to see where they went
- ❑4 By reading a map
- ❑5 Heard/saw them suggested in a traffic report
- ❑6 Other (please specify): _____

12. Within the area shown on the map, how willing are you to use alternate routes (routes other than your usual route) for your for your commute? *(check one box in each column)*

Home-to-Work Commute	Work-to-Home Commute
❑1 Very Willing	❑1 Very Willing
❑2 Somewhat Willing	❑2 Somewhat Willing
❑3 Not Very Willing	❑3 Not Very Willing
❑4 Will not take	❑4 Will not take

13a. During your commute, what is the longest delay (beyond that normally expected) that you would tolerate before you would switch from your usual route to an alternate route? *(answer both column)*

Home-to-Work Commute	Work-to-Home Commute
_____minutes	_____minutes

13b. During your commute, how much time would you have to expect to save in order to switch from your usual route to an alternate route? *(answer both columns)*

Home-To-Work Commute	Work-to-Home Commute
_____minutes	_____minutes

14. Within the area shown on the map, *how many times* did you use an alternate route for your commute in the past 8 weeks? *(answer both columns; write 0 if you didn't use any routes other than your usual route, write 1 if you used one route in addition to your usual route, and so on)*

Home-to-Work Commute	Work-to-Home Commute
_____times	_____times

15. Within the area shown on the map, how many *different* alternate routes did you use for your commute in the past 8 weeks? *(answer both columns; write 0 if you didn't use any routes other than your usual route, write 1 if you used one route in addition to your usual route, and so on)*

Home-to-Work Commute	Work-to-Home Commute
_____routes	_____routes

16. If you took one or more alternate routes for your commute in the past 8 weeks, to what extent do you agree or disagree with the following statement: "In general I am satisfied with the outcome when I take an alternate route." *(check one box in each column)*

Home-to-Work Commute	Work-to-Home Commute
❑$_0$ Didn't Take An Alternate Route	❑$_0$ Didn't Take An Alternate Route
❑$_1$ Strongly Disagree	❑$_1$ Strongly Disagree
❑$_2$ Somewhat Disagree	❑$_2$ Somewhat Disagree
❑$_3$ Neither Agree Nor Disagree	❑$_3$ Neither Agree Nor Disagree
❑$_4$ Somewhat Agree	❑$_4$ Somewhat Agree
❑$_5$ Strongly Agree	❑$_5$ Strongly Agree

17. If you took one or more alternate routes for your commute, how much time do you think you usually saved (in comparison to traveling on the original route)? *(check one in each column)*

Home-to-Work Commute	Work-to-Home Commute
❑$_0$ Didn't take any alternate routes	❑$_0$ Didn't take any alternate routes
❑$_{-1}$ Didn't save any time (alt. rt. took longer)	❑$_{-1}$ Didn't save any time (alt. rt. took longer)
❑$_1$ Saved less than 5 minutes	❑$_1$ Saved less than 5 minutes
❑$_2$ Saved 5 min or more but less than 10 min	❑$_2$ Saved 5 min or more but less than 10 min
❑$_3$ Saved 10 min or more but less than 15 min	❑$_3$ Saved 10 min or more but less than 15 min
❑$_4$ Saved 15 min or more but less than 20 min	❑$_4$ Saved 15 minutes or more but less than 20 min
❑$_5$ Saved 20 minutes or more	❑$_5$ Saved 20 minutes or more

==========

The following questions ask about your general opinions regarding traffic information systems. A traffic information system is a means (radio, TV, etc.) by which roadway status is communicated to you, either in or out of your car.

18. During your commute, what might make you think to listen to traffic information? *(check all that apply)*

- ❑0 I never listen to traffic information
- ❑1 I'm in the habit of listening to traffic information
- ❑2 I see that traffic is slowing and want to find out why
- ❑3 I see that congestion is increasing and want to find out why
- ❑4 There is a special event today and I want to know if it's affecting traffic
- ❑5 There is bad weather today and I want to know if it's affecting traffic
- ❑6 Someone told me that traffic was bad today
- ❑7 I want to let people at my destination know if I might be late
- ❑8 I've got to get somewhere and I just can't be late
- ❑9 Other (please specify): _____

19. Why might you NOT seek traffic information? *(check all that apply)*

- ❑1 I don't know of any traffic information systems that I could use
- ❑2 The traffic information systems I know of do not help me
- ❑3 I don't know any alternate routes to take, so why bother
- ❑4 I wouldn't take an alternate route even if I had information
- ❑5 I know the area well enough to get by without help
- ❑6 I rarely encounter a serious traffic problem
- ❑7 Other (please specify):_____

20. What are the 5 most important things that you might want a traffic information system to do for you? *(check 5 boxes, no more, no less)*

____ ❑$_1$ Tell me if traffic is heavier than usual
____ ❑$_2$ Tell me why traffic is heavier than usual
____ ❑$_3$ Tell me if traffic is lighter than usual
____ ❑$_4$ Tell me why traffic is lighter than usual
____ ❑$_5$ Tell me if there is an unexpected delay on my route
____ ❑$_6$ Tell me why there is an unexpected delay on my route
____ ❑$_7$ Tell me how long an unexpected delay on my route is expected to be
____ ❑$_8$ Tell me when there is NOT an unexpected delay on my route
____ ❑$_9$ Tell me the location of incidents that have occurred
____ ❑$_{10}$ Tell me the type of incidents that have occurred
____ ❑$_{11}$ Tell me the time that incidents occurred
____ ❑$_{12}$ Tell me the time that incidents are expected to be cleared
____ ❑$_{13}$ Tell me the location of construction
____ ❑$_{14}$ Tell me the duration of construction
____ ❑$_{15}$ Tell me if I should take an alternate route
____ ❑$_{16}$ Tell me why I should take an alternate route
____ ❑$_{17}$ Suggest an alternate route(s) for me to take
____ ❑$_{18}$ Other (please specify): _____

Now, please rank the 5 boxes checked in the preceding question in order of importance by writing a number from 1 to 5 on the line to the left of each of the 5 boxes checked in that question: 1 is most important, 2 is next most important, and so on.

21. Would you want a traffic information system to provide you with information relevant only to where you want to go or for the whole metro area? *(check one)*

❑$_1$ Provide me with information only for where I want to go
❑$_2$ Provide me with information for the whole metro area

22. How much would you be willing to pay for a traffic information system that completely meets your needs? *(fill in the blank in each row)*

$_____$_1$ If payment was a one time fee (answer in dollars total)
$_____$_2$ If payment was on a per-use basis (answer in [fractions of] dollars per use)
$_____$_3$ If payment was on a monthly basis (answer in dollars per month)
$_____$_4$ If payment was on an annual basis (answer in dollars per year)
$_____$_5$ Other (please specify): _____

23. Who should provide traffic information? *(check one)*

❑$_0$ Traffic information is not needed
❑$_1$ Government
❑$_2$ Private companies
❑$_3$ Both government and private companies
❑$_4$ Other (please specify): _____

24. How should traffic information be paid for? *(check all that apply)*

❑0 Traffic information is not needed
❑1 Gas tax
❑2 User fees
❑3 Advertising
❑4 Property tax
❑5 Subscription fee paid by individuals
❑6 Device purchase by individuals
❑7 Tax on employers
❑8 Vehicle Registration Tax
❑9 Sales tax
❑10 Other (please specify):_____

25. What are the top five things that the government should be doing with transportation tax dollars? *(check 5 boxes, no more, no less)*

____ ❑1 Repair roadways (fill potholes, fix bridges, etc.)
____ ❑2 Add regular lanes to the expressways
____ ❑3 Add High Occupancy Vehicle lanes to the expressways
____ ❑4 Build new roads
____ ❑5 Beautify the roadways
____ ❑6 Add more roadside call boxes (for safety)
____ ❑7 Expand the freeway courtesy patrol (which helps motorists in need)
____ ❑8 Come to the aid of motorists in need faster
____ ❑9 Clear incidents from roadways faster
____ ❑10 Improve traffic information
____ ❑11 Add more Changeable Message Signs on the expressways
____ ❑12 Provide more public transit
____ ❑13 Provide rideshare coordination
____ ❑14 Other (please specify): _____

Now, please rank the 5 boxes checked in the preceding question in order of importance by writing a number from 1 to 5 on the line to the left of each of the 5 boxes checked in that question: 1 is most important, 2 is next most important, and so on.

==========

The following questions ask about your use of traffic information systems for your home-to-work commute. A traffic information system is a means (radio, TV : etc.) by which the status of the roadway is communicated to you, either in or out of your car. By "use" we mean be aware of and consider in your decision making.

26. For your *home-to-work* commute during the past 8 weeks, *which* traffic information system(s) did you typically use? *(check all that apply)*

- ❑$_0$ Didn't use a traffic information system
- ❑$_1$ Commercial Radio [which station(s):_____]
- ❑$_2$ Television [which station(s):_____]
- ❑$_3$ Expressway Changeable Message Signs
- ❑$_4$ Other (please specify): _____

28. For your *home-to-work* commute during the past 8 weeks, *when* did you typically use Commercial Radio traffic information system(s)? *(check one)*

- ❑$_0$ Didn't use
- ❑$_1$ Used only before I left home
- ❑$_2$ Used only during the trip
- ❑$_3$ Used both before I left home and during the trip

29. For your *home-to-work* commute during the past 8 weeks, *how would you describe* your typical use of traffic information system(s)?
(check one box in each row)

	Home-to-Work Commute	DID NOT USE	USED LESS THAN ONCE A WEEK	USED 1 TIME A WEEK	USED A FEW TIMES A WEEK	USED 1 TIME A DAY	USED 2 OR MORE TIMES A DAY
1	Commercial Radio	❑$_0$	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
2	Television	❑$_0$	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
3	Changeable Message Signs	❑$_0$	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
4	Other	❑$_0$	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$

30. For your *home-to-work* commute during the past 8 weeks, to what extent did you rely on traffic information system(s) in *deciding when to leave home*?
(check one box in each row; if you did not use the system, check "DID NOT USE". if you did use the system, check one of the other four boxes in the row)

	Home-to-Work Commute	DID NOT USE	USED LESS THAN ONCE A WEEK	USED 1 TIME A WEEK	USED A FEW TIMES A WEEK	USED 1 TIME A DAY	USED 2 OR MORE TIMES A DAY
1	Commercial Radio	❑$_0$	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
2	Television	❑$_0$	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
3	Other	❑$_0$	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$

31. For your *home-to-work* commute during the past 8 weeks, how many times did you *change the time you planned to leave home* because of a traffic information system? *(in each row check **"DID NOT USE"** this system or write a number: 0 if you used the system but didn' t change your plans because of it, 1 if you used the system and changed your plans 1 time because of it, and so on)*

	Home-to-Work Commute		
1	Commercial Radio	❑0 DID NOT USE	CHANGED ____ TIMES
2	Television	❑0 DID NOT USE	CHANGED ____ TIMES
3	Other	❑0 DID NOT USE	CHANGED ____ TIMES

32. For your *home-to-work* commute during the past 8 weeks, to what extent did, you rely on traffic information system(s) when you *chose a route before leaving home?* *(check one box in each row; if you did not use the system, check "DID NOT USE", if you did use the system, check one of the other four boxes in the row)*

Home-to-Work Commute		DID NOT USE AT ALL	DID NOT RELY ON VERY MUCH	DID NOT RELY ON	RELY ON SOMEWHAT MUCH	RELY ON VERY
1	Commercial Radio	❑0	❑1	❑2	❑3	❑4
2	Television	❑0	❑1	❑2	❑3	❑4
3	Other	❑0	❑1	❑2	❑3	❑4

33. For your *home-to-work* commute during the past 8 weeks, bow many times did you *change your route before leaving home* because of a traffic information system? *(in each row check **"DID NOT USE"** this system or write a number: 0 if you used the system but didn't change your route because of it, 1 if you used the system and changed your route 1 time because of it- and so on)*

	Home-to-Work Commute		
1	Commercial Radio	❑0 DID NOT USE	CHANGED ____ TIMES
2	Television	❑0 DID NOT USE	CHANGED ____ TIMES
3	Other	❑0 DID NOT USE	CHANGED ____ TIMES

34. For your *home-to-work* commute during the past 8 weeks, how many times did you *change your route during the trip* because of a traffic information system? *(in each row check **"DID NOT USE"** this system or write a number: 0 if you used the system bra didn't change your route because of it, 1 if you used the system and changed your route 1 time because of it, and so on)*

	Home-to-Work Commute		
1	Commercial Radio	❑0 DID NOT USE	CHANGED ____ TIMES
2	Changeable Message Signs	❑0 DID NOT USE	CHANGED ____ TIMES
3	Other	❑0 DID NOT USE	CHANGED ____ TIMES

35. For your *home-to-work* commute during the past 8 weeks, how many times did you *cancel your commute* because of a traffic information system? *(in each row check **"DID NOT USE"** this system or write a number: 0 if you used the system but didn't cancel your commute because of it, 1 if you used the system and canceled your commute 1 time because of it, and so on)*

	Home-to-Work Commute		
1	Commercial Radio	❑0 DID NOT USE	CHANGED ____ TIMES
2	Television	❑0 DID NOT USE	CHANGED ____ TIMES
3	Other	❑0 DID NOT USE	CHANGED ____ TIMES

==========

The following questions ask about your use of traffic information systems for your work-to-home commute. A traffic information system is a means (radio, TV, etc.) by which the status of the roadway is communicated to you, either in or out of your car. By "use" we mean be aware of and consider in your decision making.

36. For your *work-to-home* commute during the past 8 weeks, *which* traffic information system(s) did you typically use? *(check all that apply)*

- ❑$_0$ Didn't use a traffic information system
- ❑$_1$ Commercial Radio [which station(s):_____]
- ❑$_2$ Television [which station(s):_____]
- ❑$_3$ Expressway Changeable Message Signs
- ❑$_4$ Other (please specify):_____

38. For your *work-to-home* commute during the past 8 weeks, *when* did you typically use Commercial Radio traffic information system(s)? *(check one)*

- ❑$_0$ Didn't use
- ❑$_1$ Used only before I left work
- ❑$_2$ Used only during the trip
- ❑$_3$ Used both before I left work and during the trip

39. For your *work-to-home* commute during the past 8 weeks, *how would you describe* your typical use of traffic information system(s)?
(check one box in each row)

	Home-to-Work Commute	DID NOT USE	USED LESS THAN ONCE A WEEK	USED 1 TIME A WEEK	USED A FEW TIMES A WEEK	USED 1 TIME A DAY	USED 2 OR MORE TIMES A DAY
1	Commercial Radio	❑$_0$	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
2	Television	❑$_0$	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
3	Changeable Message Signs	❑$_0$	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
4	Other	❑$_0$	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$

40. For your *work-to-home* commute during the past 8 weeks, to what extent did you rely on traffic information system(s) in *deciding when to leave work?*
(check one box in each row; if you did not use the system, check "DID NOT USE", if you did use the system, check one of the other four boxes in the row)

	Home-to-Work Commute	DID NOT USE AT ALL	DID NOT RELY ON VERY MUCH	DID NOT RELY ON	RELY ON SOMEWHAT MUCH	RELY ON VERY
1	Commercial Radio	❑$_0$	❑$_1$	❑$_2$	❑$_3$	❑$_4$
2	Television	❑$_0$	❑$_1$	❑$_2$	❑$_3$	❑$_4$
3	Other	❑$_0$	❑$_1$	❑$_2$	❑$_3$	❑$_4$

41. For your *work-to-home* commute during the past 8 weeks, how many times did you *change the time you planned to leave work* because of a traffic information system? *(in each row check "DID NOT USE" this system or write a number: 0 if you used the system but didn't change your plans because of it, 1 if you used the system and changed your plans 1 time because of it, and so on)*

	Work-to-Home Commute		
1	Commercial Radio	❑0 DID NOT USE	CHANGED ____ TIMES
2	Television	❑0 DID NOT USE	CHANGED ____ TIMES
3	Other	❑0 DID NOT USE	CHANGED ____ TIMES

42. For your *work-to-home* commute during the past 8 weeks, to what extent did you rely on traffic information system(s) when you *chose a route before leaving work*? *(check one box in each row; if you did not use the system, check "DID NOT USE", if you did use the system, check one of the other four boxes in the row)*

Work-to-Home Commute		DID NOT USE AT ALL	DID NOT RELY ON VERY MUCH	DID NOT RELY ON	RELY ON SOMEWHAT MUCH	RELY ON VERY
1	Commercial Radio	❑0	❑1	❑2	❑3	❑4
2	Television	❑0	❑1	❑2	❑3	❑4
3	Other	❑0	❑1	❑2	❑3	❑4

43. For your *work-to-home* commute during the past 8 weeks, how many times did you *change your route before leaving work* because of a traffic information system? *(in each row check "DID NOT USE" this system or write a number: 0 if you used the system but didn't change your route because of it, 1 if you used the system and changed your route 1 time because of it, and so on)*

	Work-to-Home Commute		
1	Commercial Radio	❑0 DID NOT USE	CHANGED ____ TIMES
2	Television	❑0 DID NOT USE	CHANGED ____ TIMES
3	Other	❑0 DID NOT USE	CHANGED ____ TIMES

44. For your *work-to-home* commute during the past 8 weeks, how many times did you *change your route during the trip* because of a traffic information system? *(in each row check "DID NOT USE" this system or write a number: 0 if you used the system but didn't change* your route *because of it, 1 if you used the system and changed your route 1 time because of it, and so on)*

	Work-to-Home Commute		
1	Commercial Radio	❑0 DID NOT USE	CHANGED ____ TIMES
2	Changeable Message Signs	❑0 DID NOT USE	CHANGED ____ TIMES
3	Other	❑0 DID NOT USE	CHANGED ____ TIMES

==========

The following questions also ask about your use of traffic information systems for your commute.

45. To what extent do you agree or disagree with the following statement: "Traffic information systems could be improved to the point that they completely meet my needs for traffic information." *(check one box in each row; if you do not know about a system or do not have opinions on it, check "AM NOT FAMILIAR WITH SYSTEM", otherwise check one of the other five boxes in each row.)*

		AM NOT FAMILIAR WITH SYSTEM	STRONGLY DISAGREE	SOMEWHAT DISAGREE	NEITHER	SOMEWHAT AGREE	STRONGLY AGREE
1	Commercial Radio	❑0	❑1	❑2	❑3	❑4	❑5
2	Television	❑0	❑1	❑2	❑3	❑4	❑5
3	Changeable Message Signs	❑0	❑1	❑2	❑3	❑4	❑5
4	Other	❑0	❑1	❑2	❑3	❑4	❑5

46. During the past 8 weeks, which traffic information system did you *rely on the most* in making decisions for your commute? *(check only one)*

❑0 Did not rely on any traffic information system
❑1 Commercial Radio [which station:_____]
❑2 Television [which station:_____]
❑3 Expressway Changeable Message Signs
❑4 Other (please specify): _____

47. Which traffic information system do you *like the best?* *(check only one)*

❑1 Commercial Radio [which station:_____]
❑2 Television [which station:_____]
❑3 Expressway Changeable Message Signs
❑4 Other (please specify):_____
❑5 No Preference

48. If you were given a traffic information system that completely meets your needs for traffic information, how likely is it that you would use that information system? *(check one)*

❑1 Very Unlikely
❑2 Somewhat Unlikely
❑3 Neither Likely Nor Unlikely
❑4 Somewhat Likely
❑5 Very Likely

==========

The following set of questions (on pages 13-21) ask further detail about your use of traffic information systems for your commute.

Some of these questions apply to people who have used such systems.

Others of these questions apply to people who have NOT used such systems.

As a result, no single person should answer every one of these questions.

Ask the University of Michigan staff for help if you are in doubt.

The questions are broken into 3 sections (3 pages each) and ask about:

Commercial Radio (for example, W JR, WWJ, etc.)

Television (for example WDIV, WXYZ, etc.)

Changeable Message Signs (information boards on the expressway)

Please read each question carefully and follow the instructions.

Commercial Radio (for example, WJR, WWJ, etc.)

49. Are you familiar with a *Commercial Radio* traffic information system? (By familiar we mean know about and have opinions on the system, whether or not you use the system in your decision making.) *(check one)*

❑$_0$ NO: PLEASE GO TO QUESTION 55: DO NOT ANSWER ~~QUESTIONS 50 THROUGH 54.~~
❑$_1$ YES: PLEASE GO TO NEXT QUESTION (QUESTION 50 BELOW).

50. If you are familiar with *Commercial Radio* traffic information system(s), please indicate the extent to which you agree or disagree with the following items. *(check one box in each row)*

	The *Commercial Radio* traffic information system:	STRONGLY DISAGREE	SOMEWHAT DISAGREE	NEITHER	SOMEWHAT AGREE	STRONGLY AGREE
1	works reliably	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
2	includes all the info I need to know	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
3	is specific to my commute.....	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
4	provides reliable information.....	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
5	provides accurate information.....	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
6	reports incidents soon after they happen	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
7	presents reports frequently enough	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
8	is easy to use.....	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
9	is convenient to use.....	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
10	catches my attention.....	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
11	is distracting.....	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
12	gives the reason for delays.....	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
13	gives the expected length of delays.....	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
14	provides information on demand	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
15	suggests appropriate alternate routes...	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$

51. Have you used a *Commercial Radio* traffic information system in the past 8 weeks? *(check one)*

❑$_0$ NO: PLEASE GO TO QUESTION 54: DO NOT ANSWER ~~QUESTIONS 52 AND 53.~~
❑$_1$ YES: PLEASE GO TO NEXT QUESTION (QUESTION 52 ON THE NEXT PAGE).

58. Please indicate the extent to which you agree or disagree with the following statements. *(check one box in each row)*

	I found that using the ***Commercial Radio*** traffic information system:	STRONGLY DISAGREE	SOMEWHAT DISAGREE	NEITHER	SOMEWHAT AGREE	STRONGLY AGREE
1	satisfied my need for information	❑1	❑2	❑3	❑4	❑5
2	helped me make better trip choices	❑1	❑2	❑3	❑4	❑5
3	made my commute less stressful.....	❑1	❑2	❑3	❑4	❑5
4	reduced my driving time.....	❑1	❑2	❑3	❑4	❑5
5	made my driving time more certain	❑1	❑2	❑3	❑4	❑5
6	made my arrival time more certain	❑1	❑2	❑3	❑4	❑5
7	helped me avoid congestion.....	❑1	❑2	❑3	❑4	❑5
8	helped me avoid unexpected delays....	❑1	❑2	❑3	❑4	❑5
9	on the whole, improved my commute.	❑1	❑2	❑3	❑4	❑5

53. What are the 5 most important things that would improve the existing ***Commercial Radio* traffic information system that you use most often?** *(check 5 boxes, no more, no less)*

_____ ❑1 Make the system work more reliably.
_____ ❑2 Make the information more complete (tell more of the things I need to know).
_____ ❑3 Make the information more specific to my commute (exclude irrelevant info).
_____ ❑4 Make the information more reliable.
_____ ❑5 Make the information more accurate.
_____ ❑6 Report incidents sooner after they happen.
_____ ❑7 Present traffic reports more frequently.
_____ ❑8 Make the system easier to use.
_____ ❑9 Make the system more convenient to use.
_____ ❑10 Make the system more able to catch my attention.
_____ ❑11 Make the system less distracting.
_____ ❑12 Give the reason for an unexpected delay.
_____ ❑13 Give the expected length of an unexpected delay.
_____ ❑14 Make the systems provide information on demand.
_____ ❑15 Suggest appropriate alternate routes when an unexpected delay arises.
_____ ❑16 Other (please specify):_____

_____ ❑17 No improvement possible.

Now, please rank the 5 boxes checked in the preceding question in order of importance by writing a number from 1 to 5 on the line to the left of each of the 5 boxes checked in that question: 1 is most important, 2 is next most important, and so on.

PLEASE GO TO QUESTION 55 ON TELEVISION SYSTEMS; DO NOT ANSWER QUESTION 54.

You should answer Question 54 only if you have NOT used a *Commercial Radio* traffic information system in the past 8 weeks. If you have used one, go to Question 55 (TELEVISION).

54. Why didn't you use a *Commercial Radio* traffic information system during the past 8 weeks? *(check all that apply)*

- ❑0 I didn't know of any systems that I could use.
- ❑1 Available systems do not work reliably.
- ❑2 The information was not complete enough (it did not tell me enough of the things I need to know).
- ❑3 Not enough of the information was specific to my commute.
- ❑4 The information is not reliable.
- ❑5 The information is not accurate.
- ❑6 The systems do not report incidents soon enough after they happen.
- ❑7 The systems do not present reports frequently enough.
- ❑8 The systems are too hard to use.
- ❑9 The systems are too inconvenient to use.
- ❑10 The systems do not catch my attention.
- ❑11 The systems are distracting.
- ❑12 The information does not give the reason for a delay.
- ❑13 The information does give the expected length of a delay.
- ❑14 The information the systems provide is not available on demand.
- ❑15 The information does not suggest appropriate alternate routes.
- ❑16 Other (please specify):_____

- ❑17 I wouldn't take an alternate route even if I had information.
- ❑18 I know the area well enough to get by without help.
- ❑19 I rarely encounter a serious traffic problem.
- ❑20 I rely on a different traffic information system.

PLEASE GO TO QUESTION 55 (TELEVISION).

Television (for example, WDIV, WXYZ, etc.)

55. Are you familiar with a *Television* traffic information system? (By familiar we mean know about and have opinions on the system, whether or not you use the system in your decision making.) *(check one)*

❑$_0$ NO: PLEASE GO TO QUESTION 61: DO NOT ANSWER ~~QUESTIONS 56 THROUGH 60.~~
❑$_1$ YES: PLEASE GO TO NEXT QUESTION (QUESTION 56 BELOW).

56. If you are familiar with *Television* traffic information system(s), please indicate the extent to which you agree or disagree with the following items. *(check one box in each row)*

	The *Television* traffic information system:	STRONGLY DISAGREE	SOMEWHAT DISAGREE	NEITHER	SOMEWHAT AGREE	STRONGLY AGREE
1	works reliably	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
2	includes all the info I need to know	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
3	is specific to my commute.....	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
4	provides reliable information.....	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
5	provides accurate information.....	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
6	reports incidents soon after they happen	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
7	presents reports frequently enough	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
8	is easy to use.....	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
9	is convenient to use.....	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
10	catches my attention.....	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
11	is distracting.....	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
12	gives the reason for delays.....	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
13	gives the expected length of delays.....	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
14	provides information on demand	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
15	suggests appropriate alternate routes...	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$

57. Have you used a *Television* traffic information system in the past 8 weeks? *(check one)*

❑$_0$ NO: PLEASE GO TO QUESTION 60: DO NOT ANSWER ~~QUESTIONS 58 AND 59.~~
❑$_1$ YES: PLEASE GO TO NEXT QUESTION (QUESTION 58 ON THE NEXT PAGE).

58. Please indicate the extent to which you agree or disagree with the following statements. *(check one box in each row)*

	I found that using the ***Television*** traffic information system:	STRONGLY DISAGREE	SOMEWHAT DISAGREE	NEITHER	SOMEWHAT AGREE	STRONGLY AGREE
1	satisfied my need for information	❑1	❑2	❑3	❑4	❑5
2	helped me make better trip choices	❑1	❑2	❑3	❑4	❑5
3	made my commute less stressful.....	❑1	❑2	❑3	❑4	❑5
10	reduced my driving time.....	❑1	❑2	❑3	❑4	❑5
11	made my driving time more certain	❑1	❑2	❑3	❑4	❑5
12	made my arrival time more certain	❑1	❑2	❑3	❑4	❑5
13	helped me avoid congestion.....	❑1	❑2	❑3	❑4	❑5
14	helped me avoid unexpected delays....	❑1	❑2	❑3	❑4	❑5
15	on the whole, improved my commute.	❑1	❑2	❑3	❑4	❑5

59. What are the 5 most important things that would improve the existing ***Television* traffic information system that you use most often?** *(check 5 boxes, no more, no less)*

_____ ❑1 Make the system work more reliably.
_____ ❑2 Make the information more complete (tell more of the things I need to know).
_____ ❑3 Make the information more specific to my commute (exclude irrelevant info).
_____ ❑4 Make the information more reliable.
_____ ❑5 Make the information more accurate.
_____ ❑6 Report incidents sooner after they happen.
_____ ❑7 Present traffic reports more frequently.
_____ ❑8 Make the system easier to use.
_____ ❑9 Make the system more convenient to use.
_____ ❑10 Make the system more able to catch my attention.
_____ ❑11 Make the system less distracting.
_____ ❑12 Give the reason for an unexpected delay.
_____ ❑13 Give the expected length of an unexpected delay.
_____ ❑14 Make the systems provide information on demand.
_____ ❑15 Suggest appropriate alternate routes when an unexpected delay arises.
_____ ❑16 Other (please specify): _____

_____ ❑17 No improvement possible.

Now, please rank the 5 boxes checked in the preceding question in order of importance by writing a number from 1 to 5 on the line to the left of each of the 5 boxes checked in that question: 1 is most important, 2 is next most important, and so on.

PLEASE GO TO QUESTION 61 ON THE CHANGEABLE MESSAGE SIGNS; DO NOT ANSWER ~~QUESTION 60.~~

You should answer Question 60 only if you have NOT used a *Television* traffic information system in the past 8 weeks. If you have used one, go to Question 61 (CHANGEABLE MESSAGE SIGNS).

60. Why didn't you use a *Television* traffic information system during the past 8 weeks? *(check all that apply)*

- ❑0 I didn't know of any systems that I could use.
- ❑1 Available systems do not work reliably.
- ❑2 The information was not complete enough (it did not tell me enough of the things I need to know).
- ❑3 Not enough of the information was specific to my commute.
- ❑4 The information is not reliable.
- ❑5 The information is not accurate.
- ❑6 The systems do not report incidents soon enough after they happen.
- ❑7 The systems do not present reports frequently enough.
- ❑8 The systems are too hard to use.
- ❑9 The systems are too inconvenient to use.
- ❑10 The systems do not catch my attention.
- ❑11 The systems are distracting.
- ❑12 The information does not give the reason for a delay.
- ❑13 The information does give the expected length of a delay.
- ❑14 The information the systems provide is not available on demand.
- ❑15 The information does not suggest appropriate alternate routes.
- ❑16 Other (please specify):_____

- ❑17 I wouldn't take an alternate route even if I had information.
- ❑18 I know the area well enough to get by without help.
- ❑19 I rarely encounter a serious traffic problem.
- ❑20 I rely on a different traffic information system.

PLEASE GO TO QUESTION 61 (CHANGEABLE MESSAGE SIGNS).

Changeable Message Signs (information boards on the expressway)

61. Are you familiar with a *Changeable Message Signs* traffic information system? (By familiar we mean know about and have opinions on the system, whether or not you use the system in your decision making.) *(check one)*

❑0 NO: PLEASE GO TO QUESTION 67: DO NOT ANSWER ~~QUESTIONS 62 THROUGH 66.~~
❑1 YES: PLEASE GO TO NEXT QUESTION (QUESTION 62 BELOW).

62. Based on your familiarity with the *Changeable Message Signs* traffic information system(s), please indicate the extent to which you agree or disagree with the following items.
(check one box in each row)

	The *Changeable Message Signs* traffic information system:	STRONGLY DISAGREE	SOMEWHAT DISAGREE	NEITHER	SOMEWHAT AGREE	STRONGLY AGREE
1	works reliably	❑1	❑2	❑3	❑4	❑5
2	includes all the info I need to know	❑1	❑2	❑3	❑4	❑5
3	is specific to my commute.....	❑1	❑2	❑3	❑4	❑5
4	provides reliable information.....	❑1	❑2	❑3	❑4	❑5
5	provides accurate information.....	❑1	❑2	❑3	❑4	❑5
6	reports incidents soon after they happen	❑1	❑2	❑3	❑4	❑5
7	presents reports frequently enough	❑1	❑2	❑3	❑4	❑5
8	is easy to use.....	❑1	❑2	❑3	❑4	❑5
9	is convenient to use.....	❑1	❑2	❑3	❑4	❑5
10	catches my attention.....	❑1	❑2	❑3	❑4	❑5
11	is distracting.....	❑1	❑2	❑3	❑4	❑5
12	gives the reason for delays.....	❑1	❑2	❑3	❑4	❑5
13	gives the expected length of delays.....	❑1	❑2	❑3	❑4	❑5
14	provides information on demand	❑1	❑2	❑3	❑4	❑5
15	suggests appropriate alternate routes...	❑1	❑2	❑3	❑4	❑5

63. Have you used a *Changeable Message Signs* traffic information system in the past 8 weeks? *(check one)*

❑0 NO: PLEASE GO TO QUESTION 66: DO NOT ANSWER ~~QUESTIONS 64 AND 65.~~
❑1 YES: PLEASE GO TO NEXT QUESTION (QUESTION 64 ON THE NEXT PAGE).

58. Please indicate the extent to which you agree or disagree with the following statements. *(check one box in each row)*

	I found that using the ***Changeable Message Sign*** traffic information system:	STRONGLY DISAGREE	SOMEWHAT DISAGREE	NEITHER	SOMEWHAT AGREE	STRONGLY AGREE
1	satisfied my need for information	❑1	❑2	❑3	❑4	❑5
2	helped me make better trip choices	❑1	❑2	❑3	❑4	❑5
3	made my commute less stressful.....	❑1	❑2	❑3	❑4	❑5
16	reduced my driving time.....	❑1	❑2	❑3	❑4	❑5
17	made my driving time more certain	❑1	❑2	❑3	❑4	❑5
18	made my arrival time more certain	❑1	❑2	❑3	❑4	❑5
19	helped me avoid congestion.....	❑1	❑2	❑3	❑4	❑5
20	helped me avoid unexpected delays....	❑1	❑2	❑3	❑4	❑5
21	on the whole, improved my commute.	❑1	❑2	❑3	❑4	❑5

65. What are the 5 most important things that would improve the existing ***Changeable Message Sign* traffic information system?** *(check 5 boxes, no more, no less)*

_____ ❑1 Make the system work more reliably.
_____ ❑2 Make the information more complete (tell more of the things I need to know).
_____ ❑3 Make the information more specific to my commute (exclude irrelevant info).
_____ ❑4 Make the information more reliable.
_____ ❑5 Make the information more accurate.
_____ ❑6 Report incidents sooner after they happen.
_____ ❑7 Present traffic reports more frequently.
_____ ❑8 Make the system easier to use.
_____ ❑9 Make the system more convenient to use.
_____ ❑10 Make the system more able to catch my attention.
_____ ❑11 Make the system less distracting.
_____ ❑12 Give the reason for an unexpected delay.
_____ ❑13 Give the expected length of an unexpected delay.
_____ ❑14 Make the systems provide information on demand.
_____ ❑15 Suggest appropriate alternate routes when an unexpected delay arises.
_____ ❑16 Other (please specify): _____
_____ ❑17 No improvement possible.

Now, please rank the 5 boxes checked in the preceding question in order of importance by writing a number from 1 to 5 on the line to the left of each of the 5 boxes checked in that question: 1 is most important, 2 is next most important, and so on.

PLEASE GO TO QUESTION 67; DO NOT ANSWER ~~QUESTION 66.~~

You should answer Question 66 only if you have NOT used a *Changeable Message Sign* traffic information system in the past 8 weeks. If you have used one, go to Question 67.

66. Why didn't you use a *Changeable Message Sign* traffic information system during the past 8 weeks? *(check all that apply)*

- ❑0 I didn't know of any systems that I could use.
- ❑1 Available systems do not work reliably.
- ❑2 The information was not complete enough (it did not tell me enough of the things I need to know).
- ❑3 Not enough of the information was specific to my commute.
- ❑4 The information is not reliable.
- ❑5 The information is not accurate.
- ❑6 The systems do not report incidents soon enough after they happen.
- ❑7 The systems do not present reports frequently enough.
- ❑8 The systems are too hard to use.
- ❑9 The systems are too inconvenient to use.
- ❑10 The systems do not catch my attention.
- ❑11 The systems are distracting.
- ❑12 The information does not give the reason for a delay.
- ❑13 The information does give the expected length of a delay.
- ❑14 The information the systems provide is not available on demand.
- ❑15 The information does not suggest appropriate alternate routes.
- ❑16 Other (please specify):_____

- ❑17 I wouldn't take an alternate route even if I had information.
- ❑18 I know the area well enough to get by without help.
- ❑19 I rarely encounter a serious traffic problem.
- ❑20 I rely on a different traffic information system.

PLEASE GO TO QUESTION 67.

==========

The following questions ask about your attitudes about driving and your driving history.

67. In general, how much do you enjoy driving for your commute? *(check one)*

- ❑1 I Always Enjoy driving for my commute
- ❑2 I Usually Enjoy driving for my commute
- ❑3 I Sometimes Enjoy driving for my commute
- ❑4 I Seldom Enjoy driving for my commute
- ❑5 I Never Enjoy driving for my commute

68. In general, how stressful do you find driving for your commute? *(check one)*

- ❑1 I Always Find driving for my commute Stressful
- ❑2 I Usually Find driving for my commute Stressful
- ❑3 I Sometimes Find driving for my commute Stressful
- ❑4 I Seldom Find driving for my commute Stressful
- ❑5 I Never Find driving for my commute Stressful

69. In general, how stressful do you find being late for work? *(check one)*

- ❑1 Very Stressful
- ❑2 Somewhat Stressful
- ❑3 Not Very Stressful
- ❑4 Not At All Stressful

70. On the average, how many miles do you drive in a year? *(check one)*

- ❑1 Less than 3,000
- ❑2 3,001 - 6,000
- ❑3 6,001 - 8,000
- ❑4 8,001 - 11,000
- ❑5 11,001 - 14,000
- ❑6 More than 14,000

71. Select the statement that best describes yourself. *(check one)*

- ❑1 I am good at finding my way through both familiar and unfamiliar areas
- ❑2 I am good at finding my way through familiar areas but have minor trouble in unfamiliar areas
- ❑3 I am good at finding my way through familiar areas but have trouble in unfamiliar areas
- ❑4 I have minor trouble finding my way through both familiar and unfamiliar areas
- ❑5 I have trouble finding my way through both familiar and unfamiliar areas

72. How easy or difficult do you find road maps to use in selecting routes? *(check one)*

- ❑1 Very Easy
- ❑2 Somewhat Easy
- ❑3 Neither Easy Nor Difficult
- ❑4 Somewhat Difficult
- ❑5 Very Difficult

==========

The following questions are related to your interest in and familiarity with "new technology".

73. Which of the following do *you* have for *persona2* (non-business) use?
(check all that apply)

- ❑1 Desktop computer at home
- ❑2 Laptop computer
- ❑3 Internet access from home
- ❑4 Worldwide web browser software
- ❑5 Internet phone hookup (so you can make phone calls via the intemet)
- ❑6 Scanner (for use with a computer)
- ❑7 Cellular phone
- ❑8 Pager
- ❑9 Fax machine at home
- ❑10 Voice mail for home
- ❑11 Antilock braking on your car
- ❑12 Route guidance device on your car
- ❑13 Other "new" technology (please specify):
- ❑14 None of the above

74. In general, how interested are you in news items concerning new technology?
(check one)

- ❑1 Very Interested
- ❑2 Somewhat Interested
- ❑3 Not Very Interested
- ❑4 Not At All Interested

75. In general, do you find new technology easy or difficult to use?
(check one)

- ❑1 Very Easy
- ❑2 Somewhat Easy
- ❑3 Neither Easy Nor Difficult
- ❑4 Somewhat Difficult
- ❑5 Very Difficult

***76.* In general, how enjoyable do you find using devices with new technology?**
(check one)

- ❑1 Very Enjoyable
- ❑2 Somewhat Enjoyable
- ❑3 Not Very Enjoyable
- ❑4 Not At All Enjoyable

77. In general, how frustrating do you find using devices with new technology?
(check one)

- ❑1 Very Frustrating
- ❑2 Somewhat Frustrating
- ❑3 Not Very Frustrating
- ❑4 Not At All Frustrating

==========

The following questions ask about your household.

78. How many people are there in your household? *(fill the blank)*

_____people

79. Are you married? *(check one)*

❑0 No
❑1 Yes

80. How many licensed motor vehicles are there in your household? *(fill the blank)*

_____vehicles

81. What are the makes and models of the vehicles you own? *(fill the blanks)*

	Primary vehicle	Vehicle 2	Vehicle 3
Year	_____	_____	_____
make (e.g., Buick)	_____	_____	_____
model	_____	_____	_____

82. What is your job title? *(fill the blank)*

_____

83. What is the highest level of education you have completed?
(check the most appropriate box)

❑1 Less Than High School Diploma
❑2 High School Diploma (or equivalent)
❑3 Some College
❑4 Bachelor's Degree
❑5 Some Graduate School
❑6 Graduate Degree

84. What is your *total family* gross income? *(check one)*

❑1 Less than $20,000
❑2 $20,000 to $39,999
❑3 $40,000 to $59,999
❑4 $60,000 to $79,999
❑5 $80,000 to $99,999
❑6 $100,000 to $119,999
❑7 $120,000 to $139,999
❑8 $140,000 or more

85. If you like, please make any additional comments (either about DIRECT or traffic information in general). [Use the back of the page if you need more space.]

_____
_____

==========

Thank you for taking the time to fill out this questionnaire. Please return the questionnaire to the University of Michigan staff person assisting you. Again, all responses will be kept confidential.

DIRECT EVALUATION SURVEY (After)

Test Period:_____

Vehicle ID:_____

Please complete all parts of this survey: Be careful not to skip any question or any page, unless directed otherwise. **Answer the questions with the past 8 weeks in mind. That is, we want to know your thoughts during the time that you were participating in the DIRECT test.**

Your opinions are extremely valuable in helping us assess the value of the traffic information systems being tested in DIRECT and should eventually help improve travel in the Detroit metropolitan area.

Your responses will be used solely for research. All responses on this form will be kept strictly confidential and you will remain anonymous in any public report. You do not have to answer any questions you do not wish to answer or any questions that make you feel uncomfortable.

Thank you for your participation in DIRECT.

==========

The following questions ask about your usual home-to-work commute.

1. **On average, how many minutes does your usual *home-to-work* commute take?** *(fill blank)*

_____minutes

2. **On average, how frequently does an unexpected delay occur on your usual *home-to-work* commute?** *(check one)*

❑1 5 (or more) days a week
❑2 3 or 4 days a week
❑3 1 or 2 days a week
❑4 1 day every 2 weeks
❑5 1 day a month or less

3a. **When an unexpected delay occurs on your usual *home-to-work* commute, do you usually take an alternate route to avoid the delay?** *(check one)*

❑0 No ❑1 Yes

3b. **When an unexpected delay occurs on your usual *home-to-work* commute, how long, on average, is the delay?** *(check one; if you usually take an alternate route to avoid delays, check how long you think the delays on your usual route might have been)*

❑1 Less than 5 minutes
❑2 5 minutes or more but less than 10 minutes
❑3 10 minutes or more but less than 15 minutes
❑4 15 minutes or more but less than 20 minutes
❑5 20 minutes or more

==========

The following questions ask about* factors that affect your *choice of route for your commute.

4. During your commute, what is the longest delay (beyond that normally expected) that you would tolerate before you would switch from your usual route to an alternate route? *(answer both columns)*

Home-to-Work Commute	Work-to-Home Commute
_____minutes	_____minutes

5. During your commute, how much time would you have to expect to save in order to switch from your usual route to an alternate route? *(answer both columns)*

Home-to-Work Commute	Work-to-Home Commute
_____minutes	_____minutes

6. If more than one route is available between your home and work, what factors do you consider in choosing between routes?
(Please distribute 100 points among the following. For example, travel time might be worth 30 points to you, mileage worth 25, and so on up to a total of 100 points.)

Points Assigned

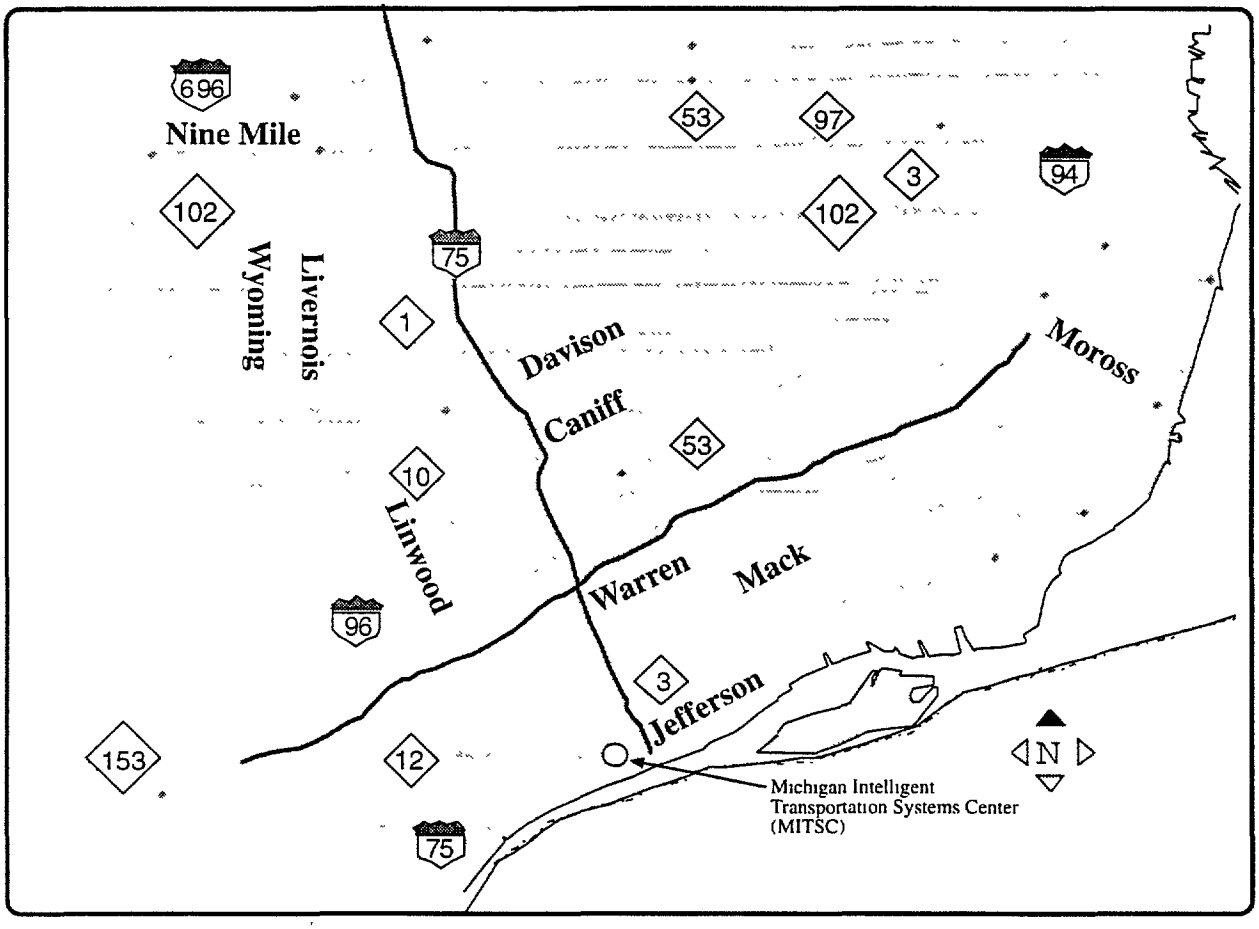
_____points$_1$ Expected travel time on each route
_____points$_2$ Total mileage on each route
_____points$_3$ Availability of traffic information for each route
_____points$_4$ Road type (expressway, major street, residential street) on each route
_____points$_5$ Number of turns on each route
_____points$_6$ Other (please specify):_____
100 points total

7. To what extent do you agree or disagree with the following statement: "If I leave my usual route to get around a traffic delay, I want to get back to my usual route as soon as possible." *(check one)*

❑$_1$ Strongly Disagree
❑$_2$ Somewhat Disagree
❑$_3$ Neither Agree Nor Disagree
❑$_4$ Somewhat Agree
❑$_5$ Strongly Agree

==========

The following questions ask about alternate routes for your commute. (An alternate route is a reasonably direct path that is significantly different from that which you usually take.) Please use the map below in answering these questions.



8. **Within the area shown on the map, how familiar are you with alternate routes for your commute?**
(check one box in each column)

Home-to-Work Commute	Work-to-Home Commute
❑1 Very Familiar	❑1 Very Familiar
❑2 Somewhat Familiar	❑2 Somewhat Familiar
❑3 Not Very Familiar	❑3 Not Very Familiar
❑4 Don't know of any	❑4 Don't know of any

9. Within the area shown on the map, how many alternate routes do you know of for your commute? *(answer both columns: write 0 if you don' t know of any routes other than your usual route, write I if you know of one route in addition to your usual route, etc.)*

Home-to-Work Commute	Work-to-Home Commute
_____routes	_____routes

10. How did you find out about these alternate routes for your commute? *(check all that apply)*

- ❑$_0$ Don't know of any alternate routes (only know my usual route)
- ❑$_1$ From a relative, friend, or coworker, etc.
- ❑$_2$ Through personal experience over a long time
- ❑$_3$ By driving different routes to see where they went
- ❑$_4$ By reading a map
- ❑$_5$ Heard/saw them suggested in a (non-DIRECT Project) traffic report
- ❑$_6$ Other (please specify):_____

❑$_5$ Through the DIRECT Project

11. Within the area shown on the map, how willing are you to use alternate routes (routes other than your usual route) for your for your commute? *(check one box in each column)*

Home-to-Work Commute	Work-to-Home Commute
❑$_1$ Very Willing	❑$_1$ Very Willing
❑$_2$ Somewhat Willing	❑$_2$ Somewhat Willing
❑$_3$ Not Very Willing	❑$_3$ Not Very Willing
❑$_4$ Will not take	❑$_4$ Will not take

12. Within the area shown on the map, *how many times* did you use an alternate route for your commute in the past 8 weeks? *(answer both columns; write 0 if you didn't use any routes other than your usual route, write 1 if you used one route in addition to your usual route, and so on)*

Home-to-Work Commute	Work-to-Home Commute
_____times	_____times

13. Within the area shown on the map, how many *different* alternate routes did you use for your commute in the past 8 weeks? *(answer both columns; write 0 if you didn't use any routes other than your usual route, write 1 if you used one route in addition to your usual route, and so on)*

Home-to-Work Commute	Work-to-Home Commute
_____routes	_____routes

14. If you took one or more alternate routes for your commute in the past 8 weeks, to what extent do you agree or disagree with the following statement: "In general I am satisfied with the outcome when I take an alternate route."
(check one box in each column)

Home-to-Work Commute	Work-to-Home Commute
❑$_0$ Didn't Take An Alternate Route	❑$_0$ Didn't Take An Alternate Route
❑$_1$ Strongly Disagree	❑$_1$ Strongly Disagree
❑$_2$ Somewhat Disagree	❑$_2$ Somewhat Disagree
❑$_3$ Neither Agree Nor Disagree	❑$_3$ Neither Agree Nor Disagree
❑$_4$ Somewhat Agree	❑$_4$ Somewhat Agree
❑$_5$ Strongly Agree	❑$_5$ Strongly Agree

15. If you took one or more alternate routes for your commute, how much time do you think you usually saved (in comparison to traveling on the original route)?
(check one in each column)

Home-to-Work Commute	Work-to-Home Commute
❑$_0$ Didn't take any alternate routes	❑$_0$ Didn't take any alternate routes
❑$_{-1}$ Didn't save any time (alt. rt. took longer)	❑$_{-1}$ Didn't save any time (alt. rt. took longer)
❑$_1$ Saved less than 5 minutes	❑$_1$ Saved less than 5 minutes
❑$_2$ Saved 5 min or more but less than 10 min	❑$_2$ Saved 5 min or more but less than 10 min
❑$_3$ Saved 10 mm or more but less than 15 min	❑$_3$ Saved 10 min or more but less than 15 min
❑$_4$ Saved 15 min or more but less than 20 min	❑$_4$ Saved 15 minutes or more but less than 20 min
❑$_5$ Saved 20 minutes or more	❑$_5$ Saved 20 minutes or more

==========

The following questions ask about your general opinions regarding traffic information systems. A traffic information system is a means (radio, TV, etc.) by which roadway status is communicated to you, either in or out of your car.

16. What are the 5 most important things that you might want a traffic information system to do for you? *(check 5 boxes, no more, no less)*

_____ ❑$_{1}$ Tell me if traffic is heavier than usual
_____ ❑$_{2}$ Tell me why traffic is heavier than usual
_____ ❑$_{3}$ Tell me if traffic is lighter than usual
_____ ❑$_{4}$ Tell me why traffic is lighter than usual
_____ ❑$_{5}$ Tell me if there is an unexpected delay on my route
_____ ❑$_{6}$ Tell me why there is an unexpected delay on my route
_____ ❑$_{7}$ Tell me how long an unexpected delay on my route is expected to be
_____ ❑$_{8}$ Tell me when there is NOT an unexpected delay on my route
_____ ❑$_{9}$ Tell me the location of incidents that have occurred
_____ ❑$_{10}$ Tell me the type of incidents that have occurred
_____ ❑$_{11}$ Tell me the time that incidents occurred
_____ ❑$_{12}$ Tell me the time that incidents are expected to be cleared
_____ ❑$_{13}$ Tell me the location of construction
_____ ❑$_{14}$ Tell me the duration of construction
_____ ❑$_{15}$ Tell me if I should take an alternate route
_____ ❑$_{16}$ Tell me why I should take an alternate route
_____ ❑$_{17}$ Suggest an alternate route(s) for me to take
_____ ❑$_{18}$ Other (please specify):_____

Now, please rank the 5 boxes checked in the preceding question in order of importance by writing a number from 1 to 5 on the line to the left of each of the 5 boxes checked in that question: 1 is most important, 2 is next most important, and so on.

17. Would you want a traffic information system to provide you with information relevant only to where you want to go or for the whole metro area? *(check one)*

❑$_{1}$ Provide me with information only for where I want to go
❑$_{2}$ Provide me with information for the whole metro area

18. How much would you be willing to pay for a traffic information system that completely meets your needs? *(fill in the blank in each row)*

$_____$_{1}$ If payment was a one time fee (answer in dollars total)
$_____$_{2}$ If payment was on a per-use basis (answer in [fractions of] dollars per use)
$_____$_{3}$ If payment was on a monthly basis (answer in dollars per month)
$_____$_{4}$ If payment was on an annual basis (answer in dollars per year)
$_____$_{5}$ Other (please specify):_____

19. Who should provide traffic information? *(check one)*

- ❑0 Traffic information is not needed
- ❑1 Government
- ❑2 Private companies
- ❑3 Both government and private companies
- ❑4 Other (please specify):_____

20. How should traffic information be paid for? *(check all that apply)*

- ❑0 Traffic information is not needed
- ❑1 Gas tax
- ❑2 User fees
- ❑3 Advertising
- ❑4 Property tax
- ❑5 Subscription fee paid by individuals
- ❑6 Device purchase by individuals
- ❑7 Tax on employers
- ❑8 Vehicle Registration Tax
- ❑9 Sales tax
- ❑10 Other (please specify):_____

21. What are the top five things that the government should be doing with transportation tax dollars? *(check 5 boxes, no more, no less)*

- ❑1 Repair roadways (fill potholes, fix bridges, etc.)
- ❑2 Add regular lanes to the expressways
- ❑3 Add High Occupancy Vehicle lanes to the expressways
- ❑4 Build new roads
- ❑5 Beautify the roadways
- ❑6 Add more roadside call boxes (for safety)
- ❑7 Expand the freeway courtesy patrol (which helps motorists in need)
- ❑8 Come to the aid of motorists in need faster
- ❑9 Clear incidents from roadways faster
- ❑10 Improve traffic information
- ❑11 Add more Changeable Message Signs on the expressways
- ❑12 Provide more public transit
- ❑13 Provide rideshare coordination
- ❑14 Other (please specify):_____

Now, please rank the 5 boxes checked in the preceding question in order of importance by writing a number from 1 to 5 on the line to the left of each of the 5 boxes checked in that question: 1 is most important, 2 is next most important, and so on.

==========

The following questions ask about your use of traffic information systems for your <u>home-to-work</u> commute. A traffic information system is a means (radio, TV, etc.) by which the status of the roadway is communicated to you, either in or out of your car. <u>By "use" we mean be aware of and consider in your decision making</u>.

22. For my *<u>home-to-work</u>* commute during the past 8 weeks, I accessed traffic information system(s) (all types together, including DIRECT): *(check one)*

- ❑$_1$ Much Less Than Before the Test
- ❑$_2$ Less Than Before the Test
- ❑$_3$ About the Same as Before the Test
- ❑$_4$ More Than Before the Test
- ❑$_5$ Much More Than Before the Test

23. For my *<u>home-to-work</u>* commute during the past 8 weeks, I accessed (the listed) traffic information system: *(check one box in each row)*

		MUCH LESS THAN BEFORE THE TEST	LESS THAN BEFORE THE TEST	ABOUT THE SAME AS BEFORE THE TEST	MORE THAN BEFORE THE TEST	MUCH MORE THAN BEFORE THE TEST
1	Commercial Radio	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
2	Television	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
3	Changeable Message Signs	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
4	Other	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$

24. For your *<u>home-to-work</u>* commute during the past *8* weeks, *<u>which</u>* traffic information system(s) did you typically use? *(check all that apply)*

- ❑$_0$ Didn't use a traffic information system
- ❑$_1$ Commercial Radio [which station(s):_____]
- ❑$_2$ Television [which station(s):_____]
- ❑$_3$ Expressway Changeable Message Signs
- ❑$_4$ Other (please specify):_____
- ❑$_5$ DIRECT Project

25. For your *<u>home-to-work</u>* commute during the past 8 weeks, *<u>when</u>* did you typically use traffic information system(s)? *(check one in each column)*

<u>Commercial Radio</u>	<u>DIRECT Project</u>
❑$_0$ Didn't use	❑$_0$ Didn't use
❑$_1$ Used only before I left work	❑$_1$ Used only before I left work
❑$_2$ Used only during the trip	❑$_2$ Used only during the trip
❑$_3$ Used both before I left work and during the trip	❑$_3$ Used both before I left work and during the trip

26. For your *home-to-work* commute during the past 8 weeks, *how would you describe* your typical use of traffic information system(s)?
(check one box in each row)

	Home-to-Work Commute	DID NOT USE	USED LESS THAN ONCE A WEEK	USED 1 TIME A WEEK	USED A FEW TIMES A WEEK	USED 1 TIME A DAY	USED 2 OR MORE TIMES A DAY
1	Commercial Radio	❑0	❑1	❑2	❑3	❑4	❑5
2	Television	❑0	❑1	❑2	❑3	❑4	❑5
3	Changeable Message Signs	❑0	❑1	❑2	❑3	❑4	❑5
4	Other	❑0	❑1	❑2	❑3	❑4	❑5
5	DIRECT Project	❑0	❑1	❑2	❑3	❑4	❑5

27. For your *home-to-work* commute during the past 8 weeks, to what extent did you rely on traffic information system(s) in *deciding when to leave home*?
(check one box in each row; if you did not use the system, check "DID NOT USE", if you did use the system, check one of the other four boxes in the row)

	Home-to-Work Commute	DID NOT USE	DID NOT RELY ON AT ALL		DID NOT RELY ON VERY MUCH	RELY ON SOMEWHAT	RELY ON VERY MUCH
1	Commercial Radio	❑0	❑1	❑2		❑3	❑4
2	Television	❑0	❑1	❑2		❑3	❑4
4	Other	❑0	❑1	❑2		❑3	❑4
5	DIRECT Project	❑0	❑1	❑2		❑3	❑4

28. For your *home-to-work* commute during the past 8 weeks, how many times did you *change the time you planned to leave home* because of a traffic information system? *(in each row check "DID NOT USE" this system or write a number: 0 if you used the system but didn't change your plans because of it, 1 if you used the system and changed your plans 1 time because of it, and so on)*

	Home-to-Work Commute		
1	Commercial Radio	❑0 DID NOT USE	CHANGED _____ TIMES
2	Television	❑0 DID NOT USE	CHANGED _____ TIMES
4	Other	❑0 DID NOT USE	CHANGED _____ TIMES
5	DIRECT Project	❑0 DID NOT USE	CHANGED _____ TIMES

29. For your *home-to-work* commute during the past 8 weeks, to what extent did you rely on traffic information system(s) when you *chose a route before leaving home*? *(check one box in each row; if you did not use the system, check "DID NOT USE ", if you did use the system, check one of the other four boxes in the row)*

	Home-to-Work Commute	DID NOT USE	DID NOT RELY ON AT ALL		DID NOT RELY ON VERY MUCH	RELY ON SOMEWHAT	RELY ON VERY MUCH
1	Commercial Radio	❑0	❑1	❑2		❑3	❑4
2	Television	❑0	❑1	❑2		❑3	❑4
4	Other	❑0	❑1	❑2		❑3	❑4
5	DIRECT Project	❑0	❑1	❑2		❑3	❑4

30. For your *home-to-work* commute during the past 8 weeks, how many times did you *change your route before leaving home* because of a traffic information system? *(in each row check "DID NOT USE" this system or write a number: 0 if you used the system but didn't change your route because of it, 1 if you used the system and changed your route 1 time because of it, and so on)*

Home-to-Work Commute

1	Commercial Radio	❑0 DID NOT USE	CHANGED _____ TIMES
2	Television	❑0 DID NOT USE	CHANGED _____ TIMES
4	Other	❑0 DID NOT USE	CHANGED _____ TIMES
5	DIRECT Project	❑0 DID NOT USE	CHANGED _____ TIMES

31. For your *home-to-work* commute during the past 8 weeks, how many times did you *change your route during the trip* because of a traffic information system? *(in each row check "DID NOT USE" this system or write a number: 0 if you used the system but didn't change your route because of it, 1 if you used the system and changed your route I time because of it, and so on)*

Home-to-Work Commute

1	Commercial Radio	❑0 DID NOT USE	CHANGED _____ TIMES
2	Television	❑0 DID NOT USE	CHANGED _____ TIMES
4	Other	❑0 DID NOT USE	CHANGED _____ TIMES
5	DIRECT Project	❑0 DID NOT USE	CHANGED _____ TIMES

32. For your *home-to-work* commute during the past 8 weeks, how many times did you *cancel your commute* because of a traffic information system? *(in each row check "DID NOT USE" this system or write a number: 0 if you used the system but didn't cancel your commute because of it, 1 if you used the system and canceled your commute 1 time because of it, and so on)*

Home-to-Work Commute

1	Commercial Radio	❑0 DID NOT USE	CANCELED _____ TIMES
2	Television	❑0 DID NOT USE	CANCELED _____ TIMES
4	Other	❑0 DID NOT USE	CANCELED _____ TIMES
5	DIRECT Project	❑0 DID NOT USE	CHANGED _____ TIMES

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The following questions ask about your use of traffic information systems for your work-to-home commute. A traffic information system is a means (radio, TV, etc.) by which the status of the roadway is communicated to you, either in or out of your car. By "use" we mean be aware of and consider in your decision making.

33. For my *work-to-home* commute during the past 8 weeks, I accessed traffic information system(s) (all types together, including DIRECT): *(check one)*

- ❑1 Much Less Than Before the Test
- ❑2 Less Than Before the Test
- ❑3 About the Same as Before the Test
- ❑4 More Than Before the Test
- ❑5 Much More Than Before the Test

34. For my *work-to-home* commute during the past 8 weeks, I accessed (the listed) traffic information system: *(check one box in each row)*

		MUCH LESS THAN BEFORE THE TEST	LESS THAN BEFORE THE TEST	ABOUT THE SAME AS BEFORE THE TEST	MORE THAN BEFORE THE TEST	MUCH MORE THAN BEFORE THE TEST
1	Commercial Radio	❑1	❑2	❑3	❑4	❑5
2	Television	❑1	❑2	❑3	❑4	❑5
3	Changeable Message Signs	❑1	❑2	❑3	❑4	❑5
4	Other (please specify) _____	❑1	❑2	❑3	❑4	❑5

35. For your *work-to-home* commute during the past *8* weeks, *which* traffic information system(s) did you typically use? *(check all that apply)*

- ❑0 Didn't use a traffic information system
- ❑1 Commercial Radio [which station(s):_____]
- ❑2 Television [which station(s):_____]
- ❑3 Expressway Changeable Message Signs
- ❑4 Other (please specify):_____
- ❑5 DIRECT Project

36. For your *work-to-home* commute during the past 8 weeks, *when* did you typically use traffic information system(s)? *(check one in each column)*

Commercial Radio	DIRECT Project
❑0 Didn't use	❑0 Didn't use
❑1 Used only before I left work	❑1 Used only before I left work
❑2 Used only during the trip	❑2 Used only during the trip
❑3 Used both before I left work and during the trip	❑3 Used both before I left work and during the trip

37. For your *work-to-home* commute during the past 8 weeks, *how would you describe* your typical use of traffic information system(s)?
(check one box in each row)

	Work-to-Home Commute	DID NOT USE	USED LESS THAN ONCE A WEEK	USED 1 TIME A WEEK	USED A FEW TIMES A WEEK	USED 1 TIME A DAY	USED 2 OR MORE TIMES A DAY
1	Commercial Radio	❑0	❑1	❑2	❑3	❑4	❑5
2	Television	❑0	❑1	❑2	❑3	❑4	❑5
3	Changeable Message Signs	❑0	❑1	❑2	❑3	❑4	❑5
4	Other	❑0	❑1	❑2	❑3	❑4	❑5
5	DIRECT Project	❑0	❑1	❑2	❑3	❑4	❑5

28. For your *work-to-home* commute during the past 8 weeks, to what extent did you rely on traffic information system(s) in *deciding when to leave home*?
(check one box in each row; if you did not use the system, check "DID NOT USE", if you did use the system, check one of the other four boxes in the row)

	Work-to-Home Commute	DID NOT USE	DID NOT RELY ON AT ALL	DID NOT RELY ON VERY MUCH	RELY ON SOMEWHAT	RELY ON VERY MUCH
1	Commercial Radio	❑0	❑1	❑2	❑3	❑4
2	Television	❑0	❑1	❑2	❑3	❑4
4	Other	❑0	❑1	❑2	❑3	❑4
5	DIRECT Project	❑0	❑1	❑2	❑3	❑4

39. For your *work-to-home* commute during the past 8 weeks, how many times did you *change the time you planned to leave work* because of a traffic information system? *(in each row check "DID NOT USE" this system or write a number: 0 if you used the system but didn't change your plans because of it, 1 if you used the system and changed your plans 1 time because of it, and so on)*

	Work-to-Home Commute		
1	Commercial Radio	❑0 DID NOT USE	CHANGED _____ TIMES
2	Television	❑0 DID NOT USE	CHANGED _____ TIMES
4	Other	❑0 DID NOT USE	CHANGED _____ TIMES
5	DIRECT Project	❑0 DID NOT USE	CHANGED _____ TIMES

40. For your *work-to-home* commute during the past 8 weeks, to what extent did you rely on traffic information system(s) when you *chose a route before leaving work*? *(check one box in each row; if you did not use the system, check "DID NOT USE ", if you did use the system, check one of the other four boxes in the row)*

	Work-to-Home Commute	DID NOT USE	DID NOT RELY ON AT ALL	DID NOT RELY ON VERY MUCH	RELY ON SOMEWHAT	RELY ON VERY MUCH
1	Commercial Radio	❑0	❑1	❑2	❑3	❑4
2	Television	❑0	❑1	❑2	❑3	❑4
4	Other	❑0	❑1	❑2	❑3	❑4
5	DIRECT Project	❑0	❑1	❑2	❑3	❑4

30. For your *work-to-home* commute during the past 8 weeks, how many times did you *change your route before leaving work* because of a traffic information system? *(in each row check "DID NOT USE" this system or write a number: 0 if you used the system but didn't change your route because of it, 1 if you used the system and changed your route 1 time because of it, and so on)*

	Work-to-Home Commute		
1	Commercial Radio	❑0 DID NOT USE	CHANGED _____ TIMES
2	Television	❑0 DID NOT USE	CHANGED _____ TIMES
4	Other	❑0 DID NOT USE	CHANGED _____ TIMES
5	DIRECT Project	❑0 DID NOT USE	CHANGED _____ TIMES

31. For your *work-to-home* commute during the past 8 weeks, how many times did you *change your route during the trip* because of a traffic information system? *(in each row check "DID NOT USE" this system or write a number: 0 if you used the system but didn't change your route because of it, 1 if you used the system and changed your route I time because of it, and so on)*

	Work-to-Home Commute		
1	Commercial Radio	❑0 DID NOT USE	CHANGED _____ TIMES
2	Television	❑0 DID NOT USE	CHANGED _____ TIMES
4	Other	❑0 DID NOT USE	CHANGED _____ TIMES
5	DIRECT Project	❑0 DID NOT USE	CHANGED _____ TIMES

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The following questions also ask about your use of traffic information systems for your commute.

43. To what extent do you agree or disagree with the following statement: "Traffic information systems could be improved to the point that they completely meet my needs for traffic information." *(check one box in each row; if you do not know about a system or do not have opinions on it, check "AM NOT FAMILIAR WITH SYSTEM", otherwise check one of the other five boxes in each row.)*

		AM NOT FAMILIAR WITH SYSTEM	STRONGLY DISAGREE	SOMEWHAT DISAGREE	NEITHER	SOMEWHAT AGREE	STRONGLY AGREE
1	Commercial Radio	❑0	❑1	❑2	❑3	❑4	❑5
2	Television	❑0	❑1	❑2	❑3	❑4	❑5
3	Changeable Message Signs	❑0	❑1	❑2	❑3	❑4	❑5
4	Other	❑0	❑1	❑2	❑3	❑4	❑5

44. During the past 8 weeks, which traffic information system did you *rely on the most* in making decisions for your commute? *(check only one)*

❑0 Did not rely on any traffic information system
❑1 Commercial Radio [which station:_____]
❑2 Television [which station:_____]
❑3 Expressway Changeable Message Signs
❑4 Other (please specify): _____
❑3 DIRECT Project

47. Which traffic information system do you *like the best*? *(check only one)*

❑1 Commercial Radio [which station:_____]
❑2 Television [which station:_____]
❑3 Expressway Changeable Message Signs
❑4 Other (please specify):_____
❑5 No Preference
❑6 DIRECT Project

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The following questions ask further detail about your opinions of <u>Commercial Radio</u> traffic information systems (for example, WJR, WWJ, etc.)

46. Are you familiar with a *<u>Commercial Radio</u>* traffic information system? (By familiar we mean know about and have opinions on the system, whether or not you use the system in your decision making.) *(check one)*

❑$_0$ NO: PLEASE GO TO <u>QUESTION 52:</u> DO NOT ANSWER ~~QUESTIONS 47 THROUGH 51.~~
❑$_1$ YES: PLEASE GO TO NEXT QUESTION (QUESTION 47 BELOW).

47. If you are familiar with *<u>Commercial Radio</u>* traffic information system(s), please indicate the extent to which you agree or disagree with the following items. *(check one box in each row)*

	The ***<u>Commercial Radio</u>*** traffic information system:	STRONGLY DISAGREE	SOMEWHAT DISAGREE	NEITHER	SOMEWHAT AGREE	STRONGLY AGREE
1	works reliably	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
2	includes all the info I need to know	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
3	is specific to my commute.....	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
4	provides reliable information.....	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
5	provides accurate information.....	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
6	reports incidents soon after they happen	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
7	presents reports frequently enough	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
8	is easy to use.....	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
9	is convenient to use.....	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
10	catches my attention.....	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
11	is distracting.....	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
12	gives the reason for delays.....	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
13	gives the expected length of delays.....	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
14	provides information on demand	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
15	suggests appropriate alternate routes...	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$

48. Have you used a *<u>Commercial Radio</u>* traffic information system in the past 8 weeks? *(check one)*

❑$_0$ NO: PLEASE GO TO <u>QUESTION 51:</u> DO NOT ANSWER ~~QUESTIONS 49 AND 50.~~
❑$_1$ YES: PLEASE GO TO NEXT QUESTION (QUESTION 49 ON THE NEXT PAGE).

49. Please indicate the extent to which you agree or disagree with the following statements. *(check one box in each row)*

	I found that using the ***Commercial Radio*** traffic information system:	STRONGLY DISAGREE	SOMEWHAT DISAGREE	NEITHER	SOMEWHAT AGREE	STRONGLY AGREE
1	satisfied my need for information	❑1	❑2	❑3	❑4	❑5
2	helped me make better trip choices	❑1	❑2	❑3	❑4	❑5
3	made my commute less stressful.....	❑1	❑2	❑3	❑4	❑5
4	reduced my driving time.....	❑1	❑2	❑3	❑4	❑5
5	made my driving time more certain	❑1	❑2	❑3	❑4	❑5
6	made my arrival time more certain	❑1	❑2	❑3	❑4	❑5
7	helped me avoid congestion.....	❑1	❑2	❑3	❑4	❑5
8	helped me avoid unexpected delays....	❑1	❑2	❑3	❑4	❑5
9	on the whole, improved my commute.	❑1	❑2	❑3	❑4	❑5

50. What are the 5 most important things that would improve the existing ***Commercial Radio* traffic information system that you use most often?** *(check 5 boxes, no more, no less)*

_____ ❑1 Make the system work more reliably.
_____ ❑2 Make the information more complete (tell more of the things I need to know).
_____ ❑3 Make the information more specific to my commute (exclude irrelevant info).
_____ ❑4 Make the information more reliable.
_____ ❑5 Make the information more accurate.
_____ ❑6 Report incidents sooner after they happen.
_____ ❑7 Present traffic reports more frequently.
_____ ❑8 Make the system easier to use.
_____ ❑9 Make the system more convenient to use.
_____ ❑10 Make the system more able to catch my attention.
_____ ❑11 Make the system less distracting.
_____ ❑12 Give the reason for an unexpected delay.
_____ ❑13 Give the expected length of an unexpected delay.
_____ ❑14 Make the systems provide information on demand.
_____ ❑15 Suggest appropriate alternate routes when an unexpected delay arises.
_____ ❑16 Other (please specify):_____

_____ ❑17 No improvement possible.

Now, please rank the 5 boxes checked in the preceding question in order of importance by writing a number from 1 to 5 on the line to the left of each of the 5 boxes checked in that question: 1 is most important, 2 is next most important, and so on.

PLEASE GO TO QUESTION 52 ON TELEVISION SYSTEMS; DO NOT ANSWER ~~QUESTION 51~~.

You should answer Question 51 only if you have NOT used a *Commercial Radio* traffic information system in the past 8 weeks. If you have used one, go to Question 52.

51. Why didn't you use a *Commercial Radio* traffic information system during the past 8 weeks? *(check all that apply)*

- ❑$_0$ I didn't know of any systems that I could use.
- ❑$_1$ Available systems do not work reliably.
- ❑$_2$ The information was not complete enough (it did not tell me enough of the things I need to know).
- ❑$_3$ Not enough of the information was specific to my commute.
- ❑$_4$ The information is not reliable.
- ❑$_5$ The information is not accurate.
- ❑$_6$ The systems do not report incidents soon enough after they happen.
- ❑$_7$ The systems do not present reports frequently enough.
- ❑$_8$ The systems are too hard to use.
- ❑$_9$ The systems are too inconvenient to use.
- ❑$_{10}$ The systems do not catch my attention.
- ❑$_{11}$ The systems are distracting.
- ❑$_{12}$ The information does not give the reason for a delay.
- ❑$_{13}$ The information does give the expected length of a delay.
- ❑$_{14}$ The information the systems provide is not available on demand.
- ❑$_{15}$ The information does not suggest appropriate alternate routes.
- ❑$_{16}$ Other (please specify):_____

- ❑$_{17}$ I wouldn't take an alternate route even if I had information.
- ❑$_{18}$ I know the area well enough to get by without help.
- ❑$_{19}$ I rarely encounter a serious traffic problem.
- ❑$_{20}$ I rely on a different traffic information system.

PLEASE GO TO QUESTION 52 ON THE DIRECT PROJECT.

==========

The following questions ask your opinion about the DIRECT Project traffic information system.

55. Based on your familiarity with *DIRECT Project* traffic information system(s), please indicate the extent to which you agree or disagree with the following items. *(check one box in each row)*

	The *DIRECT Project* traffic information system:	STRONGLY DISAGREE	SOMEWHAT DISAGREE	NEITHER	SOMEWHAT AGREE	STRONGLY AGREE
1	works reliably	❑1	❑2	❑3	❑4	❑5
2	includes all the info I need to know	❑1	❑2	❑3	❑4	❑5
3	is specific to my commute.....	❑1	❑2	❑3	❑4	❑5
4	provides reliable information.....	❑1	❑2	❑3	❑4	❑5
5	provides accurate information.....	❑1	❑2	❑3	❑4	❑5
6	reports incidents soon after they happen	❑1	❑2	❑3	❑4	❑5
7	presents reports frequently enough	❑1	❑2	❑3	❑4	❑5
8	is easy to use.....	❑1	❑2	❑3	❑4	❑5
9	is convenient to use	❑1	❑2	❑3	❑4	❑5
10	catches my attention.....	❑1	❑2	❑3	❑4	❑5
11	is distracting.....	❑1	❑2	❑3	❑4	❑5
12	gives the reason for delays.....	❑1	❑2	❑3	❑4	❑5
13	gives the expected length of delays.....	❑1	❑2	❑3	❑4	❑5
14	provides information on demand	❑1	❑2	❑3	❑4	❑5
15	suggests appropriate alternate routes...	❑1	❑2	❑3	❑4	❑5

53. Please indicate the extent to which you agree or disagree with the following statements. *(check one box in each row)*

	I found that using the ***DIRECT Project*** traffic information system:	STRONGLY DISAGREE	SOMEWHAT DISAGREE	NEITHER	SOMEWHAT AGREE	STRONGLY AGREE
1	satisfied my need for information	❑1	❑2	❑3	❑4	❑5
2	helped me make better trip choices	❑1	❑2	❑3	❑4	❑5
3	made my commute less stressful.....	❑1	❑2	❑3	❑4	❑5
4	reduced my driving time.....	❑1	❑2	❑3	❑4	❑5
5	made my driving time more certain	❑1	❑2	❑3	❑4	❑5
6	made my arrival time more certain	❑1	❑2	❑3	❑4	❑5
7	helped me avoid congestion.....	❑1	❑2	❑3	❑4	❑5
8	helped me avoid unexpected delays....	❑1	❑2	❑3	❑4	❑5
9	on the whole, improved my commute.	❑1	❑2	❑3	❑4	❑5

54. What are the 5 most important things that would improve the existing *DIRECT Project* traffic information system that you use most often? *(check 5 boxes, no more, no less)*

_____ ❑1 Make the system work more reliably.
_____ ❑2 Make the information more complete (tell more of the things I need to know).
_____ ❑3 Make the information more specific to my commute (exclude irrelevant info).
_____ ❑4 Make the information more reliable.
_____ ❑5 Make the information more accurate.
_____ ❑6 Report incidents sooner after they happen.
_____ ❑7 Present traffic reports more frequently.
_____ ❑8 Make the system easier to use.
_____ ❑9 Make the system more convenient to use.
_____ ❑10 Make the system more able to catch my attention.
_____ ❑11 Make the system less distracting.
_____ ❑12 Give the reason for an unexpected delay.
_____ ❑13 Give the expected length of an unexpected delay.
_____ ❑14 Make the systems provide information on demand.
_____ ❑15 Suggest appropriate alternate routes when an unexpected delay arises.
_____ ❑16 Other (please specify): _____

_____ ❑17 No improvement possible.

Now, please rank the 5 boxes checked in the preceding question in order of importance by writing a number from 1 to 5 on the line to the left of each of the 5 boxes checked in that question: 1 is most important, 2 is next most important, and so on.

PLEASE GO TO QUESTION 55.

==========

The following questions ask your opinions about the DIRECT system.

55. To what extent do you agree or disagree with the following statement: "Based on the information I was given, I believe the information system tested in DIRECT operated as it was intended to." *(check one)*

Strongly Disagree
Somewhat Disagree
Neither Agree nor Disagree
Somewhat Agree
Strongly Agree

56. Which line best describes your experience in operating the DIRECT system? *(check one)*

I found the system Very Difficult to Use
I found the system Somewhat Difficult to Use
I found the system Neither Easy nor Difficult to Use
I found the system Somewhat Easy to Use
I found the system Very Easy to Use

56. Overall, the DIRECT traffic information system is a significant improvement over (the listed) existing traffic information system. *(check one box in each row; if you do not know about a system or do not have opinions on it, check "AM NOT FAMILIAR WITH SYSTEM", otherwise check one of the other five boxes in each row.)*

		AM NOT FAMILIAR WITH SYSTEM	STRONGLY DISAGREE	SOMEWHAT DISAGREE	NEITHER	SOMEWHAT AGREE	STRONGLY AGREE
1	Commercial Radio	❑0	❑1	❑2	❑3	❑4	❑5
2	Television	❑0	❑1	❑2	❑3	❑4	❑5
3	Changeable Message Signs	❑0	❑1	❑2	❑3	❑4	❑5
4	Other	❑0	❑1	❑2	❑3	❑4	❑5

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57. Overall, I prefer the DIRECT traffic information system to (the listed) existing traffic information system. *(check one box in each row; if you do not know about a system or do not have opinions on it, check "AM NOT FAMILIAR WITH SYSTEM", otherwise check one of the other five boxes in each row.)*

		AM NOT FAMILIAR WITH SYSTEM	STRONGLY DISAGREE	SOMEWHAT DISAGREE	NEITHER	SOMEWHAT AGREE	STRONGLY AGREE
1	Commercial Radio	❑0	❑1	❑2	❑3	❑4	❑5
2	Television	❑0	❑1	❑2	❑3	❑4	❑5
3	Changeable Message Signs	❑0	❑1	❑2	❑3	❑4	❑5
4	Other	❑0	❑1	❑2	❑3	❑4	❑5

---

58. Overall, how satisfied were you with the DIRECT traffic information system available to you during the past 8 weeks? *(check one)*

❑1 Very Dissatisfied
❑2 Somewhat Dissatisfied
❑3 Neither Satisfied nor Dissatisfied
❑4 Somewhat Satisfied
❑5 Very Satisfied

59. How much would you be willing to pay for the DIRECT traffic information system available to you during the past 8 weeks? *(fill in the blank in each row)*

$_____1 If payment was a one time fee (answer in dollars total)
$_____2 If payment was on a per-use basis (answer in [fractions of] dollars per use)
$_____3 If payment was on a monthly basis (answer in dollars per month)
$_____4 If payment was on an annual basis (answer in dollars per year)
$_____5 Other (please specify):

61. How likely is it that you would buy the DIRECT traffic information system available to you during the past 8 weeks ' if the total cost over the first two years was (the amounts listed below)? *(check one box in each row)*

	Total cost over the first two years	VERY UNLIKELY	SOMEWHAT UNLIKELY	NEITHER	SOMEWHAT LIKELY	VERY LIKELY
1	$50	❑1	❑2	❑3	❑4	❑5
2	$100	❑1	❑2	❑3	❑4	❑5
3	$500	❑1	❑2	❑3	❑4	❑5
4	$1,000	❑1	❑2	❑3	❑4	❑5

==========

Please continue to the "Keirsey Temperament Sorter" on the following pages. Circle either "a" or "b" for each question.

[The University purchased copies of the Keirsey Temperament Sorter evaluation instrument for use in DIRECT. However, the University does not have permission to reproduce this instrument here. The Keirsey Temperament Sorter can be purchased from Prometheus Nemesis Book Company, Box 2748, Del Mar, CA 92014 (Tel: 800-754-0039; Fax: 619-481-0535). Versions of the Keirsey Temperament Sorter can also be found on the world wide web.]

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62. If you like, please make any additional comments (either about DIRECT or traffic information in general).

Thank you for taking the time to fill out this questionnaire. Please return the questionnaire to the University of Michigan (either directly to the staff person Assisting you or in the enclosed pre-addressed stamped envelope). Again, all responses will be kept confidential.

DIRECT EVALUATION SURVEY (After: Control)

Test Period:_____

Vehicle ID:_____

***Please complete all parts of this survey: Be careful not to skip any question or any page, unless directed otherwise*. Answer the questions with the past 8 weeks in mind. That is, we want to know your thoughts during the time that you were participating in the DIRECT test.**

Your opinions are extremely valuable in helping us assess the value of the traffic information systems being tested in DIRECT and should eventually help improve travel in the Detroit metropolitan area.

Your responses will be used solely for research. All responses on this form will be kept strictly confidential and you will remain anonymous in any public report. You do not have to answer any questions you do not wish to answer or any questions that make you feel uncomfortable.

Thank you for your participation in DIRECT.

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The following questions ask about your usual home-to-work commute.

1. On average, how many minutes does your usual *home-to-work* commute take? *(fill blank)*

_____minutes

2. On average, how frequently does an unexpected delay occur on your usual *home-to-work* commute? *(check one)*

❑1 5 (or more) days a week
❑2 3 or 4 days a week
❑3 1 or 2 days a week
❑4 1 day every 2 weeks
❑5 1 day a month or less

3a. When an unexpected delay occurs on your usual *home-to-work* commute, do you usually take an alternate route to avoid the delay? *(check one)*

❑0 No ❑1 Yes

3b. When an unexpected delay occurs on your usual *home-to-work* commute, how long, on average, is the delay? *(check one: if you usually take an alternate route to avoid delays, check how long you think the delays on your usual route might have been)*

❑1 Less than 5 minutes
❑2 5 minutes or more but less than 10 minutes
❑3 10 minutes or more but less than 15 minutes
❑4 15 minutes or more but less than 20 minutes
❑5 20 minutes or more

==========

The following questions ask about factors that affect your choice of route for your commute.

4. During your commute, what is the longest delay (beyond that normally expected) that you would tolerate before you would switch from your usual route to an alternate route? *(answer both columns)*

Home-to-Work Commute	Work-to-Home Commute
_____minutes	_____minutes

5. During your commute, how much time would you have to expect to save in order to switch from your usual route to an alternate route? *(answer both columns)*

Home-to-Work Commute	Work-to-Home Commute
_____minutes	_____minutes

6. If more than one route is available between your home and work, what factors do you consider in choosing between routes? *(Please distribute 100 points among the following.)*

Points Assigned	
_____points$_1$	Expected travel time on each route
_____points$_2$	Total mileage on each route
_____points$_3$	Availability of traffic information for each route
_____points$_4$	Road type (expressway, major street, residential street) on each route
_____points$_5$	Number of turns on each route
_____points$_6$	Other (please specify): _____

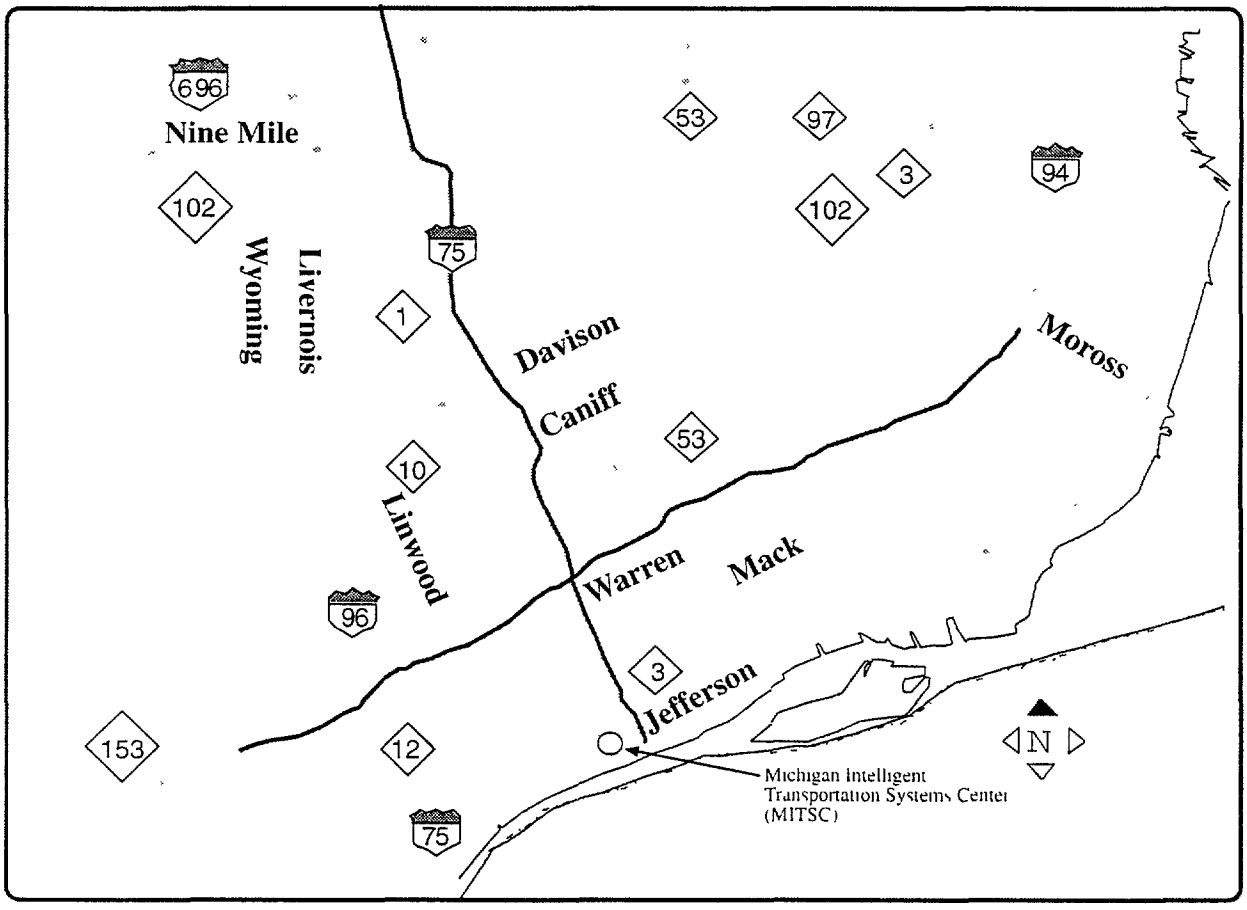
100 points total

7. To what extent do you agree or disagree with the following statement: "If I leave my usual route to get around a traffic delay, I want to get back to my usual route as soon as possible." *(check one)*

- ❑$_1$ Strongly Disagree
- ❑$_2$ Somewhat Disagree
- ❑$_3$ Neither Agree Nor Disagree
- ❑$_4$ Somewhat Agree
- ❑$_5$ Strongly Agree

==========

The following questions ask about alternate routes for your commute. (An alternate route is a reasonably direct path that is significantly different from that which you usually take.) Please use the map below in answering these questions.



8. **Within the area shown on the map, how familiar are you with alternate routes for your commute?**
(check one box in each column)

Home-to-Work Commute	Work-to-Home Commute
❑1 Very Familiar	❑1 Very Familiar
❑2 Somewhat Familiar	❑2 Somewhat Familiar
❑3 Not Very Familiar	❑3 Not Very Familiar
❑4 Don't know of any	❑4 Don't know of any

9. Within the area shown on the map, how many alternate routes do you know of for your commute? *(answer both columns; write 0 if you don't know of any routes other than your usual route, write 1 if you know of one route in addition to your usual route, etc.)*

Home-to-Work Commute	Work-to-Home Commute
_____routes	_____routes

10. How did you find out about these alternate routes for your commute? *(check all that apply)*

- ❑$_0$ Don't know of any alternate routes (only know my usual route)
- ❑$_1$ From a relative, friend, or coworker, etc.
- ❑$_2$ Through personal experience over a long time
- ❑$_3$ By driving different routes to see where they went
- ❑$_4$ By reading a map
- ❑$_5$ Heard/saw them suggested in a traffic report
- ❑$_6$ Other (please specify):_____

11. Within the area shown on the map, how willing are you to use alternate routes (routes other than your usual route) for your for your commute? *(check one box in each co1umn)*

Home-to-Work Commute	Work-to-Home Commute
❑$_1$ Very Willing	❑$_1$ Very Willing
❑$_2$ Somewhat Willing	❑$_2$ Somewhat Willing
❑$_3$ Not Very Willing	❑$_3$ Not Very Willing
❑$_4$ Will not take	❑$_4$ Will not take

12. Within the area shown on the map, *how many times* did you use an alternate route for your commute in the past *8* weeks? *(answer both columns; write 0 if you don't use any routes other than your usual route, write 1 if you used one route in addition to your usual route, and so on)*

Home-to-Work Commute	Work-to-Home Commute
_____times	_____times

13. Within the area shown on the map, how many *different* alternate routes did you use for your commute in the past 8 weeks? *(answer both columns; write 0 if you didn't use any routes other than your usual route, write 1 if you used one route in addition to your usual route, and so on)*

Home-to-Work Commute	Work-to-Home Commute
_____routes	_____routes

14. If you took one or more alternate routes for your commute in the past 8 weeks, to what extent do you agree or disagree with the following statement: "In general I am satisfied with the outcome when I take an alternate route." *(check one box in each column)*

Home-to-Work Commute	Work-to-Home Commute
❑$_0$ Didn't Take An Alternate Route	❑$_0$ Didn't Take An Alternate Route
❑$_1$ Strongly Disagree	❑$_1$ Strongly Disagree
❑$_2$ Somewhat Disagree	❑$_2$ Somewhat Disagree
❑$_3$ Neither Agree Nor Disagree	❑$_3$ Neither Agree Nor Disagree
❑$_4$ Somewhat Agree	❑$_4$ Somewhat Agree
❑$_5$ Strongly Agree	❑$_5$ Strongly Agree

15. If you took one or more alternate routes for your commute, how much time do you think you usually saved (in comparison to traveling on the original route)? *(check one in each column)*

Home-to-Work Commute	Work-to-Home Commute
❑$_0$ Didn't take any alternate routes	❑$_0$ Didn't take any alternate routes
❑$_{-1}$ Didn't save any time (ah. rt. took longer)	❑$_{-1}$ Didn't save any time (ah. rt. took longer)
❑$_1$ Saved less than 5 minutes	❑$_1$ Saved less than 5 minutes
❑$_2$ Saved 5 min or more but less than 10 min	❑$_2$ Saved 5 min or more but less than 10 min
❑$_3$ Saved 10 min or more but less than 15 min	❑$_3$ Saved 10 min or more but less than 15 min
❑$_4$ Saved 15 min or more but less than 20 min	❑$_4$ Saved 15 min or more but less than 20 min
❑$_5$ Saved 20 minutes or more	❑$_5$ Saved 20 minutes or more

==========

The following questions ask about your general opinions regarding traffic information systems. A traffic information system is a means (radio, TV, etc.) by which roadway status is communicated to you, either in or out of your car.

16. What are the 5 most important things that you might want a traffic information system to do for you? *(check 5 boxes, no more, no less)*

- ❑$_1$ Tell me if traffic is heavier than usual
- ❑$_2$ Tell me why traffic is heavier than usual
- ❑$_3$ Tell me if traffic is lighter than usual
- ❑$_4$ Tell me why traffic is lighter than usual
- ❑$_5$ Tell me if there is an unexpected delay on my route
- ❑$_6$ Tell me why there is an unexpected delay on my route
- ❑$_7$ Tell me how long an unexpected delay on my route is expected to be
- ❑$_8$ Tell me when there is NOT an unexpected delay on my route
- ❑$_9$ Tell me the location of incidents that have occurred
- ❑$_{10}$ Tell me the type of incidents that have occurred
- ❑$_{11}$ Tell me the time that incidents occurred
- ❑$_{12}$ Tell me the time that incidents are expected to be cleared
- ❑$_{13}$ Tell me the location of construction
- ❑$_{14}$ Tell me the duration of construction
- ❑$_{15}$ Tell me if I should take an alternate route
- ❑$_{16}$ Tell me why I should take an alternate route
- ❑$_{17}$ Suggest an alternate route(s) for me to take
- ❑$_{18}$ Other (please specify):_____

Now, please rank the 5 boxes checked in the preceding question in order of importance by writing a number from 1 to 5 on the line to the left of each of the 5 boxes checked in that question: 1 is most important, 2 is next most important, and so on.

17. Would you want a traffic information system to provide you with information relevant only to where you want to go or for the whole metro area? *(check one)*

- ❑$_1$ Provide me with information only for where I want to go
- ❑$_2$ Provide me with information for the whole metro area

18. How much would you be willing to pay for a traffic information system that completely meets your needs? *(fill in the blank in each row)*

- $_____$$_1$ If payment was a one time fee (answer in dollars total)
- $\_\_\_\_\_$$_2$ If payment was on a per-use basis (answer in [fractions of] dollars per use)
- $_____$$_3$ If payment was on a monthly basis (answer in dollars per month)
- $\_\_\_\_\_$$_4$ If payment was on an annual basis (answer in dollars per year)
- $_____$$_5$ Other (please specify):_____

19. Who should provide traffic information? *(check one)*

- ❑0 Traffic information is not needed
- ❑1 Government
- ❑2 Private companies
- ❑3 Both government and private companies
- ❑4 Other (please specify):_____

20. How should traffic information be paid for? *(check all that apply)*

- ❑0 Traffic information is not needed
- ❑1 Gas tax
- ❑2 User fees
- ❑3 Advertising
- ❑4 Property tax
- ❑5 Subscription fee paid by individuals
- ❑6 Device purchase by individuals
- ❑7 Tax on employers
- ❑8 Vehicle Registration Tax
- ❑9 Sales tax
- ❑10 Other (please specify):_____

21. What are the top five things that the government should be doing with transportation tax dollars? *(check 5 boxes, no more, no less)*

- ❑1 Repair roadways (fill potholes, fix bridges, etc.)
- ❑2 Add regular lanes to the expressways
- ❑3 Add High Occupancy Vehicle lanes to the expressways
- ❑4 Build new roads
- ❑5 Beautify the roadways
- ❑6 Add more roadside call boxes (for safety)
- ❑7 Expand the freeway courtesy patrol (which helps motorists in need)
- ❑8 Come to the aid of motorists in need faster
- ❑9 Clear incidents from roadways faster
- ❑10 Improve traffic information
- ❑11 Add more Changeable Message Signs on the expressways
- ❑12 Provide more public transit
- ❑13 Provide rideshare coordination
- ❑14 Other (please specify):_____

Now, please rank the 5 boxes checked in the preceding question in order of importance by writing a number from 1 to 5 on the line to the left of each of the 5 boxes checked in that question: 1 is most important, 2 is next most important, and so on.

==========

The following questions ask about your use of traffic information systems for your home-to-work commute. A traffic information system is a mean (radio, TV, etc.) by which the status of the roadway is communicated to you, either in or out of your car. <u>By "use" we mean be aware of and consider in your decision making.</u>

22. For my <u>*home-to-work*</u> commute during the past 8 weeks, I accessed traffic information system(s) (all types together): *(check one)*

- ❑1 Much Less Than Before the Test
- ❑2 Less Than Before the Test
- ❑3 About the Same as Before the Test
- ❑4 More Than Before the Test
- ❑5 Much More Than Before the Test

23. For my <u>*home-to-work*</u> commute during the past 8 weeks, I accessed (the listed) traffic information system: *(check one box in each row)*

		MUCH LESS THAN BEFORE THE TEST	LESS THAN BEFORE THE TEST	ABOUT THE SAME AS BEFORE THE TEST	MORE THAN BEFORE THE TEST	MUCH MORE THAN BEFORE THE TEST
1	Commercial Radio	❑1	❑2	❑3	❑4	❑5
2	Television	❑1	❑2	❑3	❑4	❑5
3	Changeable Message Signs	❑1	❑2	❑3	❑4	❑5
4	Other (please specify): _____	❑1	❑2	❑3	❑4	❑5

24. For your <u>*home-to-work*</u> commute during the past 8 weeks, <u>*which*</u> traffic information system(s) did you typically use? *(check all that apply)*

- ❑0 Didn't use a traffic information system
- ❑1 Commercial Radio [which station(s):_____]
- ❑2 Television [which station(s):_____]
- ❑3 Expressway Changeable Message Signs
- ❑4 Other (please specify):_____

25. For your <u>*home-to-work*</u> commute during the past 8 weeks, <u>*when*</u> did you typically use a <u>*Commercial Radio*</u> traffic information system(s)? *(check one in each column)*

- ❑0 Didn't use
- ❑1 Used only before I left work
- ❑2 Used only during the trip
- ❑3 Used both before I left work and during the trip

26. For your *home-to-work* commute during the past 8 weeks, *how would you describe* your typical use of traffic information system(s)?
(check one box in each row)

	Home-to-Work Commute	DID NOT USE	USED LESS THAN ONCE A WEEK	USED 1 TIME A WEEK	USED A FEW TIMES A WEEK	USED 1 TIME A DAY	USED 2 OR MORE TIMES A DAY
1	Commercial Radio	❑0	❑1	❑2	❑3	❑4	❑5
2	Television	❑0	❑1	❑2	❑3	❑4	❑5
3	Changeable Message Signs	❑0	❑1	❑2	❑3	❑4	❑5
4	Other	❑0	❑1	❑2	❑3	❑4	❑5

27. For your *home-to-work* commute during the past 8 weeks, to what extent did you rely on traffic information system(s) in *deciding when to leave home*?
(check one box in each row; if you did not use the system, check "DID NOT USE", if you did use the system, check one of the other-four boxes in the row)

	Home-to-Work Commute	DID NOT USE	DID NOT RELY ON AT ALL	DID NOT RELY ON VERY MUCH	RELY ON SOMEWHAT	RELY ON VERY MUCH
1	Commercial Radio	❑0	❑1	❑2	❑3	❑4
2	Television	❑0	❑1	❑2	❑3	❑4
4	Other	❑0	❑1	❑2	❑3	❑4

28. For your *home-to-work* commute during the past 8 weeks, how many times did you *change the time you planned to leave home* because of a traffic information system? *(in each row check "DID NOT USE" this system or write a number: 0 if you used the system but didn't change your plans because of it, 1 if you used the system and changed your plans 1 time because of it, and so on)*

	Home-to-Work Commute		
1	Commercial Radio	❑0 DID NOT USE	CHANGED _____ TIMES
2	Television	❑0 DID NOT USE	CHANGED _____ TIMES
4	Other	❑0 DID NOT USE	CHANGED _____ TIMES

29. For your *home-to-work* commute during the past 8 weeks, to what extent did you rely on traffic information system(s) when you *chose a route before leaving home*? *(check one box in each row if you did not use the system, check "DID NOT USE", if you did use the system, check one of the other four boxes in the row)*

	Home-to-Work Commute	DID NOT USE	DID NOT RELY ON AT ALL	DID NOT RELY ON VERY MUCH	RELY ON SOMEWHAT	RELY ON VERY MUCH
1	Commercial Radio	❑0	❑1	❑2	❑3	❑4
2	Television	❑0	❑1	❑2	❑3	❑4
4	Other	❑0	❑1	❑2	❑3	❑4

30. For your *home-to-work* commute during the past 8 weeks, how many times did you *change your route before leaving home* because of a traffic information system? *(in each row check "DID NOT USE" this system or write a number: 0 if you used the system but didn't change your route because of it, 1 if you used the system and changed your route 1 time because of it, and so on)*

	Home-to-Work Commute		
1	Commercial Radio	❑0 DID NOT USE	CHANGED ____ TIMES
2	Television	❑0 DID NOT USE	CHANGED ____ TIMES
4	Other	❑0 DID NOT USE	CHANGED ____ TIMES

31. For your *home-to-work* commute during the past 8 weeks, how many times did you *change your route during the trip* because of a traffic information system? *(in each row check **"DID NOT USE"** this system or write a number: 0 if you used the system but didn't change your route because of it, 1 if you used the system and changed your route 1 time because of it, and so on)*

	Home-to-Work Commute		
1	Commercial Radio	❑0 DID NOT USE	CHANGED ____ TIMES
2	Television	❑0 DID NOT USE	CHANGED ____ TIMES
4	Other	❑0 DID NOT USE	CHANGED ____ TIMES

==========

The following questions ask about your use of traffic information systems for your work-to-home commute. A traffic information system is a means {radio, TV, etc.) by which the status of the roadway is communicated to you, either in or out of your car. By "use" we mean be aware of and consider in your decision making.

33. For my *work-to-home* commute during the past 8 weeks, I accessed traffic information system(s) (all types together): *(check one)*

- ❑1 Much Less Than Before the Test
- ❑2 Less Than Before the Test
- ❑3 About the Same as Before the Test
- ❑4 More Than Before the Test
- ❑5 Much More Than Before the Test

34. For my *work-to-home* commute during the past 8 weeks, I accessed (the listed) traffic information system: *(check one box in each row)*

		Much Less Than Before The Test	Less Than Before The Test	About the Same as Before The Test	More Than Before The Test	Much More Than Before The Test
1	Commercial Radio	❑1	❑2	❑3	❑4	❑5
2	Television	❑1	❑2	❑3	❑4	❑5
3	Changeable Message Signs	❑1	❑2	❑3	❑4	❑5
4	Other (please specify): _____	❑1	❑2	❑3	❑4	❑5

35. For your *work-to-home* commute during the past 8 weeks, *which* traffic information system(s) did you typically use? *(check all that apply)*

- ❑0 Didn't use a traffic information system
- ❑1 Commercial Radio [which station(s):_____]
- ❑2 Television [which station(s): _____]
- ❑3 Expressway Changeable Message Signs
- ❑4 Other (please specify):_____

36. For your *work-to-home* commute during the past 8 weeks, *when* did you typically use a *Commercial Radio* traffic information system(s)? *(check one in each column)*

- ❑0 Didn't use
- ❑1 Used only before I left work
- ❑2 Used only during the trip
- ❑3 Used both before I left work and during the trip

37. For your *work-to-home* commute during the past 8 weeks, *how would you describe* your typical use of traffic information system(s)?
(check one box in each row)

	Work -to-Home Commute	DID NOT USE	USED LESS THAN ONCE A WEEK	USED 1 TIME A WEEK	USED A FEW TIMES A WEEK	USED 1 TIME A DAY	USED 2 OR MORE TIMES A DAY
1	Commercial Radio	❑0	❑1	❑2	❑3	❑4	❑5
2	Television	❑0	❑1	❑2	❑3	❑4	❑5
3	Changeable Message Signs	❑0	❑1	❑2	❑3	❑4	❑5
4	Other	❑0	❑1	❑2	❑3	❑4	❑5

38. For your *work-to-home* commute during the past 8 weeks, to what extent did you rely on traffic information system(s) in *deciding when to leave work*?
(check one box in each row if you did not use the system, check "DID NOT USE", if you did use the system, check one of the other four boxes in the row)

	Work -to-Home Commute	DID NOT USE	DID NOT RELY ON AT ALL	DID NOT RELY ON VERY MUCH	RELY ON SOMEWHAT	RELY ON VERY MUCH
1	Commercial Radio	❑0	❑1	❑2	❑3	❑4
2	Television	❑0	❑1	❑2	❑3	❑4
4	Other	❑0	❑1	❑2	❑3	❑4

39. For your *work-to-home* commute during the past 8 weeks, how many times did you *change the time you planned to leave work* because of a traffic information system? *(in each row check "DID NOT USE" this system or write a number: 0 if your used the system but didn't change your plans because of it, 1 if you used the system and changed your plans 1 time because of it, and so on)*

	Work -to-Home Commute		
1	Commercial Radio	❑0 DID NOT USE	CHANGED ____ TIMES
2	Television	❑0 DID NOT USE	CHANGED ____ TIMES
4	Other	❑0 DID NOT USE	CHANGED ____ TIMES

40. For your *work-to-home* commute during the past 8 weeks, to what extent did you rely on traffic information system(s) when you *chose a route before leaving work*? *(check one box in each row if you did not use the system, check "DID NOT USE", if you did use the system, check one of the other four boxes in the row)*

	Work -to-Home Commute	DID NOT USE	DID NOT RELY ON AT ALL	DID NOT RELY ON VERY MUCH	RELY ON SOMEWHAT	RELY ON VERY MUCH
1	Commercial Radio	❑0	❑1	❑2	❑3	❑4
2	Television	❑0	❑1	❑2	❑3	❑4
4	Other	❑0	❑1	❑2	❑3	❑4

41. For your *work-to-home* commute during the past 8 weeks, how many times did you *change your route before leaving work* because of a traffic information system? *(in each row check **"DID NOT USE"** this system or write a number: 0 if you used the system but didn't change your route because of it, 1 if you used the system and changed your route 1 time because of it, and so on)*

	Work -to-Home Commute		
1	Commercial Radio	❑0 DID NOT USE	CHANGED ____ TIMES
2	Television	❑0 DID NOT USE	CHANGED ____ TIMES
4	Other	❑0 DID NOT USE	CHANGED ____ TIMES

42. For your *work-to-home* commute during the past 8 weeks, how many times did you *change your route during the trip* because of a traffic information system? *(in each row check "DID NOT USE" this system or write a number: 0 if you used the system but didn't change your route because of it, if you used the system and changed your route 1 time because of it, and so on)*

	Work -to-Home Commute		
1	Commercial Radio	❑0 DID NOT USE	CHANGED ____ TIMES
3	Television	❑0 DID NOT USE	CHANGED ____ TIMES
4	Other	❑0 DID NOT USE	CHANGED ____ TIMES

==========

The following questions also ask about your use of traffic infornzation systems for your commute.

43. To what extent do you agree or disagree with the following statement: "Traffic information systems could be improved to the point that they completely meet my needs for traffic information." *(check one box in each row if you do not know about a system or do not have opinions on it, check "AM NOT FAMILIAR WITH SYSTEM", otherwise check one of the other five boxes in each row.)*

		AM NOT FAMILIAR WITH SYSTEM	STRONGLY DISAGREE	SOMEWHAT DISAGREE	NEITHER	SOMEWHAT AGREE	STRONGLY AGREE
1	Commercial Radio	❑0	❑1	❑2	❑3	❑4	❑5
2	Television	❑0	❑1	❑2	❑3	❑4	❑5
3	Changeable Message Signs	❑0	❑1	❑2	❑3	❑4	❑5
4	Other	❑0	❑1	❑2	❑3	❑4	❑5

44. During the past 8 weeks, which traffic information system did you *rely on the most* in making decisions for your commute? *(check only one)*

❑0 Did not rely on any traffic information system
❑1 Commercial Radio [which station: _____]
❑2 Television [which station: _____]
❑3 Expressway Changeable Message Signs
❑4 Other (please specify):_____

45. Which traffic information system do you *like the best*? *(check only one)*

❑0 Commercial Radio [which station:_____]
❑1 Television [which station:_____]
❑2 Expressway Changeable Message Signs
❑3 Other (please specify):_____
❑4 No Preference

==========

The following questions ask further detail about your opinions of Commercial Radio traffic information systems (for example, WJR, WWJ, etc.).

46. Are you familiar with a *Commercial Radio* traffic information system? (By familiar we mean know about and have opinions on the system, whether or not you use the system in your decision making.) *(check one)*

❑$_0$ NO: PLEASE GO TO THE "KEIRSEY EMPERAMENT SORTER" ON PAGE 18:
DO NOT ANSWER ~~QUESTIONS 47 THROUGH~~ 51.
❑$_1$ YES: PLEASE GO TO NEXT QUESTION (QUESTION 47 BELOW).

47. If you are familiar with *Commercial Radio* traffic information system(s), please indicate the extent to which you agree or disagree with the following items. *(check one box in each row)*

	The *Commercial Radio* traffic information system:	STRONGLY DISAGREE	SOMEWHAT DISAGREE	NEITHER	SOMEWHAT AGREE	STRONGLY AGREE
1	works reliably	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
2	includes all the info I need to know	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
3	is specific to my commute.....	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
4	provides reliable information.....	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
5	provides accurate information.....	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
6	reports incidents soon after they happen	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
7	presents reports frequently enough	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
8	is easy to use.....	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
9	is convenient to use.....	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
10	catches my attention.....	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
11	is distracting.....	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
12	gives the reason for delays.....	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
13	gives the expected length of delays.....	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
14	provides information on demand	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
15	suggests appropriate alternate routes...	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$

48. Have you used a *Commercial Radio* traffic information system in the past 8 weeks? *(check one)*

❑$_0$ NO: PLEASE GO TO QUESTION 51: DO NOT ANSWER ~~QUESTIONS 49 AND 50.~~
❑$_1$ YES: PLEASE GO TO NEXT QUESTION (QUESTION 49 ON THE NEXT PAGE).

49. Please indicate the extent to which you agree or disagree with the following statements. *(check one box in each row)*

	I found that using the ***Commercial Radio*** traffic information system:	STRONGLY DISAGREE	SOMEWHAT DISAGREE	NEITHER	SOMEWHAT AGREE	STRONGLY AGREE
1	satisfied my need for information	❑1	❑2	❑3	❑4	❑5
2	helped me make better trip choices	❑1	❑2	❑3	❑4	❑5
3	made my commute less stressful.....	❑1	❑2	❑3	❑4	❑5
4	reduced my driving time.....	❑1	❑2	❑3	❑4	❑5
5	made my driving time more certain	❑1	❑2	❑3	❑4	❑5
6	made my arrival time more certain	❑1	❑2	❑3	❑4	❑5
7	helped me avoid congestion.....	❑1	❑2	❑3	❑4	❑5
8	helped me avoid unexpected delays....	❑1	❑2	❑3	❑4	❑5
9	on the whole, improved my commute.	❑1	❑2	❑3	❑4	❑5

50. What are the 5 most important things that would improve the existing ***Commercial Radio* traffic information system that you use most often?** *(check 5 boxes, no more, no less)*

_____ ❑1 Make the system work more reliably.
_____ ❑2 Make the information more complete (tell more of the things I need to know).
_____ ❑3 Make the information more specific to my commute (exclude irrelevant info).
_____ ❑4 Make the information more reliable.
_____ ❑5 Make the information more accurate.
_____ ❑6 Report incidents sooner after they happen.
_____ ❑7 Present traffic reports more frequently.
_____ ❑8 Make the system easier to use.
_____ ❑9 Make the system more convenient to use.
_____ ❑10 Make the system more able to catch my attention.
_____ ❑11 Make the system less distracting.
_____ ❑12 Give the reason for an unexpected delay.
_____ ❑13 Give the expected length of an unexpected delay.
_____ ❑14 Make the systems provide information on demand.
_____ ❑15 Suggest appropriate alternate routes when an unexpected delay arises.
_____ ❑16 Other (please specify):_____

_____ ❑17 No improvement possible.

Now, please rank the 5 boxes checked in the preceding question in order of importance by writing a number from 1 to 5 on the line to the left of each of the 5 boxes checked in that question: 1 is most important, 2 is next most important, and so on.

PLEASE GO TO THE "KEIRSEY EMPERAMENT SORTER" ON PAGE 18; DO NOT ANSWER ~~QUESTION 51~~.

You should answer Question 51 only if you have NOT used a *Commercial Radio* traffic information system in the past 8 weeks. If you have used one, go to the "KEIRSEY EMPERAMENT SORTER" on page 18.

51. Why didn't you use a *Commercial Radio* traffic information system during the past 8 weeks? *(check all that apply)*

- ❑$_0$ I didn't know of any systems that I could use.
- ❑$_1$ Available systems do not work reliably.
- ❑$_2$ The information was not complete enough (it did not tell me enough of the things I need to know).
- ❑$_3$ Not enough of the information was specific to my commute,
- ❑$_4$ The information is not reliable.
- ❑$_5$ The information is not accurate.
- ❑$_6$ The systems do not report incidents soon enough after they happen.
- ❑$_7$ The systems do not present reports frequently enough.
- ❑$_8$ The systems are too hard to use.
- ❑$_9$ The systems are too inconvenient to use.
- ❑$_{10}$ The systems do not catch my attention.
- ❑$_{11}$ The systems are distracting.
- ❑$_{12}$ The information does not give the reason for a delay.
- ❑$_{13}$ The information does give the expected length of a delay.
- ❑$_{14}$ The information the systems provide is not available on demand.
- ❑$_{15}$ The information does not suggest appropriate alternate routes.
- ❑$_{16}$ Other (please specify):_____
- ❑$_{17}$ I wouldn't take an alternate route even if I had information.
- ❑$_{18}$ I know the area well enough to get by without help.
- ❑$_{19}$ I rarely encounter a serious traffic problem.
- ❑$_{20}$ I rely on a different traffic information system.

Please continue to the "Keirsey Temperament Sorter" on the following pages. Circle either "a" or "b" for each question.

[The University purchased copies of the Keirsey Temperament Sorter evaluation instrument for use in DIRECT. However, the University does not have permission to reproduce this instrument here. The Keirsey Temperament Sorter can be purchased from Prometheus Nemesis Book Company, Box 2748, Del Mar, CA 92014 (Tel: 800-754-0039; Fax: 619-481-0535). Versions of the Keirsey Temperament Sorter can also be found on the world wide web.]

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52. If you like, please make any additional comments (either about DIRECT or traffic information in general).

Thank you for taking the time to fill out this questionnaire. Please return the questionnaire to the University of Michigan (either directly to the staff person assisting you or in the enclosed pre-addressed stamped envelope). Again, all responses will be kept confidential.

Table B1: Mapping of Before to After Questions

Question		Relationship/Comment
Before	After	
B1	A6	After similar to Before, but uses different response categories
B2		
B3		
B4	A1	After verbatim of Before
B5	A2	After verbatim of Before
B6a	A3a	After verbatim of Before
B6b	A3b	After verbatim of Before
B7		
B8		
B9	A8	After verbatim of Before
B10	A9	After verbatim of Before
B11	A10	After same as Before, but includes a "DIRECT" response category
B12	A11	After verbatim of Before
B13a	A4	After verbatim of Before
B13b	A5	After verbatim of Before
B14	A12	After verbatim of Before
B15	A13	After verbatim of Before
B16	A14	
B17	A15	
B18		
B19		
B20	A16	
B21	A17	
B22	A18, A60	A18 is verbatim of B22; A60 asks specifically about DIRECT
B23	A19	
B24	A20	
B25	A21	
B26 (B36)	A24 (A35)	After same as Before, but includes a "DIRECT" response category
B27 (B37)		This question number not used
B28 (B38)	A25 (A36)	After same as Before, but includes a "DIRECT" response category
B29 (B39)	A26 (A37)	After same as Before, but includes a "DIRECT" response category
B30 (B40)	A27 (A38)	After same as Before, but includes a "DIRECT" response category
B31 (B41)	A28 (A39)	After same as Before, but includes a "DIRECT" response category
B32 (B42)	A29 (A40)	After same as Before, but includes a "DIRECT" response category
B33 (B43)	A30 (A41)	After same as Before, but includes a "DIRECT" response category
B34 (B44)	A31 (A42)	After same as Before, but includes a "DIRECT" response category
B35	A32	After same as Before, but includes a "DIRECT" response category
B45	A43	After same as Before, but includes a "DIRECT" response category
B46	A44	After same as Before, but includes a "DIRECT" response category
B47	A45	After same as Before, but includes a "DIRECT" response category
B48	A43	
B49	A46	After verbatim of Before
B50	A47	After verbatim of Before
B51	A48	After verbatim of Before
B52	A49	After verbatim of Before
B53	A50	After verbatim of Before
B54	A51	After verbatim of Before
B55		
B56		
B57		

Table B1 (continued): Mapping of Before to After Questions

B58		
B59		
B60		
B61		
B62		
B63		
B64		
B65		
B66		
B67		
B68		
B69		
B70		
B71		
B72		
B73		
B74		
B75		
B76		
B77		
B78		
B79		
B80		
B81		
B82		
B83		
B84		
		Age (determined during the subject recruitment process)
		Gender (determined during the subject recruitment process)
	Tmprmt	(Temperament)
B85	A62	After verbatim of Before
	A7	
	A22 (A33)	() are questions asked about the reverse commute
	A23 (A34)	() are questions asked about the reverse commute
	A52	
	A53	
	A54	
	A55	
	A56	
	A57	
	A58	
	A59	
	A61	

Telephone Interview Script for DIRECT Status Checks

Hello, may I speak to _____?

Hi. this is _____ from the University of Michigan. I am calling to find out if your DIRECT system is functioning properly.

1. Have you received any test messages on Monday mornings since you received the vehicle?

2. Have you received any incident messages since you received the vehicle'?.

3. Are you having any problems with the vehicle itself? (If yes, they should report it to Tom Mullin or Monroe Pendelton at MITSC. 313-256-9800)

You will receive another status check phone call in early November. Thank you very much for you time and have a nice day. If you have any other questions, please leave a message for Becky Richeson at 3 13-763-75 18. She will be out of the office until Oct. 27 so if you have a problem that needs immediate attention, please contact either Tom or Monroe at MITSC.

Telephone Interview Script for DIRECT Exit Interviews

Hello. may I speak to _____?

HI. this is _____ from the University of Michigan. I am calling to ask you a few final questions about your participation in the DIRECT project. Do you have a few minutes to talk or should I call back at a better time?

1. At the start of the project, did you have any expectations of DIRECT and were they met?

2. What is your overall impression of the project?

3. Did you receive traffic information?

4 Did you change your route because of any information that you received?

5. How did the traffic information system in your car compare to other sources of traffic information such as commercial radio, TV, and changeable message signs?

6. What did you like about the system in your car?

7. What did you not like about the system in your car?

8. How could the system that you experienced be improved?

Appendix C: Subject Sample Size Calculations

To determine the minimum number of subjects necessary to achieve statistically significant comparisons, the evaluator must estimate the expected magnitude of difference in subject response to the tested information delivery systems with respect to each of the dependent variables (measures of effectiveness) being examined. Unfortunately, because of the scarcity of studies on which to base a reasonable estimate of the possible effect sizes for this study, producing tables of postulated effects is impossible. However, previous behavioral studies and power analyses [Kraemer & Thielmann, 1987; Sokal & Rohlf, 1969] provide some insight into this issue. Tables Cl and C2 show the results of a power analysis for two different measures: travel time differences and survey response differences, respectively. Given the results of both analyses, and the project cost limitations on the number of vehicles and equipment, we believe that 25 subjects per information delivery system will let us identify statistically significant differences between experimental conditions. The evaluation thus calls for 5 subjects per treatment in each of 5 experimental periods), for a total of 125 subjects as a bare minimum. One additional period, the sixth, was recommend to provide a margin of safety.

Table C 1: Power Analysis for Travel Time Differences
(2-tailed test, 5% Significance Level, 80% power)

Difference between means	Standard Deviation of Means	N required per system	Total N required
1.0	3.0	152	760
2.0	3.0	37	185
3.0	3.0	18	90
4.0	3.0	12	60
5.0	3.0	9	45
1.0	4.0	271	1355
2.0	4.0	67	335
3.0	4.0	31	155
4.0	4.0	18	90
5.0	4.0	13	65
1.0	5.0	391	1955
2.0	5.0	97	485
3.0	5.0	46	230
4.0	5.0	28	140
5.0	5.0	18	90

Table C2: Power Analysis for Survey Response Differences
(2-tailed test, 5% Significance Level, 80% power)

Difference between means	Standard Deviation of Means	N required per system	Total N required
1.0	1.0	18	90
2.0	1.0	7	35
3.0	1.0	6	30
1.0	1.5	40	200
2.0	1.5	12	60
3.0	1.5	7	35
1.0	2.0	67	335
2.0	2.0	18	90
3.0	2.0	10	50

Appendix D: Subject Recruitment Materials

A variety of methods and materials were used to recruit subjects for participation in DIRECT. The primary materials are as follows:

The University of Michigan Intelligent Transportation Systems
Michigan Department of Transportation - M.DOT

News Release

M.DOT Office of Communications . Box 30050, Lansing, MI 48909 . 517/373-2160
U of M Intelligent Transportation Systems . 2609 Draper Dr., Ann Arbor, MI 48109-2140 . 313/764-4333

CONTACT: Rachel Selk, University of Michigan, (3 13) 936-7623
Robin Panecouk, MODT, (5 17) 37 l-2160

FOR IMMEDIATE RELEASE 02-02-RP
Date: February 15, 1996 Thursday, February 15, 1996

VOLUNTEERS NEEDED: TESTING NEW TRAFFIC SYSTEMS

ANN ARBOR, MI-The University of Michigan, in conjunction with the Michigan Department of Transportation (MDOT), is looking for 1,200 volunteers to participate in a study which ultimately seeks to produce a more reliable commute for the tens of thousands of drivers in Southeast Michigan. The study, commencing in April 1996, will focus on three routes used by drivers who commute to downtown Detroit in the morning: I-75 southbound and I-94 eastbound and westbound.

"We need volunteers who live in the northern suburbs and use I-75 southbound to get to work in the morning," said MDOT Project Engineer Dick Blost, "as well as individuals who drive west or east on I-94 to downtown. The study will last about a year and, in some cases, volunteers will be provided with a car to drive on their daily commute." Blost said that participants in the study would receive information affecting their particular route from one of several sources, including different radio technologies and cellular phone connections. All necessary equipment will be provided to the volunteer.

"We want the drivers who participate in the test to have better access to traffic information and information that is more relevant to them," said University researcher Rachel Selk. "People who drive these roads everyday generally know how long it takes them to reach their destinations. We're interested in their reactions once they get information on current traffic conditions." The study will determine what actions, if any, drivers take when they receive up-to-the-minute traffic information in their vehicles. Data will also be collected on each participant's opinion of the technology experienced. People interested in participating should call (3 13) 256-9880 for additional information.

(over)

The University of Michigan Intelligent Transportation Systems
Michigan Department of Transportation - M.DOT

News Release

M.DOT Office of Communications • Box 30050, Lansing, MI 48909 • 517/373-2160
U of M intelligent Transportation Systems . 2609 Draper Dr., Ann Arbor, MI 48109-2140 • 313/764-4333

The study is funded by the Michigan Department of Transportation (MDOT) and the Federal Highway Administration, along with several private business partners. After the study is completed and the results evaluated, those involved hope to make one or more of the systems available to the entire commuting public. Future plans also call for expanding the systems to all metro area freeways.

This study, known as DIRECT (Driver Information Radio using Experimental Communication Technologies), is one of many field tests occuring across the country. Various technologies are being tested that seek to improve the efficiency, safety, and productivity of the current transportation infrastructure, as well as reduce costs and environmental impacts. The U . S . DOT is responsible for assessing and ultimately implementing these systems on the nation's public roads. Future implementation requires cooperation among federal, state, and local governments and planning agencies.

#

A2-98-Metro

ATTENTION COMMUTERS

DO YOU:

DRIVE I-75 SOUTHBOUND TO DETROIT EVERYDAY?

WISH TRAFFIC INFORMATION WAS BETTER?

If you answered yes to these questions, you may be interested in the DIRECT project, sponsored by the Michigan Department of Transportation

Fill out a survey and you may be eligible to receive a test vehicle for a period of eight weeks!

Selected participants are required to:

- **Drive the test vehicle to and from work everyday**
- **Refrain from using the test vehicle evenings and weekends**
- **Pick up & return vehicles at designated times and locations**
- **Complete several surveys**
- **Participate in an interview**

The next test period begins: January 11, 1997
Other test periods begin: March 15, 1997
May 17, 1997
July 19, 1997
September 20, 1997

DAILY NEWS
MIDLAND, MICH
PM-CIRC 17,382

APRIL 14 1996

Traffic tactics: Use technology

DETROIT (AP) — Two programs aimed at decreasing traffic jams without building new roads are planned for southeastern Michigan.

"We can't build our way out of congestion. We have to start thinking our way out," state Transportation Director Robert Welke said

Both programs hope to cut down on traffic jams through technology. In Detroit, volunteer drivers will use gadgets that will provide information about their routes from a command center in downtown Detroit, using cellular phones or specialized and standard car radios.

In Auburn Hills, transportation officials unveiled some color-coded, computerized television screens that will show Chrysler Technology Center's nearly 10,000 employees the best route home when they leave work.

Both programs are part of Michigan's Intelligent Transportation Systems plan to increase traffic volume and safety without building new roads

In the program in Detroit, 25 drivers will get free use of state-owned 1996 Chevy Luminas for two months, with 150 people taking part by the time the project is completed.

Using their own cars, another 1,000 test drivers also will get the traffic advisories

The 14-month study will cover three routes into downtown Detroit: Interstate 75 southbound and I-94 eastbound and westbound. The state and federal governments will share the cost of the $4 5-million study, called DIRECT — Driver Information Radio using Experimental Communication Technologies.

The University of Michigan is participating, and U-M researcher Rachel Selk said the equipment should start becoming widely available on cars over the next five years.

In the program in Auburn Hills, the new program by the Oakland County Road Commission and Chrysler will give employees the fastest routes home before they leave the office.

Information from road sensors in Auburn Hills, Troy, Rochester Hills and South Lyon will provide 600 television monitors in the Chrysler Technology Center with color-coded maps indicating traffic congestion.

The program is part of the commission's $70-million FAST-TRAC — Faster And Safer Travel through Traffic Routing and Advanced Controls — project, funded by federal and local governments and corporations.

Federal Highway Administrator Rodney Slater said the local projects will keep southeast Michigan a national leader in managing traffic through technology.

CLARKSTON NEWS
CLARKSTON, MICH
W-CIRC. 4,465

FEB. 28. 1996

Drivers can help improve the I-75 morning commute

Do you commute every morning to downtown Detroit on I-75? If so, the Michigan Department of Transportation wants you.

MDOT is looking for 1,200 volunteers to participate in a study beginning in April and lasting for about a year. Participants will receive information affecting their route to work from a variety of sources, including different radio technologies and cellular phone connections. All necessary equipment will be provided, and in some cases even cars will be provided.

The goal of the study is to produce a more reliable commute for the tens of thousands of drivers who travel I-75 southbound and I-94 east and west in the morning.

"People who drive these roads every day generally know how long it takes them to reach their destinations," said University of Michigan Rachel Selk. "We're interested in their reactions once they get information on current traffic conditions."

The study will determine what actions, if any, drivers take when they receive up-to-the-minute traffic information in their vehicles, as well as drivers' opinions on the technology used.

The study, which is being undertaken by MDOT and the University of Michigan, is funded by MDOT and the Federal Highway Administration, along with several private businesses. Once the study is completed and evaluated, the partners hope to make the technology available to the commuting public and expand it to all metro-area freeways.

The study, known as DIRECT (Driver Information Radio using Experimental Communications Technologies) is one of many field tests going on across the US. Various technologies are being tested to try to improve the efficiency, safety and productivity of the current transportation infrastructure, as well as reduce costs and environmental impact.

The study team is looking for a new group of 25 motorists every two months on I-75. Names of volunteers are now being accepted; call Robin Panneccouk at (517) 335-3084 or Rachel Selk at (313) 936-7632.

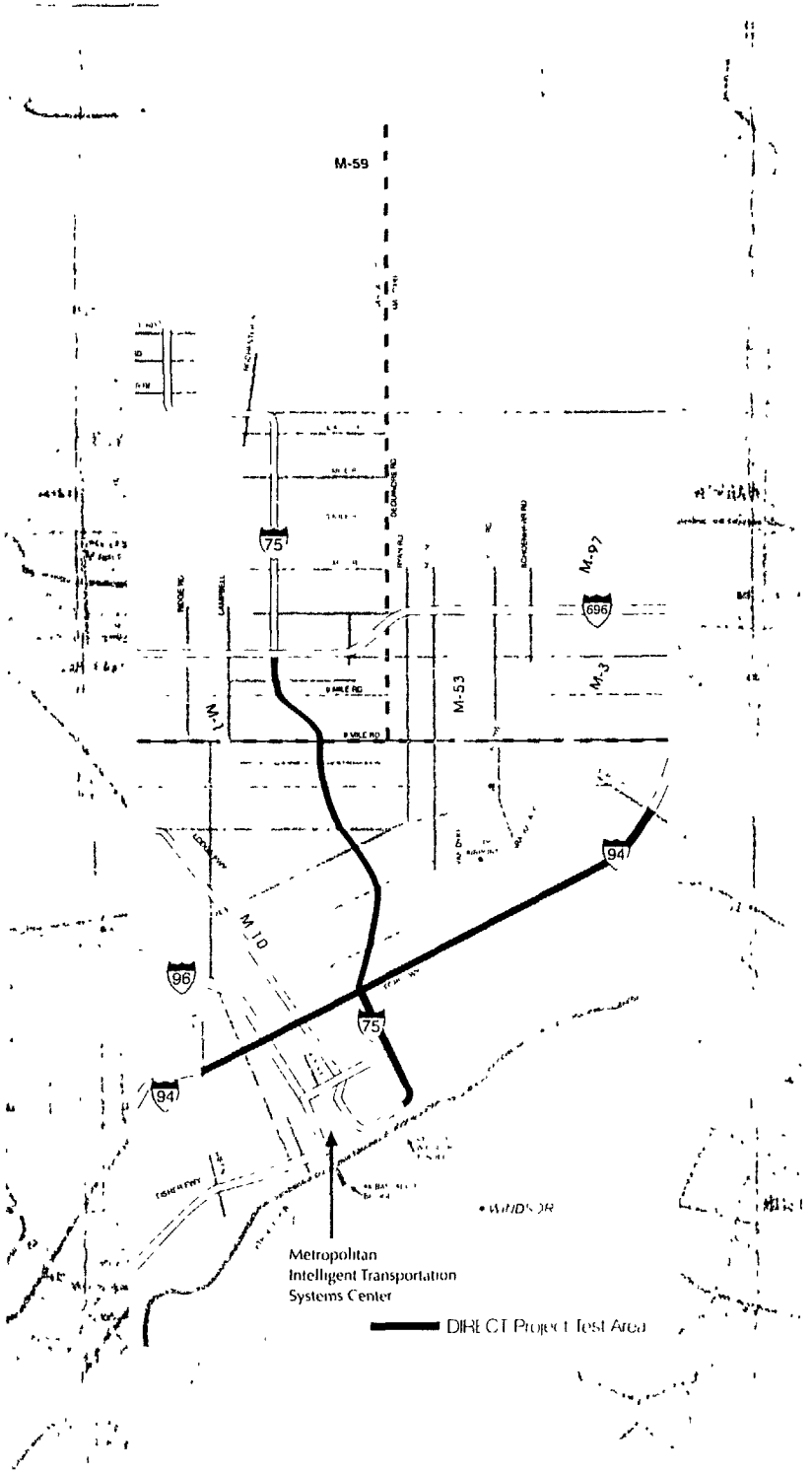
More about DIRECT and Michigan ITS

The DIRECT project is one of many field tests of Intelligent Transportation System (ITS) technologies occurring around the country. It is a project that focuses on Advanced Traveler Information Systems (ATIS). DIRECT is sponsored by the Michigan Department of Transportation (MDOT), in cooperation with the Federal Highway Administration. The University of Michigan is responsible for evaluating the system and the Environmental Research Institute of Michigan is involved as the system designer.

DIRECT is just one of several ITS projects in which MDOT is involved to improve the transportation system for the Michigan traveler. These include:

- FAST-TRAC in Oakland County
- International Border Crossing: automating clearance and toll collection
- Advanced Traffic Management System and Advanced Traveler Information System Expansion Program in Southeast Michigan
- ITS Michigan: a public-private partnership between government and industry
- Tally-Ho: a statewide network of traveler information kiosks
- Advantage I-75: expedites commercial vehicle travel

ITS is a national program developed by the U.S. Department of Transportation. It seeks to achieve five goals for improving the transportation system through the deployment of ITS technologies. The goals include: Improve Safety, Improve Efficiency, Improve Mobility, Enhance Productivity, and Reduce Environmental Impact



MICHIGAN DIRECT

Driver
Information
Radio using
Experimental
Communication
Technologies

What is DIRECT?

The DIRECT project, sponsored by the Michigan Department of Transportation (MDOT), is examining several new ways to deliver traffic information to travelers in their vehicles. The idea is to look at methods that provide accurate, route-specific, and on-demand traffic information at a low cost. The technologies include:

- Highway Advisory Radio (HAR)
- FM Radio using subcarriers
- Cellular Telephone

Why is this important to ME?

You depend on smooth traffic to get to work on time. But how often do you encounter sudden congestion en-route to your destination? You may ask yourself, what is going on here? Should I get off the expressway? Your decision depends on the congestion's cause and when it will be cleared.

The goal of the DIRECT project is to find ways to provide additional information to the traveler that improve on current systems, so **you** can make informed travel decisions.

How can I help?

If you travel to downtown Detroit, Monday through Friday, via Southbound I-75, Eastbound I-94, or Westbound I-94, you may be eligible to become a test driver for the DIRECT project. The University of Michigan is responsible for evaluating this project and is recruiting individuals to participate in the following studies.

STUDY ONE *(Base Fleet)*

- Runs on I-75
- Requires 150 participants
- Will supply the participant with a test vehicle (belonging to MDOT) outfitted with on-board communications equipment and a vehicle tracking system
- Participants will pay for gas
- Participants will respond to several mail-in surveys and participate in an interview
- Participation will last two months

STUDY TWO *(Expanded Fleet)*

- Runs on I-75 and I-94
- Requires 1000 participants
- Participants will drive their own vehicles, and possibly receive in-vehicle equipment that will not affect their own vehicles
- Participants will pay for gas
- Participants will respond to several mail-in surveys
- Participation will last six months

Where does this all happen?

The operations center for DIRECT is located in downtown Detroit. Traffic information will be routed to the center where an operator will generate traffic messages. These messages will then be sent via the various technologies used in DIRECT to you, the traveler.

Traffic information will be collected through existing highway sensors and closed circuit television cameras. In addition, Metro Traffic Networks and the Michigan State Police will be located in the center, and their traffic information resources will be available to the project.

Still interested?

If you are, fill out the enclosed informational survey and return to the University of Michigan. If you are eligible, you will be placed into a test group based on your responses and contacted by the University of Michigan to confirm your participation.

The University of Michigan Intelligent Transportation Systems

MICHIGAN DEPARTMENT OF TRANSPORTATION

Printing provided by The University of Michigan

DIRECT Information Sheet

Thank you for your interest in the DIRECT project. DIRECT is a research project sponsored by the Michigan Department of Transportation. Since a major portion of DIRECT is for research purposes, potential participants must meet pre-determined research criteria. The questionnaire that you completed serves to identify those individuals who best meet those criteria. If your driving record meets the requirements of the Michigan Department of Transportation, you will be contacted and asked to participate. During the S-week test period, participants will be provided with a test vehicle for use while commuting to and from work each day. If you are contacted, please keep the following information in mind before you agree to participate.

Participants must:
*have a valid Michigan driver's license
*have current vehicle insurance
-the State of Michigan insures the vehicles & equipment against theft, and damage due to accidents (not due to wanton negligence or intentional action) or Acts of God
*drive the test vehicle to and from work each day
-the morning commute should occur between 6:30am and 9:00am
*refrain from using the test vehicle during the evenings & on weekends
*take no major vacations from work (5 days or more) during the 8 week test period
*pick up the test vehicle at the MITS Center on DATE
-participants must attend a one hour orientation at 10:00 am on this day or a mutually agreeable time during the week of October 6- 10
-the MITS Center is located at Lafayette Ave. & Sixth St. above the Greyhound Bus Terminal
*return the test vehicle to the MITS Center on DATE or a mutually agreeable time during the week of DATE
*complete 2 surveys
*participate in 2-3 brief telephone interviews (10 minutes)

If you have any questions, please contact Becky Richeson at the University of Michigan (734-763-7518).

DIRECT

Participant Selection Survey

We wish to offer you the opportunity to participate in DIRECT, a transportation research project sponsored by the Michigan Department of Transportation examining various methods of delivering traffic information to commuters. Qualified participants may receive test vehicles for an eight week period. Therefore, participants must meet pre-determined research criteria. The purpose of this questionnaire is to find individuals who best meet those criteria. Please answer all the questions and return. If you are selected to participate in DIRECT, you will be notified and given further information about the Project and your participation. If you are not selected, thank you for your interest.

Your responses on this survey will be used solely for research. All responses on this form will be kept strictly confidential and you will remain anonymous in any public report. You do not have to answer any questions you do not wish to answer. Please return this survey as soon as possible.

Please respond to this survey with your *normal* work commute in mind.

- **Do you drive to work?**

  ☐ Yes ☐ No

- **Does your commute from home to work *completely include any one* of the following three sections of expressway?**

  I-75 from at least Exit 61 (Point 1/I-696) to at least Exit 53B (I-94)

  I-94 from at least Exit 210 (Point 2/Wyoming) to at least Exit 214 (I-96)

  I-94 from at least Exit 224 (Point 3/Moross) to at least Exit 217B (Mt. Elliott)

  ☐ Yes ☐ No

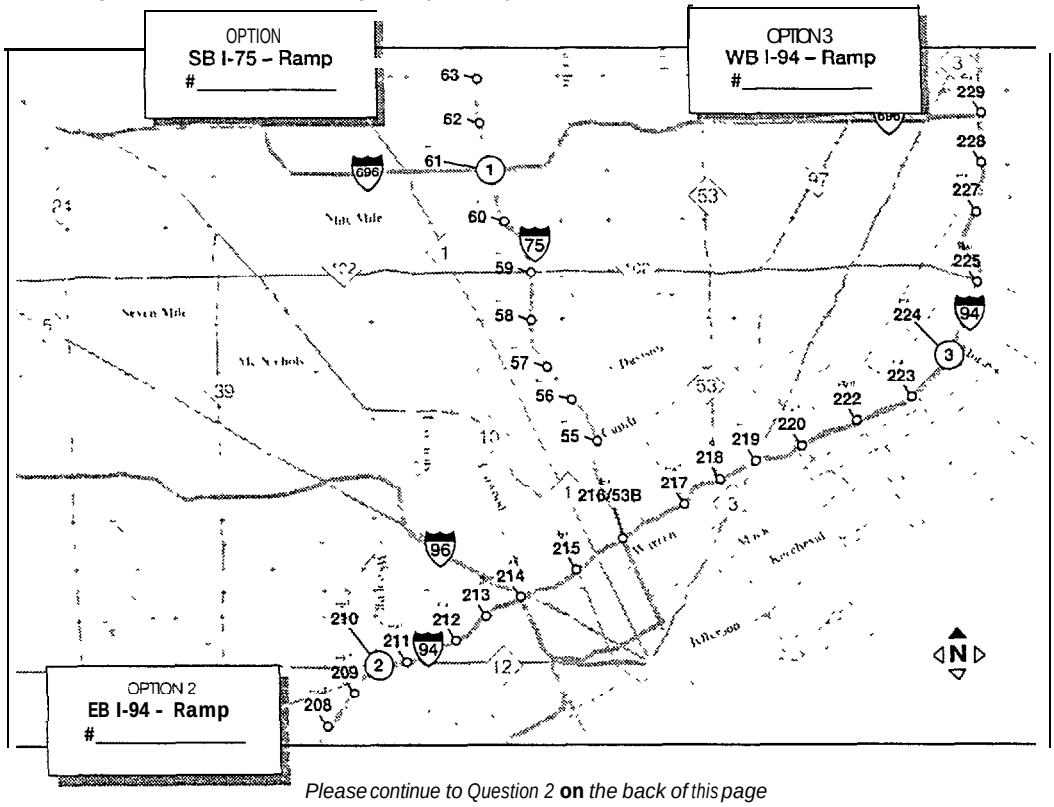
- **Does your home-to-work commute take place between the hours of 6:30 and 9:00 AM?**

  ☐ Yes ☐ No

If you answered "No" to any of the above questions, thank you for your interest but your commute is outside the DIRECT test area/time.

If you answered "Yes" to all of the above questions, please continue on to Question 1.

1. **Very Important! Please draw your usual route from *home to work on* the map. Circle the freeway entrance and exit ramps that you use. (If these are off the edge of the map, just write the ramp name or number in the spaces provided.)**



*Please continue to Question 2 **on** the back of this page*

2. **Which days of the week do you usually make this commute?** *(check all that apply)*

[] Sun [] Mon [] Tues [] wed [] Thurs [] Fri [] Sal

3. **What hours of the day do you usually work?**

____:___ *am/pm* **t o** ___:___**am/pm**
Hour Min *Hour Min*

4. **What time do you usually leave home for work?**

____: ____ *am/pm*
Hour Min

5. **What time do you usually get on the freeway on your way to work?**

____: _____ *am/pm*
Hour Mm

6. **What time do you usually arrive at point #1,#2, or #3 (see map) on your way to work?**

_____:_____ *am/pm*
Hour Mm

7. **What time do you usually arrive at the parking lot at work?**

_____:_____ *am/pm*
Hour Mm

Please provide the following information:

Name _____ _____ **Date of birth** __ / __ / __
first *last* *mo. day year*

Driver License Number *(you must fill this out to participate)* __ ____ ____ ____ ____

Home Address:

Street _____

City, Zip _____

Telephone: (_____) _____ - _____

Work Address:

Organlzatlon _____

Bldng/Street _____

City,Zip _____

Telephone (_ _ _) _ _ _ - _ _ _ _

Contact me at: [] **home** [] **work**

. . . . . first fold . .

Thank you for taking the time to fill out this questionnaire. Please fold, tape and return.

second fold

Ms. Rachel Selk
DIRECT Evaluation Manager
University of Michigan
2609 Draper Drive
Ann Arbor, MI 48109-2140

Appendix E: Subject Selection & Assignment Procedures

The project followed a specific process of selecting subjects and then assigning them to test groups. The process is highlighted here.

Driver Selection

1) driving record must be approved by MDOT

   Primary criteria were:

   a. No drinking offenses

   b. No more than two or three points within the past five years

   c. No excessive speed or reckless violations

2) drive to work on I-75 from North of I-696 to downtown Detroit

3) drive to work Monday-Friday

4) home-to-work must be between 6:30am and 9:00am

5) no major vacations during the 8-week test period

6) able to attend orientation and vehicle hand-off

7) able to return vehicle on specified date

8) complete before and after questionnaires

9) participate in 2 status checks and 1 exit interview

Subject Assignment

1) arrange the names of the 25 drivers in ascending order according to the time at which they pass exit 61 (intersection of I-696 and I-75)

2) based upon these times, develop 5 time periods - each time period with 5 similar times for passing exit 61

3) randomly assign each of the 5 drivers in one time period to a vehicle in a different method group - one to the control group, one to the cellular call-in group, etc.

4) repeat step 3 for the other 4 time periods

So, each method group (control, AHAR, LPHAR, phone, and RDS/SCA) should have 5 drivers who pass exit 61 during DIFFERENT time periods. Therefore, there will be 5 drivers who pass exit 61 at similar times using the 5 different test methods. This process will happen in 5 different time periods between 6:30am and 9:00am each day of the week.

Appendix F: Subject Orientation Materials

A significant amount of information needed to be communicated to subjects during the study. The majority of this information changed hands during orientation/hand-off of the vehicles and also during return of the vehicles. The materials, and page on which the material begins, include:

VEHICLE HAND-OFF PROCEDURES
DATE

Evaluation Team Member 1	GROUP A (blue)
Evaluation Team Member 2	GROUP B (yellow)
Evaluation Team Member 3	GROUP C (orange)
Evaluation Team Member 4	GROUP D (red)
Evaluation Team Member 5	GROUP E (green)

What you have:

1. A set of five instruction cards (except for Group B).
2. The names and the specific vehicle each individual should receive (keys are in the cars).

First Name	Last Name	Vehicle	GrP
		MNT 067	A
		MNT 069	A
		MNT 070	A
		MNT 071	A
		MNT 075	A
		MNT 060	B
		MNT 062	B
		MNT 065	B
		MNQ 165	B
		MNT 057	B
		MNT 056	C
		MNT 059	C
		MNT 061	C
		MNT 063	C
		MNT 066	C
		MNT 058	D
		MNT 064	D
		MNT 068	D
		MNT 072	D
		MNT 073	D
		MNT 076	E
		MNT 077	E
		MNT 078	E
		MNQ 121	E
		MNQ 122	E

In order to expedite the hand-off, we are going to keep everyone inside for as long as possible. After we divide into five groups, please follow this procedure:

1. Do a roll call. Check everyone's Driver License (make sure they are who they say) and proof of insurance photocopy (Check expiration date on both).

2. Tell drivers about the plastic envelope in the glove box (vehicle registration, permission to drive letter, MDOT self-insurance certificate). This is where they will place their insurance certificate photocopy. There are also accident forms and the Lumina Owner's manual.

3. Explain that each vehicle is being tracked, and why (to have a record of their normal routes and any diversions they take due to incidents). Explain the two antennae (GPS, cellular) on the car that are part of the tracking system.

4. Distribute instruction cards to everyone (except Group B). Read over completely and tell them the system will be demonstrated later in each vehicle. Questions?

   Emphasize that they will only hear about "exception" congestion, where traffic is different from normal *and* where the situation will affect traffic conditions for at least 10 minutes. They will not hear about planned construction.

   Emphasize that there will be test messages broadcast every Monday morning. Test messages will be delivered continuously from 6:30-9 am, unless there is a traffic message, which will overrule the test message. *If they do not get a test message, UM ASAP. (734-764-4333)*

5. Go out to the parking lot. Have people get in one car; you will occupy the driver's seat. Have the person to whom that vehicle is assigned sit in the passenger seat. Review the vehicle checklist:
   - Gas tank is on the driver side.
   - There is a spare tire in the trunk, as well as a box of computer equipment, that should not be tampered with.
   - Point out antennae.
   - Silver key opens trunk and door; black key is for the ignition
   - Lights: parkin,g headlights, brights, hazards, reading
   - Mirrors, seat, and steering wheel adjusters
   - Signal wand, windshield wipers and washing fluid
   - Gas tank and trunk: no latch; Hood: latch inside, once popped, open by lifting a lever not attached to the hood itself.
   - Heating/cooling system
   - Cupholders
   - Orient drivers to the radio: show basic functions (manual is in their folders)

6. Demonstrate the system (tune in, call in etc.).

7. Turnover the vehicle you're in to its driver, making sure s/he puts their insurance certificate photocopy in the plastic envelope in the glove compartment.

8. Tell the other four people to find their vehicles. Tell them not to leave until you come by. When you come by, make sure each person tests the system in their own vehicle and places the insurance photocopy where it belongs. They are free to go at that point. Do not let anyone leave whose system or vehicle does not work.

DIRECT

Driver Information Radio using Experimental Communication Technologies

DATE

University of Michigan
ITS Laboratory
2609 Draper Dr., 200 EPB
Ann Arbor, MI 48 109-2 10 1
ph: (734) 764-4333
FAX: (734) 763-1674

SUBJECT NAME
SUBJECT STREET ADDRESS
SUBJECT CITY, STATE, ZIP CODE

Dear SUBJECT NAME:

I am excited about your upcoming participation in the DIRECT project and hope you are as well. This letter confirms your attendance at the DATE meeting to receive your test vehicle and participate in an orientation. The meeting is called for 10:00 am and will be held at MITSC in downtown Detroit. A map with directions is enclosed. The meeting is expected to last one hour.

Also enclosed is a copy of the DIRECT Participation Guidelines, which includes the Participation Agreement. Please look this over before attending the meeting on DATE. We will review this material at the meeting and you will be expected to agree to the guidelines and sign the agreement at that time. In addition, you must complete the enclosed survey and bring it with you to the meeting. **You must bring your valid driver's license and a photocopy of your car insurance certificate to be placed in the test vehicle. No vehicles will be released to individuals not in possession of those two items.**

If you have questions or concerns please call me at (734) 763-75 18 prior to DATE. If you cannot attend on DATE, or are no longer interested in participating please call me as well.

Thank you for your attention to this. I look forward to meeting you.

Sincerely,

Rebecca P. Richeson
DIRECT Evaluation Manager

enclosures

Method Descriptions

Laminated cards describing the information-delivery systems were provided to each subject. These cards were discussed with the subjects during the hand-off and then kept in the vehicle for reference purposes. Subjects also were asked to practice using the system while actually in the car before they left the orientation. No description card was provided for the control group.

Welcome to your DIRECT Project vehicle. You will experience the following system:

AUTOMATIC HIGHWAY ADVISORY RADIO (AHAR)

The radio in this vehicle is specially designed to receive traffic messages via low power roadside transmitters, located along I-75 between 12 Mile and downtown Detroit. If there is unexpected congestion or delay on I-75, a message will be sent to your vehicle. This message will automatically interrupt the vehicle entertainment system, which must be on to receive messages. There is no need to tune to any station. The message will tell you the location of, and reason for, the congestion or delay. When possible, the estimated duration of the delay will be provided.

Because an active message will continue to interrupt your entertainment system while you are in transmission range, the vehicle is equipped with an "enable/disable" switch. This switch is located in a small white box to the left of the steering wheel. If you do not wish to receive the same message multiple times, you can turn AHAR off by flipping the switch to "disable." To receive automatic interrupts again during a trip you will have to return it to "enable." AHAR is automatically enabled whenever you start the vehicle. Basically, the green light on the white box is on when AHAR is enabled.

Sound quality depends on proximity to message transmitters; the further away your vehicle is, the poorer the quality. Every Monday morning a test message will be sent out, to ensure that the system is working. If you do not receive test messages, contact the University of Michigan.

Traffic information is available for the following times and locations:

- Monday through Friday
- 6:30-9:00 am (to downtown) and 3:00-6:00 pm (from downtown)
- Information is available for I-75 between 12 Mile and downtown Detroit

If you have questions about the system, please call the University of Michigan at (734) 764-4333. If you have problems with the vehicle itself, please call l-800-CHEV-USA.

Welcome to your DIRECT Project vehicle. You will experience the following system:

LOW POWER HIGHWAY ADVISORY RADIO (LPHAR)

The DIRECT project is testing the use of low power AM radio transmitters, located along I-75 between 12 Mile and downtown Detroit (map), to deliver traffic information. As you drive along I-75, you will be able to tune to 1610 AM to receive messages on current traffic conditions. Your in-vehicle radio already has a button pre-set for that station. If there is unexpected congestion or delay on I-75, you will hear a message telling you the location of, and reason for, the congestion or delay. When possible, the estimated duration of the delay will be provided.

To let you know when a message is available, small gray boxes with a blue stripe are installed on the sides of crossover bridges above the right shoulder. Each box has a strobe light, which, if blinking, indicates a message available on 1610 AM. These boxes and lights can be difficult to locate and you may not spot them right away (see location list). There are eight boxes for both Southbound and Northbound I-75 between 12 Mile and Downtown Detroit (16 total). If the lights are not blinking, there is no traffic-related message available. However, you may tune to 1610 AM to check for messages at any time, regardless of blinking lights. If there is no known unexpected congestion or delay, you will hear a message to that effect.

Sound quality depends on proximity to message transmitters: the further away your vehicle is, the poorer the quality, until the message disappears entirely. In some instances, messages may overlap.

Traffic information is available for the following times and locations:

- Monday through Friday
- 6:30-9:00 am (to downtown) and 3:00-6:00 pm (from downtown)
- Information is available for I-75 between 12 Mile and downtown Detroit

If you have questions about the system, please call the University of Michigan at (734) 764-4333.
If you have problems with the vehicle itself, please call l-800-CHEV-USA.

Welcome to your DIRECT Project vehicle. You will experience the following system:

CELLULAR TELEPHONE

Your vehicle is equipped with a Cellular Telephone. This telephone is installed in the vehicle and cannot be removed. The cellular telephone can be used as a standard telephone, or with "hands-free" operation. This telephone is specifically programmed to dial out only two numbers: the DIRECT traffic information service and 9 11. To call for traffic information, press the upper left button and then press send. At the completion of a call press end. It is not possible to receive incoming calls on this telephone. To dial 9 11, press and hold 1.

You are welcome to call for information anytime before, or during, your trip. When you call, you will hear a message asking you for which freeway you wish to receive current traffic information. You can interrupt the message at any time with the route you want, i.e. press 75 for I-75. If there is unexpected congestion or delay on I-75, you will hear a message telling you the location of, and reason for, the congestion or delay. When possible, the estimated duration of the delay will be provided. If there is no known unexpected congestion or delay, you will hear a message to that effect.

Traffic information is available for the following times and locations:

- Monday through Friday
- 6:30-9:00 am (to downtown) and 3:00-6:00 pm (from downtown)
- Information is available for I-75 between 12 Mile and downtown Detroit

If you have questions about the system, please call the University of Michigan at (734) 764-4333.
If you have problems with the vehicle itself, please call l-800-CHEV-USA.

Welcome to your DIRECT Project vehicle. You will experience the following system:

RADIO BROADCAST DATA SYSTEM (RBDS)

The radio in this vehicle is specially designed to receive traffic messages broadcast over an FM sub-carrier. For this project, a sub-carrier from WDTR (90.9 FM) is being used. If there is unexpected congestion or delay on I-75, a message will be sent to your vehicle. This message will automatically interrupt the vehicle entertainment system, which must be on to receive messages (there is no need to tune to WDTR or any other station; in fact you cannot listen to WDTR if you wish to receive automatic interrupts). The message will tell you the location of, and reason for, the congestion or delay. When possible, the estimated duration of the delay will be provided.

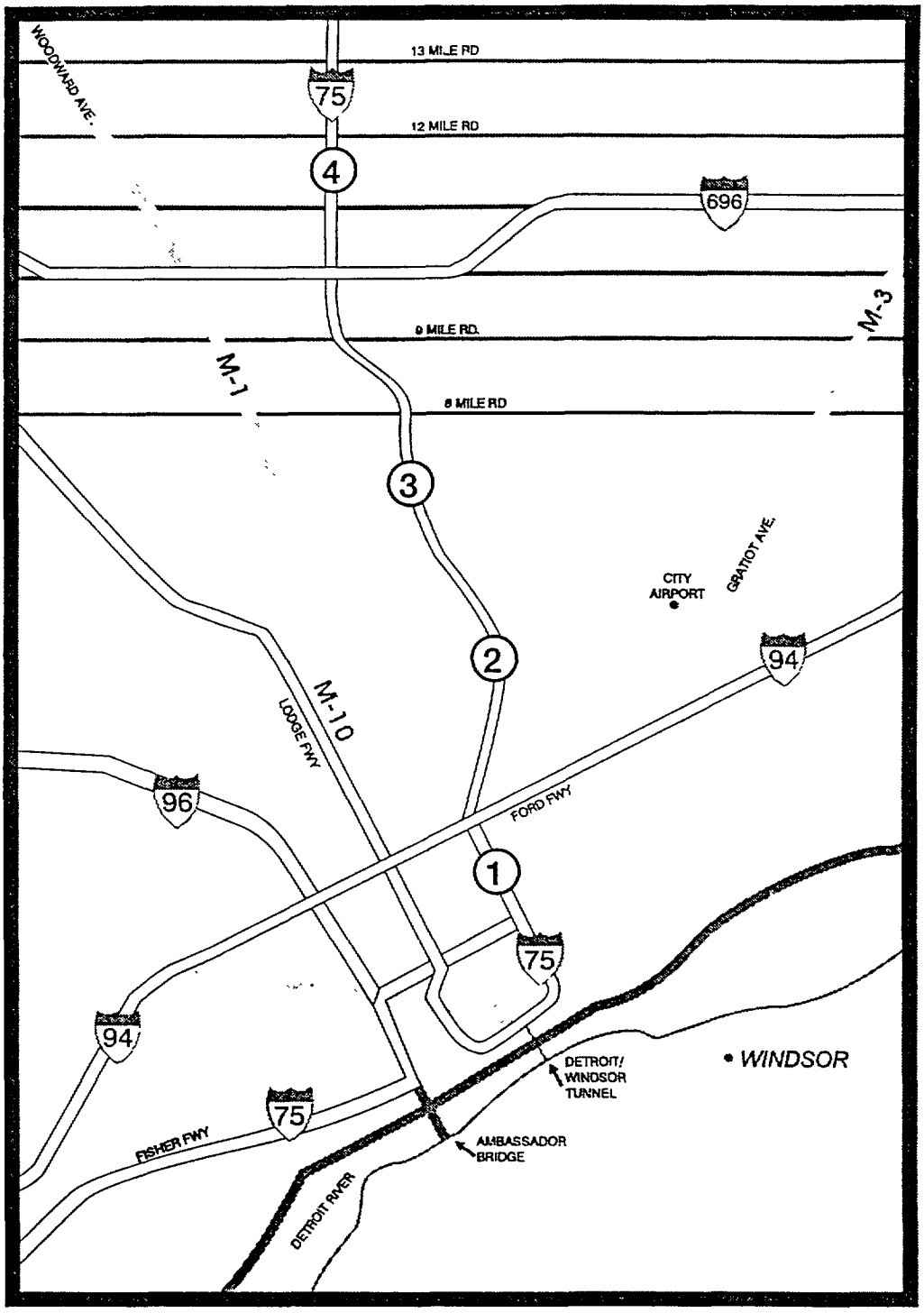
Because an active message will continue to interrupt your entertainment system while you are in the broadcast region, the vehicle is equipped with an "enable/disable" switch. This switch is located in a small white box to the left of the steering wheel. If you do not wish to receive the same message multiple times, you can turn RBDS off by flipping the switch to "disable." To receive automatic interrupts again during a trip you will have to return it to "enable." RBDS is automatically enabled whenever you start the vehicle. Basically, the green light on the white box is on when RBDS is enabled. Every Monday morning a test message will be sent out, to ensure that the system is working. If you do not receive test messages, contact the University of Michigan.

Traffic information is available for the following times and locations:

- Monday through Friday
- 6:30-9:00 am (to downtown) and 3:00-6:00 pm (from downtown)
- Information is available for I-75 between 12 Mile and downtown Detroit

you have questions about the system, please call the University of Michigan at (734) 764-4333. If you have problems with the vehicle itself, please call l-800-CHEV-USA.

DIRECT
Automatic Highway Advisory Radio Transmitter Locations



KEY

(#) Transmitter

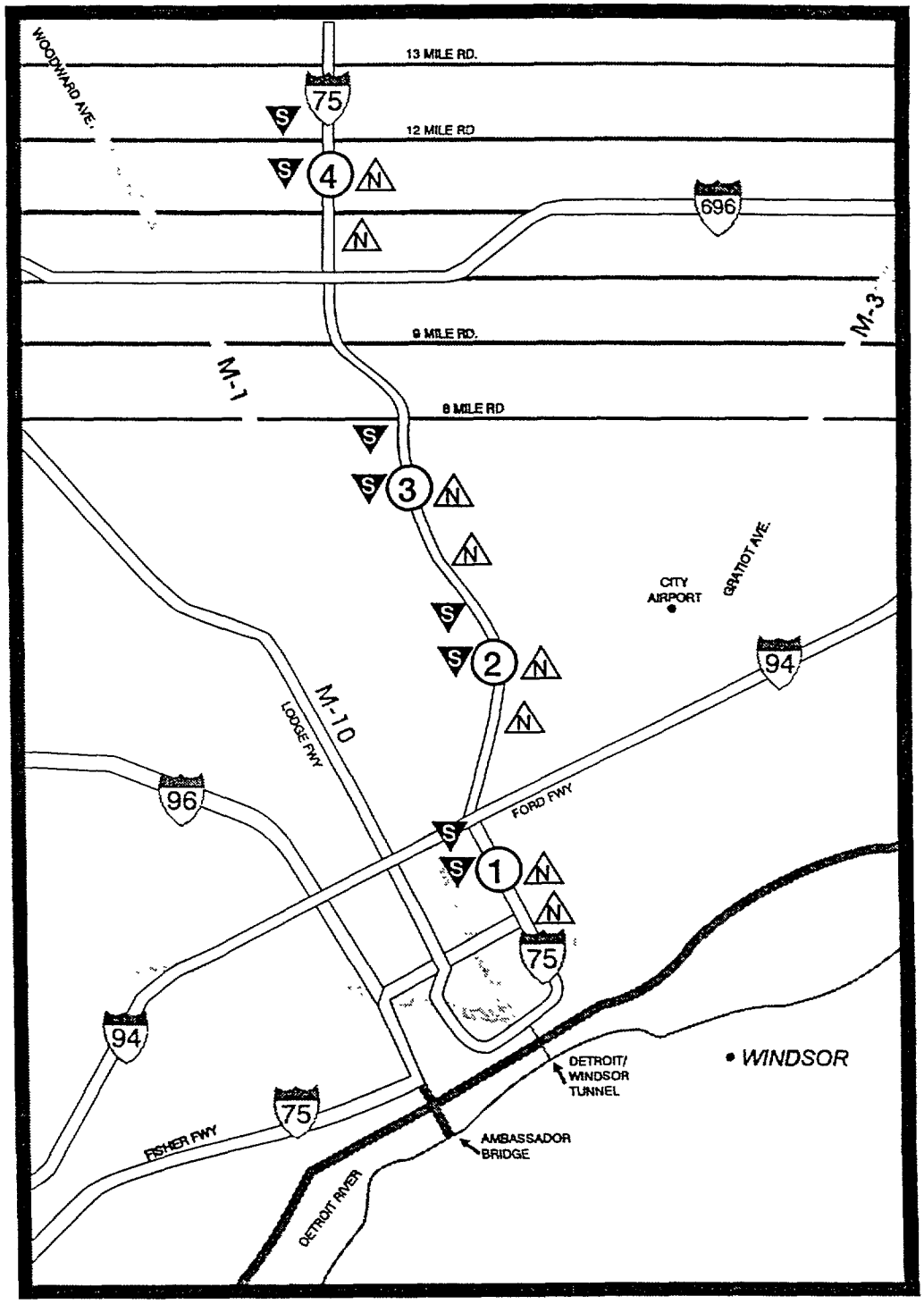
(1) Canfield

(2) Westminster

(3) Margaret

(4) Gardenia

DIRECT
Highway Advisory Radio
Transmitter & Light Boxes



KEY

- (#) Transmitter
- N North Bound Light Boxes
- S South Bound Light Boxes

- (1) Canfield
- (2) Westminster
- (3) Margaret
- (4) Gardenia

Highway Advisory Radio (HAR) Light Boxes
LOCATIONS

Northbound		
LOCATION	LOOK FOR:	NOTE
Wilkins Bridge	Before Exit 52	On bridge
Canfield Bridge	Before Exit 53A	On bridge
Clay Bridge	After Exit 54	On bridge
Holbrook	After Exit 55	On bridge
S. of McNichols	At Exit 57	On sign truss
Nevada Bridge	After Exit 57	On bridge
Lincoln Bridge	Before Exit 62	On bridge
Gardenia Bridge	Before Exit 63	On bridge

Southbound		
LOCATION	LOOK FOR:	NOTE
Canfield Bridge	Before Exit 52	On bridge
Ferry Bridge	After Exit 53B	On bridge
Holbrook	Before Exit 53	On bridge
Commor Bridge	Before Exit 55	On bridge
Greendale Ped. Bridge	After Exit 58	On pedestrian bridge
North 7 Mile Xover	After Exit 58	On bridge
Gardenia Bridge	Before Exit 62	On bridge
N. of 12 Mile Rd.	At Exit 63	On sign truss

STATE OF MICHIGAN

TRANSPORTATION COMMISSION
Barton W. LaBelle
Richard T. White
Robert M. Andrews
Jack L. Gingrass
John C. Kennedy
Irving J. Rubi

JOHN ENGLER GOVERNOR
DEPARTMENT OF TRANSPORTATION
MICHIGAN INTELLIGENT TRANSPORTATION SYSTEMS CENTER 1050 SIXTH STREET OETROIT. MICHIGAN 48226
PHONE: (313) 256-9800 (Voice) FAX: (313) 2569036
ROBERT A. WELKE. DIRECTOR

August 15, 1996

To: Volunteer Drivers of DIRECT vehicles

From: Ross J. Bremer

Subject: Instructions for exterior washing of DIRECT vehicles

If you wish to wash your DIRECT vehicle during the time it is assigned to you. please take the following precautions to avoid damaging the delicate electronic equipment.

1. If possible hand wash the vehicle. The department gets them washed at Dr. Detroit at 292 Chene Street, phone no. (3 13) 392-0037. Advance appointments are necessary and the cost for interior and exterior cleaning is $15.00.

2. If you choose to use a mechanical wash please unscrew all antennas and place the the GPS sensor (the white “hockey puck” on the trunk Iid) in the trunk. After washing the vehicle replace all antennas.

Ross Bremer, P-E.
Manager .
Detroit Freeway Operations Unit-MITSC

RJB:RC .

CONTENTS

CUSTOMER TIPS

How To Enjoy FM Stereo

Tuning to FM Stations: The best FM fidelity will be obtained from stations within a 10-40 mile range. Beyond that "noise" or "flutter" may begin to appear due to the "line of sight" range limitations of FM signals.

SOLUTION: Reduce treble (𝄞) response by moving the treble control down in fringe areas, or use RDS Alternate Frequency mode.

Sources Of Radio Interference

A. Buildings/Geography: Tall buildings or hills may cause "shadows" or cancellation of FM signals (This is similar to the "ghost" or "flutter" effect seen on television sometimes when airplanes are flying in the vicinity). It will sound like a "pop" or momentary "hiss."

SOLUTION: Reduce the treble (𝄞) to a lower volume.

B. Interference from Another Station: Although the circuits in Delco Electronics receivers are the most advanced available, there are rare instances where a station being listened to will experience interference by another station. This only happens when the stations are on almost the same frequency and certain geographical criteria are present.

SOLUTION: Select another station or switch to tape.

Note: For further information on FM and FM reception, see "FM Facts in Brief"

How To Enjoy AM

Reception Characteristics
AM does not have the flutter characteristics of FM (caused by tall buildings, hills, etc.) However, it is subject to interference from power lines, neon signs, atmospheric conditions, and unwanted stations.

TAPES & TAPE PLAYER CARE

The head in the cassette tape player can pick up dirt or tape deposits each time a cassette is played. The result is low or "muddy" sound from one or both channels, as if the treble tone control were turned all the way down. To prevent this, you should periodically clean the head with a commercially available cleaning cassette. (GM P/N 12344600 has been developed for tape head cleaning - see your GM Parts Distributor.)

As preventive maintenance, clean the head every 30 hours or less of operation. If you wait until the head becomes very dirty (noticeably poor sound), it may not be possible to remove all deposits with a simple cleaning cassette. Further, the number one cause of cassette players "eating tapes" is that the mechanism is dirty.

Store cassettes away from extreme heat or direct sunlight. Protect the open ends from dirt or damage; store them in their original cases or other protective cases.

For best results, 120 minute tapes are not recommended. When leaving the car, cassettes may be left in the tape player because tapes are internally protected

TO PLAY AS A NORMAL RADIO

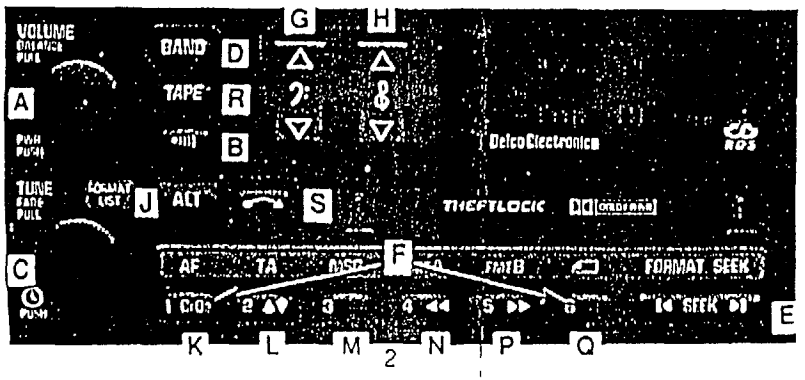
VOLUME (A) - The upper knob does these four things

1. **PWR** - To turn the radio on, push the PWR knob
2. **VOLUME** - The VOLUME knob increases and decreases volume when it is rotated CW or CCW Relative volume level is graphically displayed *while turning this knob*
3. **MUTE** - To Mute the radio or tape player, rotate the **VOLUME** knob CCW - display will indicate **Volume Mute** momentarily
4. **BALANCE** - The control behind the upper knob allows you to **BALANCE** the sound between the right and left speakers *Pull knob out to* adjust Rotate either CW or CCW for best **BALANCE** Note the mid point has a factory-set detent Push the knob back in to return to **VOLUME.**

LOUDNESS (B) - Press the LOUDNESS button to toggle Loudness off and on Note the display Also note that the effect of Loudness will be more evident at maximum Bass and Treble settings than at minimum

SCV Speed-Compensated Volume (B) - *When the vehicle provides* a vehicle speed signal to the radio, pressing the LOUDNESS button activates the SCV function of the radio to compensate for the increase of ambient noise as speed increases After pressing the LOUDNESS button, the display will show the current status - either SCV on or SCV off Pressing the LOUDNESS button again will change the status, eg, SCV on to SCV off To adjust for more or less compensation, merely adjust the volume control The easiest way to determine the desired amount of compensation is to use the volume knob to adjust the radio volume with the vehicle stopped After cruising speed has been reached press the LOUDNESS button and use the volume knob to adjust the radio volume to the desired level The radio will now maintain the desired volume level regardless of speed

You may want to change the amount of compensation for different conditions, such as windows open or closed rough or smooth road, etc To change the amount of compensation for different conditions, repeat the procedure above After a five second time-out the adjustment will be stored



• • • • RDS, AM/FMS CASS • • • •

TUNE (C) - Turn the lower knob to TUNE radio stations The TUNE knob increases and decreases station frequency.

FADE (C) - Pull the **TUNE** knob out to **FADE** the sound between the front and rear speakers Right rotation will favor the front, while left rotation favors the rear Adjust for best relative sound Note the midpoint has a factory-set detent Push the knob back in to return to **TUNE**

Clock (C) - To set the clock, just

- Push the **TUNE** knob and hold for 3-4 seconds until the display shows **Set Time**
- Rotate the **TUNE** knob CW or CCW to set the correct hour
- Press the **TUNE** knob and note that the minute digits are blinking
- Rotate the **TUNE** knob until the correct minutes are showing After five seconds the new time setting will be remembered and the radio will revert to the previous functionality
- Time of day can be displayed even when the ignition is off simply by pressing the TUNE button

BAND (D) - Push **BAND** to get **AM**, **F1**, or **F2** (Notice the graphic display)

SEEK (E) - Press the **SEEK** ▶I button to cause the receiver to seek the next higher listenable station Press **SEEK** I◀ and the radio will go to the next lower station

SCAN (E) - Scan is initiated by pressing and holding the **SEEK** button for two seconds The radio will continue to Scan stations every few seconds until you press SEEK again To Scan stations higher on the band, press the right end of the **SEEK** button and hold it for two seconds. **Scan** will appear in the display when active To Scan stations lower on the band, press the left end of the **SEEK** button and hold it for two seconds **Scan** will appear in the display when active

Radio Presets (F) - The six pushbuttons let you return to favorite stations You can set the pushbuttons for up to eighteen favorite stations (6 AM 6 F1 and 6 F2) Just

- Select a band and a frequency (use either **TUNE** or **SEEK**)
- Press and hold any pushbutton (F) to store the station, when stored, the display will show the frequency as well as **Preset** and the number of the button that you pressed
- Repeat for each of the pushbuttons and each band as you desire
- Whenever you press that button on that band again the radio will be tuned to that stored station

Bass (G) ♪ ▲ adjusts the bass level up and ♪ ▼ adjusts the bass level down Observe movement in the graphic display Press the center of the control to get the factory preset midpoint

Treble (H) - 𝄞 ▲ adjusts the treble level up and 𝄞 ▼ adjusts the treble level down Observe movement in the graphic display Press the center of the control to get the factory preset midpoint

TO PLAY AS AN RDS RADIO

What is RDS Mode?

RDS stands for Radio Data System, a system that encodes digital information on the FM station's regular audio signal This information is used to make the receiver an "intelligent" receiver

With an *RDS* receiver, you can

1 Seek programs by 25 different formats· News, Talk, Country, etc
2 Display station call letters or slogan
3 Have a Traffic Announcement interrupt either the tape, CD or radio audio
4 Have the radio switch automatically between identical programs (simulcast or translators).
5 Give the user other useful information

EMERGENCY

While tuned to an RDS station the radio automatically interrupts any kind of signal to bring you Emergency broadcasts ALERT! will be shown on the second line of the display. The audio level for Emergency broadcasts is factory preset When the Emergency system is being tested by the radio station, TEST will be shown in the bottom line of the display

RDS Mode Operation

To enter the *RDS* mode, press the ALT button (J). The RDS mode has a 20-second time-out and is indicated by "Alt Func" flashing on the display To exit RDS mode before the 20-second timeout, simply press the ALT button again

Note: In the *RDS* mode, the pushbutton functions are reassigned to the gray label on the radio faceplate above the preset buttons (F)

PAGE (Q) · Press ALT, then press PAGE one time to recall the frequency of the currently tuned station Press PAGE a second time to recall the station format

Alternate Frequency AF (K) · The radio is constantly checking for an identical (PI) Program Identification code being broadcast on an Alternate Frequency. The radio compares the signal strength of station 1 with 2 and when 2's signal strength is greater, the radio automatically switches over to station 2

AF will appear on the display, when the radio is tuned to a station that offers this service and you have selected the Reject Variants Accept Variants, and AF Check Off

Press ALT to access the *RDS* mode (Alt Func is flashing) Press AF to toggle between Accept Variants, Reject Variants and AF Check Off

Reject Variants · The radio will not change to an alternate frequency unless the program material is identical to the original

Accept Variants · The radio will change to an alternate frequency when a current station is available that is broadcasting similar but perhaps not identical program material

AF Check Off · The radio will not change to an alternate frequency

RDS, AM/FMS CASS

TA Traffic Announcement (L) · If the display annunciator shows TP, traffic messages are broadcast from time to time You can select whether or not you want to listen to Traffic Announcements by pushing the TA button To enable the Traffic Announcement feature, press ALT then TA until Traffic ON is displayed The TA annunciator will now be illuminated If a traffic message is generated by the radio station, the radio/tape/CD will stop playing and the audio will increase in volume to a preset level until the message is complete You can adjust TA volume level up or down as follows·

- Press ALT
- Hold the TA button down until TA Vol and bars appear in the graphic display
- Adjust the VOLUME control to the desired level After a five-second time-out the setting will be stored

Two Methods of Seeking On Program Type

First Method FORMAT SEEK/SCAN

1 Press ALT
2 Rotate the FORMAT LIST knob (C) to select one of 25 different types of program formats The display shows your selection e g Sports
3 Press FORMAT SEEK (E) (either end of button) Display shows Seeking (flashing) and Sports It will stop on a Sports station if one with sufficient signal strength is available (Otherwise it will return to the last tuned frequency.) If dissatisfied with that station, press the FORMAT SEEK button again before the 20-second timeout reverts the radio to non-*RDS* mode

Note: To seek another station with the same format as the currently tuned station skip step 2

Second Method FMT A or B

RDS also allows storing a favorite format type on either of the FMT A (N) or B (P) buttons

1 Repeat steps 1 and 2 above
2 Now press FMT A button (N) and hold it The radio will mute until the display changes and the station audio returns If you selected News, for instance, the display will show.

Format A
News

3 Repeat this procedure for a different favorite format on the FMT B button (P)
4 To seek using one of the preset formats press ALT and then FMT A or FMT B

Note, There are three special formats that can be used with the format seek function They are

1 Any Type · Used to seek any type of RDS station
2 TrafficP · Used to seek a station that sends traffic messages
3 TrafficA · Used to seek a station that has a traffic announcement in progress

MSG (M) · Some RDS stations broadcast a text message such as artist and song title If the MSG annunciator is illuminated then a message is available for viewing Press ALT and the MSG button up to four times to scroll through the message

RDS Time Set · To enable the clock to automatically update time, or make sure the time shown is correct, enable

CT (Clock Time) as follows:

1 Press ALT
2 Press and hold the TUNE knob (C) until the display shows CT off *(If CT off is shown, press the TUNE knob once to show CT on)*
3 Adjust the TUNE knob until the correct time zone for your area is displayed The radio will automatically update the clock when tuned to an RDS station NOTE: Not all RDS stations transmit this information

Enhanced Other Network (EON) - EON information allows the receiver to update the radio's internal Alternate Frequency (AF) list of stations not currently tuned. This feature also allows the receiver to react to Traffic Announcements (TA) on other stations or networks The EON feature works automatically

TO PLAY A CASSETTE

Your tape player is built to work best with tapes that are 30 to 45 minutes long on each side. Tapes longer than that are so thin, they may not work well in this player They also can break easily and can get stuck in the tape mechanism

With the radio on, push a tape into the cassette slot (tape side goes in first) Once the tape is playing, use the upper and lower knobs for VOLume BALance and FADE just as you did for radio The arrow in the graphic display beside the word Tape shows which side of the tape is being played

This audio system has automatic DOLBY B NR* to reduce background noise on Dolby encoded tapes Dolby* Noise Reduction is manufactured under license from Dolby Laboratories Licensing Corporation Dolby* and the ⊡ symbol are trademarks of Dolby Laboratories Licensing Corporation

CrO2 (K) - This button sets the tape bias When playing high bias chrome or metal tapes, press the CrO2 button (K) to turn the CrO2 display on When playing standard bias tapes, press again to turn the feature off CrO2 on or off appears on the display

Program (L) - To go from one side of the tape to the other, press push-button (L) labeled: ⬇ ⬆

Reverse (N) - To reverse tape rapidly, press ◄◄ (N) and the tape will rapidly reverse to the beginning of the tape or until you press the ◄◄ or ▼ ▲ or TAPE (R) button again lightly The radio will play during reverse operation

Fast Forward (P) - To advance tape rapidly, press ►► (P) and the tape will rapidly go forward to the end of the tape or until you press the ►► or ▼ ▲ or TAPE (R) button again lightly The radio will play during forward operation

PREV (E) - To hear a passage on the tape that has just played, press SEEK I◄ (E) and the tape will back up and stop at either the first four second quiet spot in the tape or when you press I◄ or ▼ ▲ or TAPE (R) button again lightly

NEXT (E) - To go immediately to the next selection on the tape, press SEEK ►I (E) A four second quiet interval must be present for the tape to stop Tape also stops if you press

►I or ▼ ▲ or TAPE (R) button again lightly.

Stop/Play (D) - To switch from tape to radio immediately, press the BAND button, (D), and the radio will resume playing the station to which it was tuned to when you inserted a tape Pressing TAPE (R) will allow the tape to resume where it stopped

EJECT (S)
To remove the tape, press the EJECT button Tapes also may be ejected when the radio is off

THEFTLOCK®

The THEFTLOCK® feature can be used or ignored If ignored the system plays normally If it is used, your radio won't be useable if it is ever stolen If stolen and THEFTLOCK® has been activated it will go to Locked mode any time battery power is removed Until an unlock code is entered it will not turn on

Activating THEFTLOCK®

The instructions below tell you how to enter a secret code into the system If your car loses battery power for any reason you must unlock the system with the secret code before the radio will turn on

1 Write down any number from 0000 to 9999 and keep it in a safe place
2 Turn the ignition to the "Accessory or the "RUN" position
3 Turn the radio off
4 Press the 1 and 4 buttons together Hold them down until Not Secure appears in the display You are ready to enter your secret code

Note: If you allow more than 15 seconds to elapse between steps, the radio automatically reverts to time display and you must start the procedure over at step 4

5 Press the TUNE knob and note that Set Code and the two hour digits are blinking
6 Dial in the first two digits of your security code by rotating the TUNE knob CW or CCW
7 Press the TUNE knob and note that now the two minutes digits are blinking
8 Dial in the last two digits of your security code by rotating the TUNE knob CW or CCW
9 Press the BAND button after you have confirmed that the code matches the one you wrote down earlier Set Code Repeat appears in the display indicating that you need to repeat steps 5-8
10 Repeat steps 5 8 and press the BAND button, this time the display will show Secure

STATE OF MICHIGAN

TRANSPORTATION COMMISSION
Barton w. LaBelle
Richard T. White
Robert M. Andrews
Jack L Gingrass
John C. Kennedy
Betty Jean Amey

JOHN ENGLER, GOVERNOR
DEPARTMENT OF TRANSPORTATION
MICHIGAN INTELLIGENT TRANSPORTATION SYSTEMS CENTER 1050 SIXTH STREET DETROIT, MICHIGAN 46226
PHONE: (313) 26&9800 (Voice) FAX: (313) 256-9036
ROBERT A. WELKE, DIRECTOR

August l2, 1996

To Whom It May Concern:

Subject: 1996 Lumina State License No. MNQ122 DMB Tag: **09-6160**
VIN **2GlWL52M7T1156295**

The above vehicle is owned by Wheels Inc. and leased to the State of Michigan. As with all State of Michigan vehicles it is self insured. It is currently being used in an experiment and is driven by a private citizen: _____.

This person is authorized by the State of Michigan to operate this vehicle. For further information, please contact Mr. Thomas Mullin or Ross Bremer at 313-256-9800.

Very truly yours,

Thomas D. Mullin, P.E.
Intelligent Transportation Systems Engineer

TDM:br

DIRECT Participation Guidelines

This document provides guidelines for participation in the DIRECT project. DIRECT (Driver Information Radio using Experimental Communication Technologies) is investigating low cost, innovative approaches that deliver traffic information to motorists while they are driving. The lessons learned from DIRECT will help improve traffic information in metropolitan Detroit.

Definitions:

(1) Authorized Participant:	A person who has signed a DIRECT Participation Agreement and has subsequently been assigned a DIRECT vehicle.
(2) DIRECT Vehicle:	A car operated by the Michigan Department of Transportation (MDOT) and equipped for use in the DIRECT project. A DIRECT vehicle will be provided to authorized participants for use during the 8 week period of the DIRECT project.
(3) DIRECT Equipment:	Communications and data recording devices installed in the DIRECT vehicle in support of the DIRECT project.

The authorized participant (you) must comply with the following guidelines:

DIRECT Vehicle Use

1. The authorized participant will have use of a DIRECT vehicle for 8 weeks, unless otherwise stated by a DIRECT project representative. The authorized participant must return the DIRECT vehicle at the end of the time specified.
2. Only the authorized participant may drive the DIRECT vehicle. NO OTHER DRIVERS MAY DRIVE THE DIRECT VEHICLE.
3. The DIRECT vehicle shall be used only for trips to and from the work site. Trips not in conjunction with commuting to and from the work site are unauthorized and shall not take place. Occasional short trips within the metropolitan Detroit area made in conjunction with commuting shall be permitted. For example: occasional business meetings, lunch, class, or professional association meeting.
4. Individuals other than the authorized participant may travel as passengers in the DIRECT vehicle only if the authorized participant is en-route to or from his/her work site within the DIRECT test area.
5. If necessary, the authorized participant agrees to allow DIRECT project staff to inspect the DIRECT vehicle and equipment at a mutually agreeable time and location.
6. The authorized participant must carry proof of his/her insurance in the vehicle. A copy of the authorized policy should be placed with the DIRECT vehicle's registration for the duration of test period.

Participant Responsibilities

1. The authorized participant is responsible for purchasing gasoline and returning the vehicle with a full tank of gasoline.
2. The authorized participant is responsible for filling out the requisite surveys and possibly participate in an interview.
3. The authorized participant is responsible for all traffic or parking violations and related fines associated with the use of the DIRECT vehicle.
4. No physical changes shall take place on or within the vehicle, with the exception of parking stickers, which can be displayed on the windshield.
5. No equipment shall be removed from the DIRECT vehicle. Do not tamper with the in-vehicle equipment.

DIRECT Participation Guidelines, cont.

Liability

1. The authorized participant IS responsible for the cost of replacing or repairing the DIRECT vehicle or equipment if the loss or damage is due to:
   a. Wanton negligence or intentional action* on the part of the authorized participant.
   b. A non-authorized driver being allowed to drive the DIRECT vehicle.

   * Such as driving under the influence of alcohol.
2. The authorized participant is NOT responsible for the cost of replacing or repairing the DIRECT vehicle or equipment if the loss or damage is not due to wanton negligence or intentional action on the part of the authorized participant. For example:
   a. A vehicle accident when the authorized participant is driving the DIRECT vehicle.
   b. Acts of God, such as flooding, lightning, etc.
   c. Theft of the entire DIRECT vehicle (submittal of police report required).
   d. Theft of DIRECT project equipment as part of a vehicle break-in (submittal of police report required).
   e Normal wear and tear on the DIRECT vehicle and equipment.
3. In the event of an accident, state insurance covers the vehicle according to Section 2 above. The authorized participant is covered by his/her own insurance for all other damage.

Termination of Participation

1. The authorized participant must notify Ross Bremer or Tom Mullin at (3 13) 256-9800 if any of the following conditions occur:
   a. The authorized participant no longer commutes to work in the official test area (I-75 to downtown Detroit), no longer commutes five days a week, or no longer commutes during the 6-9 am period.
   b. The authorized participant falls victim to a medical condition that would make him/her a less reliable driver.
   c. The authorized participant, or someone in his/her household, is convicted of a serious traffic offense-such as driving under the influence, or leaving the scene of an accident.

   Based upon the nature and severity of the condition, a DIRECT project representative will decide whether the authorized participant can continue to use the DIRECT vehicle.
2. Improper use of the DIRECT vehicle, public complaints, or violations of these guidelines will be promptly investigated and appropriate corrective action will be taken. Such action may include removal of an assigned vehicle and termination of participation in the DIRECT project.
3. Either a DIRECT project representative or the authorized participant may terminate the agreement for any reason by giving written notice to the other party.

DIRECT Participation Guidelines, cont.

General

1 The authorized participant must be in possession of a valid Michigan drivers license at all times while driving the DIRECT vehicle.

2. The authorized participant must maintain automobile insurance policy coverage that meets the minimum Michigan requirement during use of the DIRECT vehicle.

3. All applicable laws and regulations must be observed when driving the DIRECT vehicle.

4. Seat belts must be worn by all occupants during travel in the DIRECT vehicle.

5. The DIRECT vehicle and equipment must be operated in a safe manner.

6. The DIRECT vehicle is to be smoke-free.

7. In accordance with applicable laws, alcoholic beverages and controlled substances are not to be consumed or transported in the DIRECT vehicle.

8. The DIRECT vehicle belongs to the state of Michigan. At the request of MDOT the vehicle is to be returned to the MITSC.

9. Assistance to stranded motorists may be provided at the discretion of the driver but caution should be exercised. Hitchhikers are not to be provided transportation.

10. Trailers shall not be towed with the DIRECT vehicle.

Important Contacts and Phone Numbers

If the DIRECT vehicle is involved in an accident:

(1) Contact the police.
(2) Contact Ross Bremer or Tom Mullin of MDOT at (3 13) 256-9800.

If the DIRECT vehicle requires repair:

(3) Call l-800~CHEV-USA (sticker on left rear window).
(4) Contact Ross Bremer or Tom Mullin of MDOT at (313) 256-9800.

The vehicle should not require routine maintenance during the period of your assignment.

If the DIRECT equipment appears to be malfunctioning:

Remember that this is a test project and there will be an occasional glitch. If you experience a problem with the vehicle's equipment or systems, contact Ross Bremer of MDOT at (3 13) 256-9800. He will answer your questions and, if necessary, forward the problem to the appropriate MDOT technicians.

If you have questions concerning the evaluation, contact Becky Richeson at the University of Michigan at (734) 763-75 18 or richeson@eecs.umich.edu.

DIRECT Participation Agreement

I understand that DIRECT (Driver Information Radio using Experimental Communication Technologies) is an operational field test to investigate low cost, innovative approaches that communicate traffic information to motorists while they are driving. My participation involves driving an MDOT-owned vehicle for eight weeks during my regular commute to work. This vehicle is equipped with a traffic information system, a vehicle-tracking system, and recording devices for driver actions.

I understand that I will be asked to respond to questions (written and/or verbal) periodically during this study to determine my opinions about, and usage of, the information and systems provided. I understand that I may be asked to participate in a phone or personal interview during or soon after the eight week driving period. I understand that I do not have to answer any questions I do not wish to answer, or any questions that make me feel uncomfortable.

I understand that my operation of the DIRECT equipment and the location of the DIRECT vehicle will be recorded for the purposes of analysis and evaluation.

I understand that any personally identifying information, including use of the DIRECT equipment and my travel patterns, and all responses that I provide via surveys will be kept strictly confidential and that I will remain anonymous in any public report, except so far as such information is of necessity released in accordance with the Michigan Freedom of Information Act.

I understand that I should at no time do anything unsafe while driving the car. Further, I understand that the operation of the traffic information system has been explained to me and demonstrated from a driver perspective and that the risks of participation are those associated with operating a motor vehicle.

I have received a copy of, have read, understand, and agree to comply with all directives in the "DIRECT Participation Guidelines" and I have read, understand, and agree to comply with the information presented above. I understand that my participation in this study is completely voluntary and that I may withdraw at any time without penalty.

Print name: _____

Signature: _____

Date: _____

Driver Notebook Instructions

A small notebook was provided in each vehicle for subject to record any comments that they might wish to make. The cover of the notebook had the following instructions affixed to it.

DIRECT NOTES

The purpose of this notebook is to provide a way for you to respond to this study in a timely and meaningful manner. Rather than wait to share your experiences on a survey towards the end of your participation, this notebook encourages you to record your thoughts as they occur to you, throughout your participation in the study.

We are particularly interested in what you do in response to unexpected congestion or delay. If you hear about, or encounter, **such** congestion or delay, please answer the following questions:

- What was the approximate time and date?
- Was it during your commute from home to work, or work to home?
- Do you know why there was congestion? How?
- Did you hear about the congestion before you encountered it? How?
- Were you satisfied with the traffic information you received? Why or why not?
- Did you have enough time to respond to the information (e.g. get off the freeway)?
- Did you have sufficient opportunities to change your route after receiving information?
- Did you change your route based on information you received? Why or why not?
    a. If you did **not** change your route, were you satisfied with that decision? **Why** or why not?
    b. If you **did** change your route, were you satisfied with that decision? Why or why not?
- Did you encounter congestion and then decide **to** change your route? Why or why not?

Feel free to use this notebook to record other thoughts you have about your experience.

Please date each entry.

Thank you and we hope you enjoy your participation!

DIRECT

Driver Information Radio using Experimental Communication Technologies

DATE

University of Michigan
ITS Laboratory
2609 Draper Dr., 200 EPB
Ann Arbor, MI 48109-2101
ph: (734) 764-4333
FAX: (734) 763-1674

SUBJECT NAME
SUBJECT STREET ADDRESS
SUBJECT CITY, STATE, ZIP CODE

Dear SUBJECT NAME:

As you enter the final two weeks of your participation in the DIRECT project, we remind you of the plan for returning the test vehicles, and enclose a survey for you to fill out and bring completed when you return the vehicle. Here are the details:

Date:	Return your DIRECT vehicle on DATE between 9:00 and 10:00 AM.
Location:	Michigan Intelligent Transportation Systems (MITS) Center in downtown Detroit. A map is enclosed. Remember to arrange for a ride home.
What to bring:	(1) Your completed survey (2) Your DIRECT notebook (3) Your laminated instruction card (if you have one)
What to expect:	If the vehicle is in good condition, and you have brought the above materials, the drop-off should take 10 minutes.

Finally, we will be conducting exit interviews during the weeks following your return of the vehicle. Anticipate a phone call from the me between DATES for a brief (10-15 minute) interview.

We thank you in advance for your participation in DIRECT. The results of this study will help decision-makers select ways to improve traffic information in southeast Michigan.

Sincerely,

Rebecca P, Richeson
DIRECT Evaluation Manager

enclosures

DIRECT

Driver Information Radio using Experimental Communication Technologies

DATE

University of Michigan
ITS Laboratory
2609 Draper Dr., 200 EPB
Ann Arbor, MI 48109-2101
ph: (734) 764-4333
FAX: (734) 763-1674

SUBJECT NAME
SUBJECT STREET ADDRESS
SUBJECT CITY, STATE, ZIP CODE

Dear SUBJECT NAME:

Now that all the vehicles have been returned, surveys completed, and interviews conducted, I would like to take the opportunity to once again thank you for your participation in DIRECT. All the partners on the project appreciate your enthusiasm and cooperation, as well as your patience with ongoing kinks in the system.

As you learned at the orientation, the results of, and lessons learned from, this study will help decision-makers select the best combination of methods to deliver traffic information to motorists in Southeast Michigan. A synopsis of study findings will be sent out to all participants at the time of project completion (late 1997/early 1998).

Again. thank you for your assistance with this effort. And if you have not yet spoken to someone from the University of Michigan via an interview please set aside 15 minutes of your time to do so.

Sincerely,

Rebecca P. Richeson
DIRECT Evaluation Manager

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Appendix G: Summary of Data

This appendix presents a summary of subject response to the Before and After Questionnaires of DIRECT project. The questionnaires are presented in Appendix F. The raw response data is presented in Appendix H. The summary data here is contained in three parts:

The first two sections present subject response to each question of the Before and After Questionnaires, respectively. The exception to this is the set of questions that ask subjects to comment on the project in general. These latter questions are categorized in the third section of this appendix along with comments made during interviews and recorded in driver notebooks.

The first two sections of the appendix are in the following format. Each question is given and identified with the question number, preceded by B for Before and A for After, e.g., B24 for question number 24 from the Before questionnaire. If the question was asked twice, both in the Before and After questionnaires, then the analogous question is indicated in parentheses, e.g., B24 (A20) to indicate that Before Question number 24 was asked again as After Question number 20. Following the question, subject response is described through four pieces of information: "Valid N", "Mean", "Std Dev", and "F Prob". "Valid N" indicates the number of subjects who actually responded to the question. That is, the number of subjects who did not respond to a question, either because they were asked to skip the question because they did not meet question criteria or because they simply did not answer, have been excluded from the Valid N and their non-response does not affect the remaining three parameters. "Mean" is the arithmetic mean of subject responses and "Std Dev" is the standard deviation of the data around those means. For a few questions, the mean response has no real-world interpretation and this is so noted. The "F Prob." is the F statistic of an Analysis of Variance of the mean subject response when the data is divided into two or more categories. For example, a major goal in DIRECT is to determine whether subjects experiencing different information delivery systems (Control, AHAR, LPHAR, Phone, and RDS/SCA) responded differently to questions regarding perceived system performance, benefit, and impact on behavior. The F value can indicate this because it represents the probability that subject response in each of the categories being tested has the same underlying distribution, i.e., the likelihood that the mean subject response is the same for all groups. When the F value is high, 0.25 or greater, then the mean response of all the groups can be assumed to be the same. When the F value is low, 0.05 or less, then the mean response of (at least two of) the groups can be assumed to be different, i.e., e.g., subjects who experienced the phone system responded to a question differently than subjects who experienced the RDS/SCA system. When this is the case, then other analyses need to be done to determine which groups of subjects responded differently. No clear statement can be made about values that lie between 0.05 and 0.25, except that most scientific analyses consider an F statistic of greater than 0.05 to represent a distribution of responses that is the same among the categories tested. When the F value is represented by a "." this indicates that the calculation could not be made, usually because too little data or variance in the data existed. In plain terms, if a question has an F Prob value of greater than 0.05, then all groups of participants are generally assumed to have given essentially the same response to the question. The caveat here is that the F value is a probability, not a certainty.

Note that some of the data presented here has been revised from the cross tabulations of Appendix H. Primarily, questions with a "did not use" type of response as category 0, followed by an ordinal ranking of 1 to 5 for those who "did use", are divided here into response "a", which presents the number who did use (a reversal from the data in Appendix H, which shows the number who "did not use"), and response "b", which provides the mean for those who "did use" the system. This manipulation was done to improve clarity and so that data from subjects who "did not use" a system does not bias data from those who "did".

Subject Response to the Before Questionnaire

B1. If more than one route is available between your home and work, what factors do you consider in choosing between routes? *(check one box in each row)*

		NOT IMPORTANT					VERY IMPORTANT
1	Expected travel time on each route	❑1	❑2	❑3	❑4	❑5	❑6
2	Expected travel speed on each route						
3	Total mileage on each route..... ...						
4	Expected level of congestion on each route.....						
5	Predictability of traffic on each route.....						
6	Availability of traffic information for each route....						
7	Certainty of arrival time using each route						
8	Presence of incidents on each route						
9	Presence of construction on each route						
10	Number of train crossings on each route						
11	Special events (e.g., ball game) on each route						
12	Road type (expressway, major street, etc.) on each route						
13	Number of lanes on roads on each route						
14	Condition of road surface on each route.....						
15	Condition of each route during bad weather.....						
16	Number of turns on each route.....						
17	Number of stops on each route						
18	Level of travel safety on each route						
19	Need to run an errand on one route						
20	Level of familiarity with each route.....						
21	Scenery on each route.....						
22	Other.....						

(mean of responses from 1 to 7)

	Valid N	Mean	Std Dev	F Prob
1	173	6.3	0.95	0.1149
2	172	5.2	1.36	0.4251
3	170	3.9	1.64	0.0763
4	173	6.3	0.79	0.3313
5	171	5.7	1.12	0.1436
6	173	5.0	1.50	0.7144
7	173	5.8	1.11	0.1595
8	171	5.7	1.28	0.3693
9	170	6.2	0.95	0.9962
10	172	3.2	1.82	0.0643
11	172	4.2	1.83	0.4948
12	173	5.0	1.52	0.4650
13	173	4.5	1.53	0.2810
14	173	5.1	1.30	0.5989
15	173	5.7	1.15	0.9315
16	173	2.8	1.61	0.0121
17	172	4.3	1.68	0.1777
18	173	5.1	1.57	0.3016
19	172	4.2	1.81	0.4270
20	171	4.6	1.56	0.4545
21	173	2.2	1.42	0.8287
22	14	5.4	2.17	0.7348

B2. If you encounter unexpected delay after you start driving on your commute, what 3 factors do you consider most important in deciding whether or not to leave your usual route and take an alternate route instead? *(check 3 boxes, no more, no less)*

____ ❑1 Availability of alternate routes
____ ❑2 Familiarity with alternate routes
____ ❑3 Road type (expressway, major street, residential street) on alternate routes
____ ❑4 Distance remaining till destination
____ ❑5 Expected delay on original route
____ ❑6 Expected time savings if an alternate route is taken
____ ❑7 Need to make stops (e.g., errands) that can't be reached from an alternate route
____ ❑8 Importance of not being late
____ ❑9 Other

Now, please rank the 3 boxes checked in the preceding question in order of importance by writing a number from 1 to 3 on the line to the left of each of the 3 boxes checked in that question: 1 is most important, 2 is next most important, and 3 is third most important.

(mean of responses from 0 to 3; where 0 indicates item not selected)

	Valid N	Mean	Std Dev	F Prob
1	174	1.3	1.12	0.9529
2	174	0.8	1.11	0.4295
3	174	0.3	0.82	0.5803
4	174	0.7	1.15	0.8018
5	174	1.2	1.05	0.9505
6	174	1.1	1.11	0.7763
7	174	0.1	0.50	0.7540
8	174	0.6	1.02	0.3039
9	174	0.0	0.27	0.5514

B3. Which of the following best describes the usual traffic conditions on your usual route from *home to work*? *(check one)*

❑1 Stop and go traffic
❑2 Heavy traffic that flows steadily but slower than the speed limit
❑3 Heavy traffic that flows steadily and continues at the speed limit
❑4 Moderate traffic
❑5 Light traffic

(mean of responses from 1 to 5)

	Valid N	Mean	Std Dev	F Prob
	173	2.2	0.89	0.3110

B4(Al). On average, how many minutes does your usual *home-to-work* commute take?

_____minutes

(mean of responses from 1 to 5)

	Valid N	Mean	Std Dev	F Prob
	174	43.6	14.42	0.7842

B5(A2). On average, how frequently does an unexpected delay occur on your usual *home-to-work* commute? *(check one)*

❑1 5 (or more) days a week
❑2 3 or 4 days a week
❑3 1 or 2 days a week
❑4 1 day every 2 weeks
❑5 1 day a month or less

(mean of responses from 1 to 5)

	Valid N	Mean	Std Dev	F Prob
	173	3.0	0.93	0.2179

B6a(A3a). When an unexpected delay occurs on your usual *home-to-work* commute, do you usually take an alternate route to avoid the delay? *(check one)*

❑0 No ❑1 Yes

(mean of responses from 0 to 1)

	Valid N	Mean	Std Dev	F Prob
	149	0.4	0.49	0.7523

B6b(A3b). When an unexpected delay occurs on your usual *home-to-work* commute, how long, on average, is the delay? *(check one; if you usually take an alternate route to avoid delays, check how long you think the delays on your usual route might have been)*

❑1 Less than 5 minutes
❑2 5 minutes or more but less than 10 minutes
❑3 10 minutes or more but less than 15 minutes
❑4 15 minutes or more but less than 20 minutes
❑5 20 minutes or more

(mean of responses from 1 to 5)

	Valid N	Mean	Std Dev	F Prob
	174	3.3	1.03	0.9008

B7. Is your usual work-to-home route essentially the reverse of your usual *home-to-work* route? *(check one)*

❑0 No ❑1 Yes

(mean of responses from 0 to 1)

	Valid N	Mean	Std Dev	F Prob
	174	0.9	0.35	0.4682

B8. How important a role does habit play in your choice of route for your ***home-to-work*** commute? *(check one)*

❑1 Not At All Important
❑2 Not Very Important
❑3 Somewhat Important
❑4 Very Important

(mean of responses from 1 to 4)

	Valid N	Mean	Std Dev	F Prob
	174	2.1	0.89	0.6738

B9(A8). Within the area shown on the map, how familiar are you with alternate routes for your commute? *(check one box in each column)*

a. Home-to-Work Commute
- ❑1 Very Familiar
- ❑2 Somewhat Familiar
- ❑3 Not Very Familiar
- ❑4 Don't know of any

b. Work-to-Home Commute
- ❑1 Very Familiar
- ❑2 Somewhat Familiar
- ❑3 Not Very Familiar
- ❑4 Don't know of any

(mean of responses from 1 to 4)

	Valid N	Mean	Std Dev	F Prob	# who don't know of any
a	174	1.7	0.73	0.2767	3
b	172	1.7	0.70	0.1992	1

B10(A9). Within the area shown on the map, how many alternate routes do you know of for your commute? *(answer both columns: write 0 if you don't know of any routes other than your usual route, write 1 if you know* of one route *in addition to your usual route, etc.)*

a. Home-to-Work Commute _____routes b. Work-to-Home Commute _____routes

(mean of number of routes)

	Valid N	Mean	Std Dev	F Prob	# who knew of no alt rtes
a	174	2.9	1.70	0.2886	10
b	173	3.0	1.71	0.3554	6

B11(A10). How did you find out about these alternate routes for your commute? *(check all that apply)*

- ❑0 Don't know of any alternate routes (only know my usual route)
- ❑1 From a relative, friend, or coworker, etc.
- ❑2 Through personal experience over a long time
- ❑3 By driving different routes to see where they went
- ❑4 By reading a map
- ❑5 Heard/saw them suggested in a traffic report
- ❑6 Other

(mean of responses 0 = don't know any and 1 = know at least one)

	Valid N	Mean	Std Dev	F Prob	# who don't know any	# know at least one
0	174	1.0	0.18	0.0547	6	168

(mean of responses from 1 to 7)

	Valid N	Mean	Std Dev	F Prob
1	168	0.4	0.48	0.0319
2	168	0.8	0.43	0.7477
3	168	0.4	0.49	0.8943
4	168	0.3	0.47	0.4317
5	168	0.1	0.29	0.8346
6	168	0.0	0.13	0.2590

B12(A11). Within the area shown on the map, how willing are you to use alternate routes (routes other than your usual route) for your commute? *(check one box in each column)*

a. Home-to-Work Commute
❑$_1$ Very Willing ❑$_3$ Not Very Willing
❑$_2$ Somewhat Willing ❑$_4$ Will not take

b. Work-to-Home Commute
❑$_1$ Very Willing ❑$_3$ Not Very Willing
❑$_2$ Somewhat Willing ❑$_4$ Will not take

(mean of responses from 1 to 4)

	Valid N	Mean	Std Dev	F Prob	# who knew of no alt rtes
a	174	1.7	0.74	0.4488	1
b	173	1.6	0.74	0.1154	1

B13a(A4). During your commute, what is the longest delay (beyond that normally expected) that you would tolerate before you would switch from your usual route to an alternate route? *(answer both columns)*

a. Home-to-Work Commute ___minutes b. Work-to-Home Commute ___minutes

(mean of number of minutes)

	Valid N	Mean	Std Dev	F Prob
a	149	16.3	8.56	0.8666
b	149	17.1	9.11	0.8304

B13b(A5). During your commute, how much time would you have to expect to save in order to switch from your usual route to an alternate route? *(answer both columns)*

a. Home-to-Work Commute ___minutes b. Work-to-Home Commute ___minutes

(mean of number of minutes)

	Valid N	Mean	Std Dev	F Prob
a	174	11.7	6.06	0.9538
b	174	12.8	7.15	0.8344

B14(A12). Within the area shown on the map, *how many times* did you use an alternate route for your commute in the past *8 weeks?* *(answer both columns: write 0 if you didn't use any routes other than your usual route, write I if you used one route in addition to your usual route, and so on)*

a. Home-to-Work Commute ___times b. Work-to-Home Commute ___times

(mean of number of times)

	Valid N	Mean	Std Dev	F Prob	# who knew of no alt rtes
a	173	3.1	3.99	0.8831	55
b	173	4.2	5.82	0.3445	41

B15(A13). Within the area shown on the map, how many *different* alternate routes did you use for your commute in the past *8 weeks?* *(answer both columns; write 0 if you didn't use any routes other than your usual route, write 1 if you used one route in addition to your usual route, and so on)*

a. Home-to-Work Commute _____routes b. Work-to-Home Commute _____routes

(mean of number of routes)

	Valid N	Mean	Std Dev	F Prob	# who knew of no alt rtes
a	173	1.2	1.29	0.8117	57
b	173	1.7	2.20	0.3169	43

B16(A14). If you took one or more alternate routes for your commute in the past 8 weeks, to what extent do you agree or disagree with the following statement: "In general I am satisfied with the outcome when I take an alternate route." *(check one in each column)*

a. Home-to-Work Commute

a.1 ❑$_0$ Didn't Take An Alternate Route

a.2 ❑$_1$ Strongly Disagree ❑$_4$ Somewhat Agree ❑$_2$ Somewhat Disagree ❑$_5$ Strongly Agree ❑$_3$ Neither

b. Work-to-Home Commute

b.1 ❑$_0$ Didn't Take An Alternate Route

b.2 ❑$_1$ Strongly Disagree ❑$_4$ Somewhat Agree ❑$_2$ Somewhat Disagree ❑$_5$ Strongly Agree ❑$_3$ Neither

(mean of responses 0 = didn't take and 1 did take)

	Valid N	Mean	Std Dev	F Prob	# who didn't take	# who took
a.1	169	0.7	0.45	0.5998	48	121
b.1	168	0.8	0.40	0.2098	33	135

(mean of responses from 1 to 5)

	Valid N	Mean	Std Dev	F Prob
a.2	121	3.6	1.13	0.5280
b.2	135	3.6	1.14	0.3915

B17(A15). If you took one or more alternate routes for your commute, how much time do you think you usually saved (in comparison to traveling on the original route)? *(check one in each column)*

a. Home-to-Work Commute

a.1 ❑$_0$ Didn't Take An Alternate Route

a.2 ❑$_1$ Didn't save any time (alt. rt. took longer)
❑$_2$ Saved less than 5 minutes
❑$_3$ Saved 5 mm or more but less than 10 min
❑$_4$ Saved 10 min or more but less than 15 min
❑$_5$ Saved 15 min or more but less than 20 min
❑$_6$ Saved 20 minutes or more

b. Work-to-Home Commute

b.1 ❑$_0$ Didn't Take An Alternate Route

b.2 ❑$_1$ Didn't save any time (alt. took longer)
❑$_2$ Saved less than 5 minutes
❑$_3$ Saved 5 min or more but less than 10 min
❑$_4$ Saved 10 min or more but less than 15 min
❑$_5$ Saved 15 min or more but less than 20 min
❑$_6$ Saved 20 minutes or more

(mean of responses 0 = didn't take and 1 did take)

	Valid N	Mean	Std Dev	F Prob	# who didn't take	# who took
a.1	169	0.7	0.45	0.6110	48	121
b.1	170	0.8	0.40	0.4906	34	136

(mean of responses from 1 to 5)

	Valid N	Mean	Std Dev	F Prob
a.2	121	3.3	1.45	0.6546
b.2	136	3.4	1.64	0.5582

B18. During your commute, what might make you think to listen to traffic information?
(check all that apply)

- ❑$_0$ I never listen to traffic information
- ❑$_1$ I'm in the habit of listening to traffic information
- ❑$_2$ I see that traffic is slowing and want to find out why
- ❑$_3$ I see that congestion is increasing and want to find out why
- ❑$_4$ There is a special event today and I want to know if it's affecting traffic
- ❑$_5$ There is bad weather today and I want to know if it's affecting traffic
- ❑$_6$ Someone told me that traffic was bad today
- ❑$_7$ I want to let people at my destination know if I might be late
- ❑$_8$ I've got to get somewhere and I just can't be late
- ❑$_9$ Other

(mean of responses 0 = never listen and 1 = do listen)

	Valid N	Mean	Std Dev	F Prob	# who never listen	# who do listen
0	149	1.0	0.08	0.3911	1	148

(mean of responses 0 = not selected and 1 = selected)

	Valid N	Mean	Std Dev	F Prob
1	148	0.7	0.45	0.7306
2	148	0.6	0.48	0.7929
3	148	0.7	0.47	0.8883
4	148	0.3	0.46	0.7053
5	148	0.8	0.43	0.0238
6	148	0.2	0.42	0.1086
7	148	0.2	0.42	0.8243
8	148	0.3	0.45	0.0079
9	148	0.1	0.23	0.4566

B19. Why might you NOT seek traffic information? *(check all that apply)*

- ❑$_1$ I don't know of any traffic information systems that I could use
- ❑$_2$ The traffic information systems I know of do not help me
- ❑$_3$ I don't know any alternate routes to take, so why bother
- ❑$_4$ I wouldn't take an alternate route even if I had information
- ❑$_5$ I know the area well enough to get by without help
- ❑$_6$ I rarely encounter a serious traffic problem
- ❑$_7$ Other

(mean of responses 0 = don't know of any and 1 = do know of some)

	Valid N	Mean	Std Dev	F Prob	# who never listen	# who do listen
0	99	0.9	0.30	0.5199	10	89

(mean of responses 0 = not selected and 1 = selected)

	Valid N	Mean	Std Dev	F Prob
2	99	0.3	0.47	0.6772
3	99	0.1	0.26	0.6511
4	99	0.0	0.14	0.1087
5	99	0.2	0.43	0.6445
6	99	0.1	0.22	0.7007
7	99	0.3	0.47	0.6337

B20(A16). What are the 5 most important things that you might want a traffic information system to do for you? *(check 5 boxes, no more, no less)*

____ ❑1 Tell me if traffic is heavier than usual
____ ❑2 Tell me why traffic is heavier than usual
____ ❑3 Tell me if traffic is lighter than usual
____ ❑4 Tell me why traffic is lighter than usual
____ ❑5 Tell me if there is an unexpected delay on my route
____ ❑6 Tell me why there is an unexpected delay on my route
____ ❑7 Tell me how long an unexpected delay on my route is expected to be
____ ❑8 Tell me when there is NOT an unexpected delay on my route
____ ❑9 Tell me the location of incidents that have occurred
____ ❑10 Tell me the type of incidents that have occurred
____ ❑11 Tell me the time that incidents occurred
____ ❑12 Tell me the time that incidents are expected to be cleared
____ ❑13 Tell me the location of construction
____ ❑14 Tell me the duration of construction
____ ❑15 Tell me if I should take an alternate route
____ ❑16 Tell me why I should take an alternate route
____ ❑17 Suggest an alternate route(s) for me to take
____ ❑18 Other

Now, please rank the 5 boxes checked in the preceding question in order of importance by writing a number from 1 to 5 on the line to the left of each of the 5 boxes checked in that question: 1 is most important, 2 is next most important, and so on.

(mean of responses from 0 to 5; where 0 indicates item not selected)

	Valid N	Mean	Std Dev	F Prob
1	174	1.4	1.89	0.8346
2	174	0.8	1.57	0.0166
3	174	0.1	0.47	0.4165
4	174	0.0	0.38	0.3933
5	174	1.5	1.36	0.6377
6	174	0.7	1.45	0.9705
7	174	1.6	1.74	0.1347
8	174	0.1	0.58	0.0620
9	174	1.9	1.49	0.6082
10	174	0.4	1.29	0.2088
11	174	0.3	1.02	0.0810
12	174	1.4	1.84	0.3577
13	174	2.0	1.87	0.7049
14	174	0.4	1.20	0.2806
15	174	1.1	1.79	0.4229
16	174	0.3	1.16	0.7101
17	174	1.1	1.82	0.1848
18	174	0.0	0.00	-

B21(A17). Would you want a traffic information system to provide you with information relevant only to where you want to go or for the whole metro area? *(check one)*

❑1 only for where I want to go ❑2 for the whole metro area

(mean of responses from 1 to 2)

	Valid N	Mean	Std Dev	F Prob
	173	1.5	0.50	0.5370

B22(A18). How much would you be willing to pay for a traffic information system that completely meets your needs? *(fill in the blank in each row)*

$_____$_1 If payment was a one time fee (answer in dollars total)
$_____$_2 If payment was on a per-use basis (answer in [fractions ofj dollars per use)
$_____$_3 If payment was on a monthly basis (answer in dollars per month)
$_____$_4 If payment was on an annual basis (answer in dollars per year)
$_____$_5 Other

(mean willingness to pay)

	Valid N	Mean	Std Dev	F Prob
1	112	156.1	177.08	0.6171
2	106	2.3	11.04	0.6968
3	118	8.0	8.47	0.5304
4	110	62.7	83.01	0.5429
5	16	0.5	1.88	0.6155

B23(A19). Who should provide traffic information? *(check one)*

❑0 Traffic information is not needed
❑1 Government
❑2 Private companies
❑3 Both government and private companies
❑4 Other

(mean of responses from 0 to 5)

	Valid N	Mean	Std Dev	F Prob
	173	2.5	0.82	0.1249

The mean response for this question has no real-world significance. To better understand subject response, please view the cross tabulation of the data in Appendix H.

B24(A20). How should traffic information be paid for? *(check all that apply)*

❑0 Traffic information is not needed

❑1 Gas tax
❑2 User fees
❑3 Advertising
❑4 Property tax
❑5 Subscription fee paid by individuals
❑6 Device purchase by individuals
❑7 Tax on employers
❑8 Vehicle Registration Tax
❑9 Sales tax
❑10 Other

(mean of responses 0 = info not needed and 1 = info needed)

	Valid N	Mean	Std Dev	F Prob	# who never listen	# who do listen
0	149	1.0	0.08	0.3911	1	148

(mean of responses 0 = not selected and 1 = selected)

	Valid N	Mean	Std Dev	F Prob
1	169	0.2	0.41	0.6826
2	169	0.4	0.49	0.5976
3	169	0.3	0.48	0.1832
4	169	0.0	0.08	0.3508
5	169	0.5	0.50	0.4585
6	169	0.5	0.50	0.2144
7	169	0.1	0.30	0.6240
8	169	0.3	0.47	0.3625
9	170	0.0	0.17	0.1905
10	169	0.0	0.20	0.3589

B25(A21). What are the top five things that the government should be doing with transportation tax dollars? *(check 5 boxes, no more, no less)*

____ ❑1 Repair roadways (fill potholes, fix bridges, etc.)
____ ❑2 Add regular lanes to the expressways
____ ❑3 Add High Occupancy Vehicle lanes to the expressways
____ ❑4 Build new roads
____ ❑5 Beautify the roadways
____ ❑6 Add more roadside call boxes (for safety)
____ ❑7 Expand the freeway courtesy patrol (which helps motorists in need)
____ ❑8 Come to the aid of motorists in need faster
____ ❑9 Clear incidents from raodways faster
____ ❑10 Improve traffic information
____ ❑11 Add more Changeable Message Signs on the expressways
____ ❑12 Provide more public transit
____ ❑13 Provide rideshare coordination
____ ❑14 Other

Now, please rank the 5 boxes checked in the preceding question in order of importance by writing a number from 1 to 5 on the line to the left of each of the 5 boxes checked in that question: 1 is most important, 2 is next most important, and so on.

(mean of responses from 1 to 7)

	Valid N	Mean	Std Dev	F Prob
1	174	1.3	0.80	0.3838
2	174	1.4	1.73	0.2309
3	174	0.8	1.58	0.9361
4	174	1.3	1.76	0.0127
5	174	0.5	1.50	0.4064
6	174	0.6	1.33	0.8962
7	174	1.6	2.00	0.6189
8	174	0.8	1.59	0.0094
9	174	1.8	1.85	0.0490
10	174	1.8	1.78	0.3618
11	174	0.8	1.62	0.1493
12	174	1.3	1.77	0.1575
13	174	0.5	1.41	0.2394
14	174	0.3	0.95	0.8445

B26(A24). For your *home-to-work* commute during the past 8 weeks, *which* traffic information system(s) did you typically use? *(check all that apply)*

❑0 Didn't use a traffic information system

❑1 Commercial Radio
❑2 Television
❑3 Expressway Changeable Message Signs
❑4 Other

(mean of responses 0 = not selected and 1 = selected)

	Valid N	Mean	Std Dev	F Prob	# who don't know any	# know at least one
0	173	1.0	0.08	0.3770	1	172

(mean of responses 0 = not selected and 1 = selected)

	Valid N	Mean	Std Dev	F Prob
1	172	1.0	0.15	0.9048
2	172	0.3	0.48	0.8605
3	172	0.3	0.47	0.8563
4	172	0.1	0.21	0.7132

B27. This question number was not used.

B28(A25). For your *home-to-work* commute during the past 8 weeks, *when* did you typically use traffic information system(s)? *(check one in each column)*

a. Commercial Radio

a.1 ❑$_0$ Didn't use

a.2 ❑$_1$ Used only before I left home
❑$_2$ Used only during the trip
❑$_3$ Used both before I left home and during the trip

(mean of responses 0 = didn't use and 1 = used)

	Valid N	Mean	Std Dev	F Prob	# who don't know any	# know at least one
a.1	173	1.0	0.13	0.7279	3	170

(mean of responses from 1 to 3)

	Valid N	Mean	Std Dev	F Prob
a.2	170	2.4	0.51	0.1284

The mean response for a.2 of this question has no real-world significance. To better understand subject response, please view the cross tabulation of the data in Appendix H.

B29(A26). For your *home-to-work* commute during the past 8 weeks, *how would you describe* your typical use of traffic information system(s)? *(check one box in each row)*

	Home-to-Work Commute	a Did Not Use	b Used Less Than Once a Week	Used 1 Time a Week	Used a Few Times a Week	Used 1 Time a Day	Used 2 or More Times a Day
1	Commercial Radio	❑$_0$	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
2	Television						
3	Changeable Message Signs						
4	Other						

(mean of responses 0 = didn't use and 1 = used)

	Valid N	Mean	Std Dev	F Prob	# who didn't use	# who used
1a	173	1.0	0.13	0.7279	3	170
2a	148	0.5	0.50	0.6631	80	68
3a	153	0.6	0.50	0.9935	65	88
4a	90	0.1	0.23	0.0931	85	5

(mean of responses from 1 to 5)

	Valid N	Mean	Std Dev	F Prob
1b	170	4.5	0.92	0.8327
2b	68	3.2	1.21	0.6576
3b	88	2.8	1.47	0.6914
4b	5	3.2	1.30	0.8824

B30(A27). For your *home-to-work* commute during the past 8 weeks, to what extent did you rely on traffic information system(s) in *deciding when to leave home*? *(check one box in each row; if you did not use the system, check "DID NOT USE", if you did use the system, check one of the other-four boxes in the row)*

Home-to-Work Commute	a DID NOT USE	b DID NOT RELY ON AT ALL	DID NOT RELY ON VERY MUCH	RELY ON SOMEWHAT	RELY ON VERY MUCH
1 Commercial Radio	❑0	❑1	❑2	❑3	❑4
2 Television	❑0	❑1	❑2	❑3	❑4
4 Other	❑0	❑1	❑2	❑3	❑4

(mean of responses 0 = didn't use and 1 = used)

	Valid N	Mean	Std Dev	F Prob	# who didn't use	# who used
1a	172	0.7	0.47	0.8892	58	114
2a	162	0.5	0.50	0.5886	88	74
4a	123	0.1	0.34	0.9965	107	16

(mean of responses from 1 to 4)

	Valid N	Mean	Std Dev	F Prob
1b	114	2.9	1.21	0.3454
2b	74	2.6	1.09	0.0900
4b	16	1.8	1.0	0.0111

B31(A28). For your *home-to-work* commute during the past 8 weeks, how many times did you *change the time you planned to leave home* because of a traffic information system? *(in each row check "DID NOT USE" this system or write a number: 0 if you used the system but didn't change your plans because of it, 1 if you used the system and changed your plans I time because of it, and so on)*

Home-to-Work Commute

1 Commercial Radio ❑0 DID NOT USE CHANGED ____ TIMES
2 Television
4 Other

(mean of responses 0 – didn't use and 1 = used)

	Valid N	Mean	Std Dev	F Prob	# who didn't use	# who used
1a	168	0.5	0.50	0.6171	80	88
2a	162	0.3	0.47	0.7250	110	52
4a	135	0.1	0.30	0.5409	122	13

(mean of number of times)

	Valid N	Mean	Std Dev	F Prob
1b	92	2.5	3.09	0.5008
2b	52	2.1	1.98	0.7647
4b	13	0.2	0.55	0.5744

B32(A29). For your *home-to-work* commute during the past 8 weeks, to what extent did you rely on traffic information system(s) when you *chose a route before leaving home*? *(check one box in each row; if you did not use the system, check "DID NOT USE", if you did use the system, check one of the other four boxes in the row)*

Home-to-Work Commute	a DID NOT USE	b DID NOT RELY ON AT ALL	DID NOT RELY ON VERY MUCH	RELY ON SOMEWHAT	RELY ON VERY MUCH
1 Commercial Radio	❑0	❑1	❑2	❑3	❑4
2 Television					
4 Other					

(mean of responses 0 = didn't use and 1 = used)

	Valid N	Mean	Std Dev	F Prob	# who didn't use	# who used
1a	168	0.6	0.49	0.2325	70	98
2a	162	0.4	0.49	0.2659	98	64
4a	132	0.1	0.28	0.3669	121	11

(mean of responses from 1 to 4)

	Valid N	Mean	Std Dev	F Prob
1b	98	3.0	1.06	0.7684
2b	64	2.7	0.91	0.2165
4b	11	1.8	1.25	0.7881

B33(A30). For your *home-to-work* commute during the past 8 weeks, how many times did you *change your route before leaving home* because of a traffic information system? *(in each row check "DID NOT USE" this system or write a number: 0 if you used the system but didn't change your route because of it, 1 if you used the system and changed your plans I time because of it, and so on)*

Home-to-Work Commute

1 Commercial Radio ❑0 DID NOT USE CHANGED ____ TIMES
2 Television
4 Other

(mean of responses 0 – didn't use and 1 = used)

	Valid N	Mean	Std Dev	F Prob	# who didn't use	# who used
1a	170	0.5	0.50	0.3388	78	92
2a	160	0.3	0.47	0.7125	107	53
4a	135	0.1	0.26	0.4882	125	10

(mean of number of times)

	Valid N	Mean	Std Dev	F Prob
1b	92	1.8	3.03	0.6298
2b	53	1.3	1.53	0.6813
4b	10	0.4	0.84	0.7583

B34(A31). For your *home-to-work* commute during the past 8 weeks, how many times did you *change your route during the trip* because of a traffic information system? *(in each row check "DID NOT USE" this system or write a number: 0 if you used the system but didn't change your route because of it, 1 if you used the system and changed your plans I time because of it, and so on)*

Home-to-Work Commute

1 Commercial Radio ❑$_0$ DID NOT USE CHANGED ____ TIMES
3 Changeable Message Signs
4 Other

(mean of responses 0 – didn't use and 1 = used)

	Valid N	Mean	Std Dev	F Prob	# who didn't use	# who used
1a	173	0.9	0.29	0.3273	16	157
3a	150	0.3	0.45	0.8991	108	42
4a	129	0.2	0.36	0.5086	110	19

(mean of number of times)

	Valid N	Mean	Std Dev	F Prob
1b	173	0.9	0.29	0.3273
3b	150	0.3	0.45	0.8991
4b	129	0.2	0.36	0.5086

B35(A32). For your *home-to-work* commute during the past 8 weeks, how many times did you *cancel your commute* because of a traffic information system? *(in each row check "DID NOT USE" this system or write a number: 0 if you used the system but didn't change your route because of it, 1 if you used the system and changed your plans I time because of it, and so on)*

Home-to-Work Commute

1 Commercial Radio ❑$_0$ DID NOT USE CHANGED ____ TIMES
2 Television
4 Other

(mean of responses 0 – didn't use and 1 = used)

	Valid N	Mean	Std Dev	F Prob	# who didn't use	# who used
1a	171	0.7	0.46	0.4376	51	120
2a	158	0.3	0.48	0.4821	104	54
4a	140	0.2	0.37	0.6317	118	22

(mean of number of times)

	Valid N	Mean	Std Dev	F Prob
1b	120	0.1	0.68	0.8157
2b	54	0.2	0.74	0.6367
4b	22	0.0	0.00	-

B36(A35). For your *work-to-home* commute during the past 8 weeks, *which* traffic information system(s) did you typically use? *(check all that apply)*

❑$_0$ Didn't use a traffic information system

❑$_1$ Commercial Radio
❑$_2$ Television
❑$_3$ Expressway Changeable Message Signs
❑$_4$ Other

(mean of responses 0 = didn't use and 1 = used)

	Valid N	Mean	Std Dev	F Prob	# who didn't use	# who used
0	173	1.0	0.18	0.6663	6	167

(mean of responses 0 = not selected and 1 = selected)

	Valid N	Mean	Std Dev	F Prob
1	167	1.0	0.15	0.4869
2	167	0.1	0.23	0.0769
3	167	0.3	0.47	0.6016
4	167	0.1	0.23	0.8317

B37. This question number was not used.

B38(A36). For your *work-to-home* commute during the past 8 weeks, *when* did you typically use (Commercial Radio before only) traffic information system(s)? *(check one in each column)*

a. Commercial Radio
a.1 ❑$_0$ Didn't use

a.2 ❑$_1$ Used only before I left home ❑$_3$ Used both before I left home and during the trip
❑$_2$ Used only during the trip

(mean of responses 0 = didn't use and 1 = used)

	Valid N	Mean	Std Dev	F Prob	# who didn't use	# who used
0	173	1.0	0.18	0.6799	6	167

(mean of responses from 1 to 3)

	Valid N	Mean	Std Dev	F Prob
a.2	167	2.2	0.41	0.8291

The mean response for part a.2 of this question has no real-world significance. To better understand subject response, please view the cross tabulation of the data in Appendix H.

B39(A37). For your *work-to-home* commute during the past 8 weeks, *how would you describe* your typical use of traffic information system(s)? *(check one box in each row)*

	Work-to-Home Commute	a DID NOT USE	b USED LESS THAN ONCE A WEEK	USED 1 TIME A WEEK	USED A FEW TIMES A WEEK	USED 1 TIME A DAY	USED 2 OR MORE TIMES A DAY
1	Commercial Radio	❑$_0$	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
2	Television						
3	Changeable Message Signs						
4	Other						

(mean of responses 0 = didn't use and 1 = used)

	Valid N	Mean	Std Dev	F Prob	# who didn't use	# who used
1a	171	1.0	0.17	0.7448	5	166
2a	143	0.0	0.18	0.2365	138	5
3a	156	0.5	0.50	0.8890	81	75
4a	120	0.1	0.25	0.5638	112	8

(mean of responses from 1 to 5)

	Valid N	Mean	Std Dev	F Prob
1b	166	4.4	0.96	0.6848
2b	5	3.4	0.89	0.8333
3b	75	3.0	1.47	0.4684
4b	8	3.3	1.75	0.3402

B40(A38). For your *work-to-home* commute during the past 8 weeks, to what extent did you rely on traffic information system(s) in *deciding when to leave work*? *(check one box in each row; if you did not use the system, check "DID NOT USE", if you did use the system, check one of the other four boxes in the row)*

Work-to-Home Commute	a DID NOT USE	b DID NOT RELY ON AT ALL	DID NOT RELY ON VERY MUCH	RELY ON SOMEWHAT	RELY ON VERY MUCH
1 Commercial Radio	❑0	❑1	❑2	❑3	❑4
2 Television					
4 Other					

(mean of responses 0 = didn't use and 1 = used)

	Valid N	Mean	Std Dev	F Prob	# who didn't use	# who used
1a	172	0.5	0.50	0.1213	87	85
2a	159	0.1	0.25	0.6415	148	11
4a	142	0.1	0.31	0.3743	127	15

(mean of responses from 1 to 4)

	Valid N	Mean	Std Dev	F Prob
1b	85	2.2	1.09	0.1951
2b	11	1.5	0.82	0.1895
4b	15	2.3	1.33	0.4886

B41(A39). For your *work-to-home* commute during the past 8 weeks, how many times did you *change the time you planned to leave work* because of a traffic information system? *(in each row check "DID NOT USE" this system or write a number: 0 if you used the system but didn't change your plans because of it, 1 if you used the system and changed your plans I time because of it, and so on)*

Work-to-Home Commute

1 Commercial Radio ❑0 DID NOT USE CHANGED ____ TIMES
2 Television
4 Other

(mean of responses 0 = didn't use and 1 = used)

	Valid N	Mean	Std Dev	F Prob	# who didn't use	# who used
1a	171	0.5	0.50	0.2263	94	77
2a	162	0.1	0.28	0.4994	148	14
4a	148	0.1	0.29	0.3319	134	14

(mean of number of times)

	Valid N	Mean	Std Dev	F Prob
1a	171	0.5	0.50	0.2263
2a	162	0.1	0.28	0.4994
4a	148	0.1	0.29	0.3319

B42(A40). For your *work-to-home* commute during the past 8 weeks, to what extent did you rely on traffic information system(s) when you *chose a route before leaving work*? *(check one box in each row: if you did not use the system, check "DID NOT USE", if you did use the system, check one of the other four boxes in the row)*

Work-to-Home Commute	a DID NOT USE	b DID NOT RELY ON AT ALL	DID NOT RELY ON VERY MUCH	RELY ON SOMEWHAT	RELY ON VERY MUCH
1 Commercial Radio	❑0	❑1	❑2	❑3	❑4
2 Television					
4 Other					

(mean of responses 0 = didn't use and 1 = used)

	Valid N	Mean	Std Dev	F Prob	# who didn't use	# who used
1a	173	0.5	0.50	0.8566	87	86
2a	159	0.0	0.18	0.7550	154	5
4a	144	0.1	0.29	0.1347	131	13

(mean of responses from 1 to 4)

	Valid N	Mean	Std Dev	F Prob
1b	86	2.7	1.18	0.4573
2b	5	1.4	0.89	-
4b	13	2.8	1.01	0.110

B43(A41). For your *work-to-home* commute during the past 8 weeks, how many times did you *change your route before 1eaving work* because of a traffic information system? *(in each row check "DID NOT USE" this system or write a number: 0 if you used the system but didn't change your route because of it, 1 if you used the system and changed your route I time because of it, and so on)*

Work-to-Home Commute

1 Commercial Radio ❑0 DID NOT USE CHANGED ____ TIMES
2 Television
4 Other

(mean of responses 0 = didn't use and 1 = used)

	Valid N	Mean	Std Dev	F Prob	# who didn't use	# who used
1a	172	0.5	0.50	0.6821	93	79
2a	158	0.0	0.21	0.9252	151	7
4a	143	0.1	0.29	0.1191	130	13

(mean of number of times)

	Valid N	Mean	Std Dev	F Prob
1b	79	1.6	2.16	0.8474
2b	7	0.1	0.38	-
4b	13	1.4	1.33	0.6896

B44(A42). For your *work-to-home* commute during the past 8 weeks, how many times did you *change your route during the trip* because of a traffic information system? *(in each row check "DID NOT USE" this system or write a number: 0 if you used the system but didn't change your route because of it, 1 if you used the system and changed your route I time because of it, and so on)*

Work-to-Home Commute

1 Commercial Radio ❑$_0$ DID NOT USE CHANGED ____ TIMES
2 Television
4 Other

(mean of responses 0 = didn't use and 1 = used)

	Valid N	Mean	Std Dev	F Prob	# who didn't use	# who used
1a	171	0.9	0.27	0.4485	13	158
3a	154	0.3	0.44	0.7837	115	39
4a	140	0.1	0.31	0.1450	125	15

(mean of number of times)

	Valid N	Mean	Std Dev	F Prob
1a	171	0.9	0.27	0.4485
3a	154	0.3	0.44	0.7837
4a	140	0.1	0.31	0.1450

B45(A43). To what extent do you agree or disagree with the following statement: "Traffic information systems could be improved to the point that they completely meet my needs for traffic information." *(check one box in each row; if you do not know about a system or do not have opinions on it, check "AM NOT FAMILIAR WITH SYSTEM". otherwise check one of the other five boxes in each row.)*

	a AM NOT FAMILIAR WITH SYSTEM	b STRONGLY DISAGREE	SOMEWHAT DISAGREE	NEITHER	SOMEWHAT AGREE	STRONGLY AGREE
1 Commercial Radio	❑$_0$	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
2 Television						
3 Changeable Message Signs						
4 Other						

(mean of responses 0 = not familiar and 1 = familiar)

	Valid N	Mean	Std Dev	F Prob	# who didn't use	# who used
1a	171	1.0	0.00	-	7	164
2a	161	0.8	0.41	0.3355	34	127
3a	163	0.9	0.28	0.2532	14	149
4a	109	0.3	0.47	0.2251	73	36

(mean of responses from 1 to 5)

	Valid N	Mean	Std Dev	F Prob
1b	171	3.9	1.09	0.4077
2b	127	3.1	1.39	0.2833
3b	149	3.7	1.21	0.8716
4b	36	3.8	1.27	0.9339

B46(A44). During the past 8 weeks, which traffic information system did you *rely on the most* in making decisions for your commute? *(check only one)*

a. ❑$_0$ Did not rely on any traffic information system

b. ❑$_1$ Commercial Radio
❑$_2$ Television
❑$_3$ Expressway Changeable Message Signs
❑$_4$ Other

(mean of responses 0 = didn't rely on and 1 = relied on)

	Valid N	Mean	Std Dev	F Prob	# who didn't use	# who used
a	170	1.0	0.21	0.4894	8	162

(mean of responses from 1 to 4)

	Valid N	Mean	Std Dev	F Prob
b	162	1.1	0.52	0.3163

The mean response for part b of this question has no real-world significance. To better understand subject response, please view the cross tabulation of the data in Appendix H.

B47(A45). Which traffic information system do you *like the best*? *(check only one)*

❑$_1$ Commercial Radio
❑$_2$ Television
❑$_3$ Expressway Changeable Message Signs
❑$_4$ Other
❑$_5$ No Preference

(mean of responses from 1 to 5)

	Valid N	Mean	Std Dev	F Prob
	172	1.6	1.26	0.2129

The mean response for this question has no real-world significance. To better understand subject response, please view the cross tabulation of the data in Appendix H.

B48. If you were given a traffic information system that completely meets your needs for traffic information, how likely is it that you would use that information system? *(check 1)*

❑$_1$ Very Unlikely
❑$_2$ Somewhat Unlikely
❑$_3$ Neither Likely Nor Unlikely
❑$_4$ Somewhat Likely
❑$_5$ Very Likely

(mean of responses from 1 to 5)

	Valid N	Mean	Std Dev	F Prob
	173	4.3	1.29	0.818

B49(A46). Are you familiar with a *Commercial Radio* traffic information system? (By familiar we mean know about and have opinions on the system, whether or not you use the system in your decision making.) *(check one)*

❑$_0$ NO: PLEASE GO TO QUESTION B55(A52; DO NOT ANSWER ~~QUESTIONS B50(A47 THROUGH B54(A51.~~
❑$_1$ YES: PLEASE GO TO THE NEXT QUESTION (QUESTION B50(A47 BELOW).

(mean of responses from 0 to 1)

	Valid N	Mean	Std Dev	F Prob
	170	1.0	0.20	0.4539

B50(A47). If you are familiar with *Commercial Radio* traffic information system(s), please indicate the extent to which you agree or disagree with the following items. *(check one box in each row)*

	The ***Commercial Radio*** traffic information system:	STRONGLY DISAGREE	SOMEWHAT DISAGREE	NEITHER	SOMEWHAT AGREE	STRONGLY AGREE
1	works reliably	❑1	❑2	❑3	❑4	❑5
2	includes all the info I need to know					
3	is specific to my commute					
4	provides reliable information					
5	provides accurate information					
6	reports incidents soon after they happen					
7	presents reports frequently enough					
8	is easy to use					
9	is convenient to use					
10	catches my attention					
11	is distracting					
12	gives the reason for delays					
13	gives the expected length of delays					
14	provides information on demand					
15	suggests appropriate alternate routes					

(mean of responses from 1 to 5)

	Valid N	Mean	Std Dev	F Prob
1	165	3.8	0.85	0.1320
2	166	2.7	1.18	0.9299
3	165	2.8	1.21	0.5735
4	166	3.5	0.93	0.7406
5	165	3.3	0.93	0.5417
6	165	2.9	1.14	0.1905
7	166	3.5	1.22	0.5626
8	164	4.3	0.76	0.4139
9	165	4.3	0.77	0.7274
10	164	4.0	0.90	0.0919
11	165	1.7	0.87	0.0971
12	166	3.8	0.82	0.1599
13	164	2.3	1.07	0.1763
14	163	1.5	0.80	0.5928
15	164	2.5	1.17	0.7736

B51(A48). Have you used a *Commercial Radio* traffic information system in the past 8 weeks? *(check one)*

❑0 NO. PLEASE GO TO QUESTION B54(A51; DO NOT ANSWER QUESTIONS B52(A49 AND B53(A50.
❑1 YES. PLEASE GO TO THE NEXT QUESTION (QUESTION B52(A49 ON THE NEXT PAGE).

(mean of responses 0 = no and 1 = yes)

	Valid N	Mean	Std Dev	F Prob
	162	1.0	0.17	0.2004

B52(A49). Please indicate theextent to which you agree or disagree with the following statements. *(check one box* in *each row)*

	I found that using the ***Commercial Radio*** traffic information system:	STRONGLY DISAGREE	SOMEWHAT DISAGREE	NEITHER	SOMEWHAT AGREE	STRONGLY AGREE
1	satisfied my need for information.	❑1	❑2	❑3	❑4	❑5
2	helped me make better trip choices.					
3	made my commute less stressful.					
4	reduced my driving time.					
5	made my driving time more certain.					
6	made my arrival time more certain.					
7	helped me avoid congestion.					
8	helped me avoid unexpected delays.					
9	on the whole, improved my commute.					

(mean of responses from 1 to 5)

	Valid N	Mean	Std Dev	F Prob
1	160	3.4	1.09	0.8407
2	159	3.6	0.96	0.6204
3	160	3.2	1.05	0.7621
4	159	3.1	1.03	0.4933
5	160	3.2	0.99	0.4063
6	159	3.1	0.99	0.2627
7	160	3.5	1.02	0.8410
8	159	3.4	1.10	0.9408
9	159	3.6	0.96	0.9460

B53(A50). What are the 5 most important things that would improve the existing *Commercial Radio* traffic information system that you use most often? *(check 5 boxes, no more, no less)*

____ ❑1 Make the system work more reliably.
____ ❑2 Make the information more complete (tell more of the things I need to know),
____ ❑3 Make the information more specific to my commute (exclude irrelevant info).
____ ❑4 Make the information more reliable.
____ ❑5 Make the information more accurate.
____ ❑6 Report incidents sooner after they happen.
____ ❑7 Present traffic reports more frequently.
____ ❑8 Make the system easier to use.
____ ❑9 Make the system more convenient to use.
____ ❑10 Make the system more able to catch my attention.
____ ❑11 Make the system less distracting.
____ ❑12 Give the reason for an unexpected delay.
____ ❑13 Give the expected length of an unexpected delay.
____ ❑14 Make the systems provide information on demand.
____ ❑15 Suggest appropriate alternate routes when an unexpected delay arises.
____ ❑16 Other (please specify):_____
____ ❑17 No improvement possible.

Now, please rank the 5 boxes checked in the preceding question in order of importance by writing a number from 1 to 5 on the line to the left of each of the 5 boxes checked in that question: 1 is most important, 2 is next most important, and so on.

(mean of responses from 0 to 5; where 0 indicates item not selected)

	Valid N	Mean	Std Dev	F Prob
1	161	0.5	1.27	0.5332
2	161	1.6	1.81	0.5181
3	161	1.2	1.63	0.4580
4	161	1.1	1.74	0.7415
5	161	1.4	1.68	0.5497
6	161	1.4	1.46	0.7279
7	161	0.8	1.45	0.3149
8	161	0.0	0.42	0.5078
9	161	0.1	0.81	0.6596
10	161	0.2	0.82	0.2503
11	161	0.0	0.42	0.5691
12	161	1.0	1.79	0.3894
13	161	1.8	1.80	0.9354
14	161	1.6	1.86	0.0238
15	161	1.9	2.02	0.0544
16	161	0.2	0.93	0.2598
17	161	0.0	0.00	-

B54(A51). Why didn't you use a *Commercial Radio* traffic information system during the past 8 weeks? *(check all that apply)*

❑0 I didn't know of any systems that I could use.

❑1 Available systems do not work reliably.
❑2 The information was not complete enough (it did not tell me enough of the things I need to know).
❑3 Not enough of the information was specific to my commute.
❑4 The information is not reliable.
❑5 The information is not accurate.
❑6 The systems do not report incidents soon enough after they happen.
❑7 The systems do not present reports frequently enough.
❑8 The systems are too hard to use.
❑9 The systems are too inconvenient to use.
❑10 The systems do not catch my attention.
❑11 The systems are distracting.
❑12 The information does not give the reason for a delay.
❑13 The information does give the expected length of a delay.
❑14 The information the systems provide is not available on demand.
❑15 The information does not suggest appropriate alternate routes.
❑16 Other
❑17 I wouldn't take an alternate route even if I had information.
❑18 I know the area well enough to get by without help.
❑19 I rarely encounter a serious traffic problem.
❑20 I rely on a different traffic information system.

(mean of responses 0 = didn't know of any and 1 = knew of)

	Valid N	Mean	Std Dev	F Prob	# who didn't know any	# did know
0	4	0.5	0.58	0.7071	2	2

(mean of responses 0 = not selected and 1 = selected)

	Valid N	Mean	Std Dev	F Prob
1	4	0.3	0.50	0.8165
2	4	0.3	0.50	0.8165
3	4	0.3	0.50	0.8165
4	4	0.3	0.50	0.8165
5	4	0.3	0.50	0.8165
6	4	0.3	0.50	0.8165
7	4	0.3	0.50	0.8165
8	4	0.0	0.00	-
9	4	0.0	0.00	-
10	4	0.0	0.00	-
11	4	0.3	0.50	-
12	4	0.0	0.00	-
13	4	0.0	0.00	-
14	4	0.3	0.50	0.8165
15	4	0.0	0.00	-
16	4	0.3	0.50	0.8165
17	4	0.0	0.00	-
18	4	0.3	0.50	0.8165
19	4	0.3	0.50	0.8165
20	4	0.0	0.00	-

B55. Are you familiar with a*Television* traffic information system?*(check one)*

❑$_0$ NO: PLEASE GO TO QUESTION 61; DO NOT ANSWER ~~QUESTIONS 56 THROUGH 60.~~

❑$_1$ YES: PLEASE GO TO THE NEXT QUESTION (QUESTION 56 BELOW).

(mean of responses 0 = no and 1 = yes)

	Valid N	Mean	Std Dev	F Prob
	165	0.6	0.50	0.6551

B56. Based on your familiarity with*Television* traffic information system(s), please indicate the extent to which you agree or disagree with the following items*(check one box* in *each row)*

	The ***Television*** traffic information system:	STRONGLY DISAGREE	SOMEWHAT DISAGREE	NEITHER	SOMEWHAT AGREE	STRONGLY AGREE
1	works reliably	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
2	includes all the info I need to know					
3	is specific to my commute					
4	provides reliable information					
5	provides accurate information					
6	reports incidents soon after they happen					
7	presents reports frequently enough					
8	is easy to use					
9	is convenient to use					
10	catches my attention					
11	is distracting					
12	gives the reason for delays					
13	gives the expected length of delays					
14	provides information on demand					
15	suggests appropriate alternate routes					

(mean of responses from 1 to 5)

	Valid N	Mean	Std Dev	F Prob
1	96	3.3	0.91	0.1660
2	97	2.9	1.09	0.8354
3	98	2.8	1.17	0.6999
4	97	3.4	0.92	0.9669
5	97	3.3	0.90	0.9914
6	97	2.8	1.00	0.2249
7	97	2.6	1.16	0.9201
8	98	3.5	1.12	0.4321
9	98	3.1	1.28	0.8557
10	97	3.4	1.08	0.8807
11	97	2.3	1.08	0.1298
12	95	3.7	0.72	0.3231
13	97	2.7	0.99	0.9030
14	96	1.5	0.77	0.0145
15	97	2.8	1.14	0.9466

B57. Have you used a *Television* traffic information system in the past 8 weeks? *(check one)*

❑$_0$ NO: PLEASE GO TO QUESTION 60; DO NOT ANSWER ~~QUESTIONS 58 AND 59.~~

❑$_1$ YES: PLEASE GO TO THE NEXT QUESTION (QUESTION 58 BELOW).

(mean of responses 0 = no and 1 = yes)

	Valid N	Mean	Std Dev	F Prob
	98	0.6	0.48	0.2009

B58. Please indicate the extent to which you agree or disagree with the following statements.

(check one box in each row)

	I found that using the *Television* traffic information system:	STRONGLY DISAGREE	SOMEWHAT DISAGREE	NEITHER	SOMEWHAT AGREE	STRONGLY AGREE
1	satisfied my need for information.	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
2	helped me make better trip choices.					
3	made my commute less stressful.					
4	reduced my driving time.					
5	made my driving time more certain.					
6	made my arrival time more certain.					
7	helped me avoid congestion.					
8	helped me avoid unexpected delays.					
9	on the whole, improved my commute.					

(mean of responses from 1 to 5)

	Valid N	Mean	Std Dev	F Prob
1	64	3.0	1.21	0.7678
2	64	3.5	1.07	0.3631
3	64	3.1	1.08	0.9278
4	64	3.0	0.98	0.6972
5	64	3.0	0.96	0.7231
6	64	3.0	0.90	0.7688
7	64	3.4	0.92	0.9210
8	64	3.4	1.03	0.9291
9	64	3.3	1.01	0.8397

B59. What are the 5 most important things that would improve the existing *Television* traffic information system that you use most often? *(check 5 boxes, no more, no less)*

___ ❑1 Make the system work more reliably.
___ ❑2 Make the information more complete (tell more of the things I need to know),
___ ❑3 Make the information more specific to my commute (exclude irrelevant info).
___ ❑4 Make the information more reliable.
___ ❑5 Make the information more accurate.
___ ❑6 Report incidents sooner after they happen.
___ ❑7 Present traffic reports more frequently.
___ ❑8 Make the system easier to use.
___ ❑9 Make the system more convenient to use.
___ ❑10 Make the system more able to catch my attention.
___ ❑11 Make the system less distracting.
___ ❑12 Give the reason for an unexpected delay.
___ ❑13 Give the expected length of an unexpected delay.
___ ❑14 Make the systems provide information on demand.
___ ❑15 Suggest appropriate alternate routes when an unexpected delay arises.
___ ❑16 Other (please specify):_____
___ ❑17 No improvement possible.

Now, please rank the 5 boxes checked in the preceding question in order of importance by writing a number from 1 to 5 on the line to the left of each of the 5 boxes checked in that question: 1 is most important, 2 is next most important, and so on.

(mean of responses from 0 to 5; where 0 indicates item not selected)

	Valid N	Mean	Std Dev	F Prob
1	67	0.5	1.22	0.5213
2	67	1.4	1.69	0.5577
3	67	1.5	1.85	0.3098
4	67	1.0	1.71	0.4790
5	67	1.3	1.70	0.4147
6	67	1.6	1.60	0.8547
7	67	1.6	1.74	0.6707
8	67	0.1	0.61	0.3934
9	67	0.1	0.63	0.4935
10	67	0.1	0.62	0.2164
11	67	0.0	0.00	-
12	67	0.8	1.57	0.3314
13	67	1.6	1.84	0.1892
14	67	1.5	2.00	0.4194
15	67	1.4	1.77	0.8272
16	67	0.1	0.62	0.4984
17	67	0.0	0.00	-

B60. Why didn't you use a *Television* traffic information system during the past 8 weeks?
(check all that apply)

❑$_0$ I didn't know of any systems that I could use.
❑$_1$ Available systems do not work reliably.
❑$_2$ The information was not complete enough (it did not tell me enough of the things I need to know).
❑$_3$ Not enough of the information was specific to my commute.
❑$_4$ The information is not reliable.
❑$_5$ The information is not accurate.
❑$_6$ The systems do not report incidents soon enough after they happen.
❑$_7$ The systems do not present reports frequently enough.
❑$_8$ The systems are too hard to use.
❑$_9$ The systems are too inconvenient to use.
❑$_{10}$ The systems do not catch my attention.
❑$_{11}$ The systems are distracting.
❑$_{12}$ The information does not give the reason for a delay.
❑$_{13}$ The information does give the expected length of a delay.
❑$_{14}$ The information the systems provide is not available on demand.
❑$_{15}$ The information does not suggest appropriate alternate routes.
❑$_{16}$ Other
❑$_{17}$ I wouldn't take an alternate route even if I had information.
❑$_{18}$ I know the area well enough to get by without help.
❑$_{19}$ I rarely encounter a serious traffic problem.
❑$_{20}$ I rely on a different traffic information system.

(mean of responses 0 = didn't know of any and 1 = knew of)

	Valid N	Mean	Std Dev	F Prob	# who didn't know any	# did know
0	30	0.9	0.31	0.6510	3	27

(mean of responses 0 = not selected and 1 = selected)

	Valid N	Mean	Std Dev	F Prob
1	30	0.0	0.18	0.0469
2	30	0.1	0.31	0.6510
3	30	0.1	0.35	0.2358
4	30	0.1	0.25	0.6269
5	30	0.1	0.25	0.6269
6	30	0.1	0.35	0.2021
7	30	0.2	0.43	0.6269
8	30	0.1	0.25	0.3367
9	30	0.5	0.51	0.1251
10	30	0.1	0.25	0.4056
11	30	0.0	0.18	0.0469
12	30	0.0	0.00	-
13	30	0.0	0.18	0.7622
14	30	0.2	0.38	0.4343
15	30	0.1	0.25	0.4056
16	30	0.4	0.50	0.1819
17	30	0.0	0.00	-
18	30	0.0	0.00	-
19	30	0.0	0.00	-
20	30	0.5	0.51	0.8934

B61. Are you familiar with a *Changeable Message Sign* traffic information system? (By familiar we mean know about and have opinions on the system, whether or not you use the system in your decision making.) *(check one)*

❑$_0$ NO: PLEASE GO TO QUESTION B67; DO NOT ANSWER ~~QUESTIONS B62 THROUGH B66.~~
❑$_1$ YES: PLEASE GO TO THE NEXT QUESTION (QUESTION B62 BELOW).

(mean of responses 0 = no and 1 = yes)

	Valid N	Mean	Std Dev	F Prob
	169	0.8	0.42	0.3631

B62. Based on your familiarity with *Changeable Message Sign* traffic information system, please indicate the extent to which you agree or disagree with the following items. *(check one box in each row)*

	The ***Changeable Message Sign*** traffic information system:	STRONGLY DISAGREE	SOMEWHAT DISAGREE	NEITHER	SOMEWHAT AGREE	STRONGLY AGREE
1	works reliably	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
2	includes all the info I need to know					
3	is specific to my commute					
4	provides reliable information					
5	provides accurate information					
6	reports incidents soon after they happen					
7	presents reports frequently enough					
8	is easy to use					
9	is convenient to use					
10	catches my attention					
11	is distracting					
12	gives the reason for delays					
13	gives the expected length of delays					
14	provides information on demand					
15	suggests appropriate alternate routes					

(mean of responses from 1 to 5)

	Valid N	Mean	Std Dev	F Prob
1	130	2.7	1.08	0.5735
2	133	2.0	0.98	0.1719
3	132	3.2	1.29	0.7401
4	131	3.0	1.06	0.9436
5	132	3.0	1.02	0.9529
6	132	2.4	0.97	0.1956
7	132	2.6	1.15	0.8735
8	132	3.6	1.20	0.9109
9	133	3.5	1.26	0.4917
10	133	3.9	1.06	0.0900
11	132	2.1	1.08	0.6387
12	132	2.5	1.19	0.5575
13	132	1.8	0.87	0.2920
14	133	1.7	1.01	0.7804
15	133	2.2	1.22	0.6977

B63. Have you used a *Changeable Message Sign* traffic information system in the past 8 weeks? *(check one)*

❑$_0$ NO: PLEASE GO TO QUESTION 60; DO NOT ANSWER ~~QUESTIONS 58 AND 59.~~
❑$_1$ YES: PLEASE GO TO THE NEXT QUESTION (QUESTION 58 BELOW).

(mean of responses 0 = no and 1 = yes)

	Valid N	Mean	Std Dev	F Prob
	131	0.6	0.48	0.7928

B64. Please indicate the extent to which you agree or disagree with the following statements. *(check one box in each row)*

	I found that using the ***Chageable Message Sign*** traffic information system:	STRONGLY DISAGREE	SOMEWHAT DISAGREE	NEITHER	SOMEWHAT AGREE	STRONGLY AGREE
1	satisfied my need for information.	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
2	helped me make better trip choices.					
3	made my commute less stressful.					
4	reduced my driving time.					
5	made my driving time more certain.					
6	made my arrival time more certain.					
7	helped me avoid congestion.					
8	helped me avoid unexpected delays.					
9	on the whole, improved my commute.					

(mean of responses from 1 to 5)

	Valid N	Mean	Std Dev	F Prob
1	85	2.6	1.16	0.6291
2	85	2.9	1.16	0.8682
3	85	2.6	1.07	0.2809
4	85	2.7	1.03	0.7430
5	85	2.7	1.04	0.5472
6	85	2.7	1.01	0.7473
7	85	3.1	1.14	0.6534
8	85	3.0	1.15	0.8765
9	85	3.0	1.08	0.9444

B65. What are the 5 most important things that would improve the existing *Changeable Message Sign* traffic information system that you use most often? *(check 5 boxes, no more, no less)*

____ ❑1 Make the system work more reliably.
____ ❑2 Make the information more complete (tell more of the things I need to know),
____ ❑3 Make the information more specific to my commute (exclude irrelevant info).
____ ❑4 Make the information more reliable.
____ ❑5 Make the information more accurate.
____ ❑6 Report incidents sooner after they happen.
____ ❑7 Present traffic reports more frequently.
____ ❑8 Make the system easier to use.
____ ❑9 Make the system more convenient to use.
____ ❑10 Make the system more able to catch my attention.
____ ❑11 Make the system less distracting.
____ ❑12 Give the reason for an unexpected delay.
____ ❑13 Give the expected length of an unexpected delay.
____ ❑14 Make the systems provide information on demand.
____ ❑15 Suggest appropriate alternate routes when an unexpected delay arises.
____ ❑16 Other (please specify):_____
____ ❑17 No improvement possible.

Now, please rank the 5 boxes checked in the preceding question in order of importance by writing a number from 1 to 5 on the line to the left of each of the 5 boxes checked in that question: 1 is most important, 2 is next most important, and so on.

(mean of responses from 0 to 5; where 0 indicates item not selected)

	Valid N	Mean	Std Dev	F Prob
1	89	1.0	1.58	0.8655
2	89	1.5	1.81	0.7726
3	89	0.8	1.37	0.0237
4	89	0.9	1.57	0.0747
5	89	0.9	1.61	0.8933
6	89	1.7	1.71	0.1796
7	89	1.0	1.68	0.4001
8	89	0.2	0.68	0.6247
9	89	0.5	1.33	0.8943
10	89	0.3	1.04	0.5243
11	89	0.1	0.44	0.6039
12	89	0.6	1.45	0.9428
13	89	1.6	1.79	0.5713
14	89	1.0	1.65	0.0821
15	89	1.6	1.94	0.0050
16	89	0.4	1.01	0.3489
17	89	0.0	0.18	0.8148

B66. Why didn't you use a *Changeable Message Sign* traffic information system during the past 8 weeks? *(check all that apply)*

❑$_0$ I didn't know of any systems that I could use.
❑$_1$ Available systems do not work reliably.
❑$_2$ The information was not complete enough (it did not tell me enough of the things I need to know).
❑$_3$ Not enough of the information was specific to my commute.
❑$_4$ The information is not reliable.
❑$_5$ The information is not accurate.
❑$_6$ The systems do not report incidents soon enough after they happen.
❑$_7$ The systems do not present reports frequently enough.
❑$_8$ The systems are too hard to use.
❑$_9$ The systems are too inconvenient to use.
❑$_{10}$ The systems do not catch my attention.
❑$_{11}$ The systems are distracting.
❑$_{12}$ The information does not give the reason for a delay.
❑$_{13}$ The information does give the expected length of a delay.
❑$_{14}$ The information the systems provide is not available on demand.
❑$_{15}$ The information does not suggest appropriate alternate routes.
❑$_{16}$ Other
❑$_{17}$ I wouldn't take an alternate route even if I had information.
❑$_{18}$ I know the area well enough to get by without help.
❑$_{19}$ I rarely encounter a serious traffic problem.
❑$_{20}$ I rely on a different traffic information system.

(mean of responses 0 = didn't know of any and 1 = knew of)

	Valid N	Mean	Std Dev	F Prob	# who didn't know any	# did know
0	36	0.9	0.23	0.5970	2	34

(mean of responses 0 = not selected and 1 = selected)

	Valid N	Mean	Std Dev	F Prob
1	36	0.3	0.47	0.1802
2	36	0.5	0.51	0.7698
3	36	0.4	0.49	0.3099
4	36	0.3	0.45	0.0243
5	36	0.1	0.32	0.3791
6	36	0.3	0.45	0.7510
7	36	0.2	0.40	0.3650
8	36	0.1	0.23	0.4660
9	36	0.2	0.38	0.1538
10	36	0.1	0.32	0.8726
11	36	0.1	0.32	0.4809
12	36	0.2	0.38	0.7123
13	36	0.3	0.47	0.2064
14	36	0.2	0.40	0.0216
15	36	0.2	0.38	0.7555
16	36	0.3	0.45	0.1504
17	36	0.0	0.00	-
18	36	0.0	0.17	0.4022
19	36	0.0	0.00	-
20	36	0.4	0.50	0.8278

B67. In general, how much do you enjoy driving for your commute? *(check one)*

❑1 I Always Enjoy driving for my commute
❑2 I Usually Enjoy driving for my commute
❑3 I Sometimes Enjoy driving for my commute
❑4 I Seldom Enjoy driving for my commute
❑5 I Never Enjoy driving for my commute

(mean of responses from 1 to 5)

	Valid N	Mean	Std Dev	F Prob
	85	174	0.96	0.4480

B68. In general, how stressful do you find driving for your commute? *(check one)*

❑1 I Always Find driving for my commute Stressful
❑2 I Usually Find driving for my commute Stressful
❑3 I Sometimes Find driving for my commute Stressful
❑4 I Seldom Find driving for my commute Stressful
❑5 I Never Find driving for my commute Stressful

(mean of responses from 1 to 5)

	Valid N	Mean	Std Dev	F Prob
	174	2.9	0.73	0.4242

B69. In general, how stressful do you find being late for work? *(check one)*

❑1 Very Stressful
❑2 Somewhat Stressful
❑3 Not Very Stressful
❑4 Not At All Stressful

(mean of responses from 1 to 5)

	Valid N	Mean	Std Dev	F Prob
	174	2.0	0.80	0.6724

B70. On the average, how many mles do you drive in a year? *(check one)*

❑1 Less than 3.000
❑2 3,001-6,000
❑3 6,001-8,000
❑4 8,001-l 1,000
❑5 11,00l-14,000
❑6 More than 14,000

(mean of responses from 1 to 6)

	Valid N	Mean	Std Dev	F Prob
	174	5.6	0.75	0.6565

B71. Select the statement that best describes yourself. *(check one)*

❑1 I am good at finding my way through both familiar and unfamiliar areas
❑2 I am good at finding my way through familiar areas but have minor trouble in unfamiliar areas
❑3 I am good at finding my way through familiar areas but have trouble in unfamiliar areas
❑4 I have minor trouble finding my way through both familiar and unfamiliar areas
❑5 I have trouble finding my way through both familiar and unfamiliar areas

(mean of responses from 1 to 5)

	Valid N	Mean	Std Dev	F Prob
	174	1.8	0.73	0.0956

B72. How easy or difficult do YOU find road maps to use in selecting routes? *(check one)*

❑1 Very Easy
❑2 Somewhat Easy
❑3 Neither Easy Nor Difficult
❑4 Somewhat Difficult
❑5 Very Difficult

(mean of responses from 1 to 5)

	Valid N	Mean	Std Dev	F Prob
	174	1.9	0.99	0.4944

B73. Which of the following do youhave for *personal* (non-business) use? *(check all that apply)*

❑1 Desktop computer at home
❑2 Laptop computer
❑3 Internet access from home
❑4 Worldwide web browser software
❑5 Internet phone hookup (so you can make phone calls via the intemet)
❑6 Scanner (for use with a computer)
❑7 Cellular phone
❑8 Pager
❑9 Fax machine at home
❑10 Voice mall for home
❑11 Antilock braking on your car
❑12 Route guidance device on your car
❑13 Other "new" technology
❑14 None of the above

(mean of responses 0 = not selected and 1 = selected)

	Valid N	Mean	Std Dev	F Prob
1	173	0.7	0.46	0.4917
2	173	0.2	0.36	0.0214
3	173	0.5	0.50	0.0085
4	173	0.4	0.49	0.0098
5	173	0.2	0.40	0.0207
6	173	0.1	0.26	0.2361
7	173	0.7	0.46	0.7812
8	173	0.4	0.48	0.3617
9	173	0.2	0.42	0.1028
10	173	0.3	0.47	0.3567
11	173	0.7	0.47	0.4384
12	173	0.0	0.00	-
13	173	0.1	0.22	0.4122
14	173	0.0	0.13	0.7374

B74. In general, how interested are you in news items concerning new technology? *(check one)*

❑1 Very Interested
❑2 Somewhat Interested
❑3 Not Very Interested
❑4 Not At All Interested

(mean of responses from 1 to 4)

	Valid N	Mean	Std Dev	F Prob
	174	1.5	0.61	0.0171

B75. In general, do you find new technology easy or difficult to use? *(check one)*

❑1 Very Easy
❑2 Somewhat Easy
❑3 Neither Easy Nor Difficult
❑4 Somewhat Difficult
❑5 Very Difficult

(mean of responses from 1 to 5)

	Valid N	Mean	Std Dev	F Prob
	174	2.0	0.79	0.1112

B76. In general, how enjoyable do you find using devices with new technology? *(check one)*

❑1 Very Enjoyable
❑2 Somewhat Enjoyable
❑3 Not Very Enjoyable
❑4 Not At All Enjoyable

(mean of responses from 1 to 4)

	Valid N	Mean	Std Dev	F Prob
	174	1.5	0.53	0.0275

B77. In general, how frustrating do you find using devices with new technology? *(check one)*

❑1 Very Frustrating
❑2 Somewhat Frustrating
❑3 Not Very Frustrating
❑4 Not At All Frustrating

(mean of responses from 1 to 4)

	Valid N	Mean	Std Dev	F Prob
	174	3.0	0.73	0.0234

B78. How many people are there in your household? *(fill the blank)*

_____people

(mean of number of people)

	Valid N	Mean	Std Dev	F Prob
	171	3.1	1.36	0.1299

B79. Are you married? *(check one)*

❑0 No ❑1 Yes

(mean of responses from 0 to 1)

	Valid N	Mean	Std Dev	F Prob
	173	1.2	0.41	0.7802

B80. How many licensed motor vehicles are there in your household? *(fill the blank)*

_____vehicles

(mean of number of vehicles)

	Valid N	Mean	Std Dev	F Prob
	172	2.4	1.04	0.3791

B81. What are the makes and models of the vehicles you own? *(fill the blanks)*

	a. Primary vehicle	b. Vehicle 2	c. Vehicle 3
1. year	_____	_____	_____
2. make (e.g., Buick)	_____	_____	_____
3. model	_____	_____	_____

(mean of vehicle year)

	Valid N	Mean	Std Dev	F Prob
a.1	170	93.3	3.00	0.1522
b.1	141	92.4	4.66	0.8432
c.1	52	87.4	6.32	0.7400

The response for parts 2 and 3 of question are text and thus there is no arithmetic mean.

B82. What is your job title? *(fill the blank)*

_____

Subject response to this question is included in the third section of this appendix.

B83. What is the highest level of education you have completed?
(check the most appropriate box)

❑1 Less Than High School Diploma
❑2 High School Diploma (or equivalent)
❑3 Some College
❑4 Bachelor's Degree
❑5 Some Graduate School
❑6 Graduate Degree

(mean of responses from 1 to 6)

	Valid N	Mean	Std Dev	F Prob
Raw	173	4.3	1.24	0.1093

BQ83CAT

1: Less than HS, HS
2: BS/BA
3: Some grad school
4: MA/MS and up

(mean of categories from 1 to 4)

	Valid N	Mean	Std Dev	F Prob
	173	2.4	1.18	0.1605

B84. What is your *total family* gross income? *(check one)*

❑1 Less than $20,000
❑2 $20,000 to $39,999
❑3 $40,000 to $59,999
❑4 $60,000 to $79,999
❑5 $80.000 to $99,999
❑6 $100,000 to $119,999
❑7 $120,000 to $139,999
❑8 $140,000 or more

(mean of responses from 1 to 9)

	Valid N	Mean	Std Dev	F Prob
Raw	163	4.7	1.49	0.2188

BQ84CAT

1: Less than $60,000
2: $60,000 - $79,999
3: $80,000 - $99,999
4: Over $100,000

(mean of responses from 1 to 4)

	Valid N	Mean	Std Dev	F Prob
	163	2.6	1.12	.0958

EDUINC categorization

1: Less than HS, HS; BS/BA; Less than $60,000; $60,000 - $79,999
2: Less than HS, HS; BS/BA; $80,000 - $99,999; Over $100,000
3: Some grad school; MA/MS and up; Less than $60,000; $60,000 - $79,999
4: Some grad school; MA/MS and up; $80,000 - $99,999; Over $100,000

(mean of responses from 1 to 4)

	Valid N	Mean	Std Dev	F Prob
	163	2.3	1.22	0.2110

B85(A62). If you like, please make any additional comments (either about DIRECT or traffic information in general).[Use the back of the page if you need more space.]

Subject response to this question is included in the third section of this appendix.

Subject Response to the After Questionnaire

Al(B4). On average, how many minutes does your usual ***home-to-work* commute take?**

_____minutes

(mean of responses from 1 to 5)

	Valid N	Mean	Std Dev	F Prob
	170	42.3	13.60	0.7203

A2(B5). On average, how frequently does an unexpected delay occur on your usual ***home-to-work* commute?** *(check one)*

❑1 5 (or more) days a week
❑2 3 or 4 days a week
❑3 1 or 2 days a week
❑4 1 day every 2 weeks
❑5 1 day a month or less

(mean of responses from 1 to 5)

	Valid N	Mean	Std Dev	F Prob
	169	3.3	0.90	0.0954

A3a(B6a). When an unexpected delay occurs on your usual ***home-to-work* commute, do you usually take an alternate route to avoid the delay?** *(check one)*

❑0 No ❑1 Yes

(mean of responses from 0 to 1)

	Valid N	Mean	Std Dev	F Prob
	170	0.5	0.50	0.5148

A3b(B6b). When an unexpected delay occurs on your usual ***home-to-work* commute, how long, on average, is the delay?** *(check one; if you usually take an alternate route to avoid delays, check how long you think the delays on your usual route might have been)*

❑1 Less than 5 minutes
❑2 5 minutes or more but less than 10 minutes
❑3 10 minutes or more but less than 15 minutes
❑4 15 minutes or more but less than 20 minutes
❑5 20 minutes or more

(mean of responses from 1 to 5)

	Valid N	Mean	Std Dev	F Prob
	170	3.2	1.01	0.2305

A4(B13a). During your commute, what is the longest delay (beyond that normally expected) that you would tolerate before you would switch from your usual route to an alternate route? *(answer both columns)*

a. Home-to-Work Commute ___minutes b. Work-to-Home Commute ___minutes

(mean of number of minutes)

	Valid N	Mean	Std Dev	F Prob
a	170	15.6	8.31	0.3804
b	169	16.7	9.14	0.3445

A5(B13b). During your commute, how much time would you have to expect to save in order to switch from your usual route to an alternate route? *(answer both columns)*

a. Home-to-Work Commute ___minutes b. Work-to-Home Commute ___minutes

(mean of number of minutes)

	Valid N	Mean	Std Dev	F Prob
a	166	12.0	6.58	0.7195
b	165	12.6	6.83	0.4392

A6. If more than one route is available between your home and work, what factors do you Consider in choosing between routes? *(Please distribute 100 points among the following. For example, travel time might be worth 30 points to you, mileage worth 25, and so on up to a total **of** 100 points.)*

Points Assigned

_____ points$_1$ Expected travel time on each route
_____ points$_2$ Total mileage on each route
_____ points$_3$ Availability of traffic information for each route
_____ points$_4$ Road type (expressway, major street, residential street) on each route
_____ points$_5$ Number of turns on each route
_____ points$_6$ Other

(mean of number of point out of 100)

	Valid N	Mean	Std Dev	F Prob
1	169	51.8	21.59	0.7472
2	129	15.9	9.99	0.1904
3	123	14.0	9.81	0.6375
4	151	21.1	14.60	0.8010
5	85	5.0	6.58	0.7936
6	57	12.9	18.60	0.0312

A7. To what extent do you agree or disagree with the following statement: "If I leave my usual route to get around a traffic delay, I want to get back to my usual route as soon as possible." *(check one)*

❑$_1$ Strongly Disagree
❑$_2$ Somewhat Disagree
❑$_3$ Neither Agree Nor Disagree
❑$_4$ Somewhat Agree
❑$_5$ Strongly Agree

(mean of responses from 1 to 5)

	Valid N	Mean	Std Dev	F Prob
	170	3.3	1.21	0.6480

A8(B9). Within the area shown on the map, how familiar are you with alternate routes for your commute? *(check one box in each column)*

a. Home-to-Work Commute
❑$_1$ Very Familiar ❑$_2$ Somewhat Familiar
❑$_3$ Not Very Familiar ❑$_4$ Don't know of any

b. Work-to-Home Commute
❑$_1$ Very Familiar ❑$_2$ Somewhat Familiar
❑$_3$ Not Very Familiar ❑$_4$ Don't know of any

(mean of responses from 1 to 4)

	Valid N	Mean	Std Dev	F Prob	# who don't know of any
A	170	1.7	0.70	0.6410	2
b	166	1.6	0.64	0.3906	1

A9(B10). Within the area shown on the map, how many alternate routes do you know of for your commute? *(answer both columns: write 0 if you don't know of any routes other than your usual route, write 1 if you know* of one route *in addition to your usual route, etc.)*

a. Home-to-Work Commute _____routes b. Work-to-Home Commute _____routes

(mean of number of routes)

	Valid N	Mean	Std Dev	F Prob	# who knew of no alt rtes
a	169	3.3	1.90	0.9306	7
b	169	3.5	1.91	0.8644	3

A10(B11). How did you find out about these alternate routes for your commute? *(check all that apply)*

❑$_0$ Don't know of any alternate routes (only know my usual route)
❑$_1$ From a relative, friend, or coworker, etc.
❑$_2$ Through personal experience over a long time
❑$_3$ By driving different routes to see where they went
❑$_4$ By reading a map
❑$_5$ Heard/saw them suggested in a traffic report
❑$_6$ Other
❑$_7$ Through the DIRECT Project

(mean of responses 0 = don't know any and 1 = know at least one)

	Valid N	Mean	Std Dev	F Prob	# who don't know any	# know at least one
0	170	1.0	0.13	0.2681	3	167

(mean of responses from 1 to 7)

	Valid N	Mean	Std Dev	F Prob
1	167	0.4	0.49	0.1683
2	167	0.8	0.41	0.1628
3	167	0.4	0.50	0.1154
4	167	0.4	0.48	0.2061
5	167	0.1	0.24	0.5499
6	167	0.0	0.11	0.5617
7	133	0.0	0.12	0.5919

A11(B12). Within the area shown on the map, how willing are you to use alternate routes (routes other than your usual route) for your commute? *(check one box in each column)*

a. Home-to-Work Commute
❑$_1$ Very Willing
❑$_2$ Somewhat Willing
❑$_3$ Not Very Willing
❑$_4$ Will not take

b. Work-to-Home Commute
❑$_1$ Very Willing
❑$_2$ Somewhat Willing
❑$_3$ Not Very Willing
❑$_4$ Will not take

(mean of responses from 1 to 4)

	Valid N	Mean	Std Dev	F Prob	# who will not take
a	170	1.7	0.69	0.6644	0
b	170	1.6	0.61	0.9128	0

A12(B14). Within the area shown on the map, *how many times* did you use an alternateroute for your commute in the past *8 weeks?* *(answer both columns: write 0 if you didn't use any routes other than your usual route, write I if you used one route in addition to your usual route, and so on)*

a. Home-to-Work Commute ___times b. Work-to-Home Commute ___times

(mean of number of times)

	Valid N	Mean	Std Dev	F Prob	# who knew of no alt rtes
a	169	4.2	5.87	0.7213	50
b	169	4.6	5.20	0.3590	25

A13(B15). Within the area shown on the map, how many *different* alternate routes did youuse for your commute in the past *8 weeks?* *(answer both columns; write 0 if you didn't use any routes other than your usual route, write 1 if you used one route in addition to your usual route, and so on)*

a. Home-to-Work Commute _____routes b. Work-to-Home Commute _____routes

(mean of number of routes)

	Valid N	Mean	Std Dev	F Prob	# who knew of no alt rtes
a	170	1.3	1.20	0.7380	54
b	170	1.9	1.40	0.6238	27

A14(B16). If you took one or more alternate routes for your commute in the past 8 weeks, to what extent do you agree or disagree with the following statement: "In general I am satisfied with the outcome when I take an alternate route." *(check one in each column)*

a. Home-to-Work Commute

a.1 ❑$_0$ Didn't Take An Alternate Route

a.2 ❑$_1$ Strongly Disagree
❑$_2$ Somewhat Disagree
❑$_3$ Neither
❑$_4$ Somewhat Agree
❑$_5$ Strongly Agree

b. Work-to-Home Commute

b.1 ❑$_0$ Didn't Take An Alternate Route

b.2 ❑$_1$ Strongly Disagree
❑$_2$ Somewhat Disagree
❑$_3$ Neither
❑$_4$ Somewhat Agree
❑$_5$ Strongly Agree

(mean of responses 0 = did not take and 1 took)

	Valid N	Mean	Std Dev	F Prob	# who did not take alt rte	# who took alt rte
a.1	160	0.8	0.42	0.1643	36	124
b.1	160	0.9	0.30	0.2363	16	144

(mean of responses from 1 to 5)

	Valid N	Mean	Std Dev	F Prob
a.2	124	3.8	1.04	0.1988
b.2	144	3.8	1.00	0.7287

A15(B17). If you took one or more alternate routes for your commute, how much time do you think you usually saved (in comparison to traveling on the original route)? *(check one in each column)*

a. Home-to-Work Commute

a.1 ❑$_0$ Didn't Take An Alternate Route

a.2 ❑$_1$ Didn't save any time (alt. rt. took longer)
❑$_2$ Saved less than 5 minutes
❑$_3$ Saved 5 mm or more but less than 10 min
❑$_4$ Saved 10 min or more but less than 15 min
❑$_5$ Saved 15 min or more but less than 20 min
❑$_6$ Saved 20 minutes or more

b. Work-to-Home Commute

b.1 ❑$_0$ Didn't Take An Alternate Route

b.2 ❑$_1$ Didn't save any time (alt. took longer)
❑$_2$ Saved less than 5 minutes
❑$_3$ Saved 5 min or more but less than 10 min
❑$_4$ Saved 10 min or more but less than 15 min
❑$_5$ Saved 15 min or more but less than 20 min
❑$_6$ Saved 20 minutes or more

(mean of responses 0 = did not take and 1 took)

	Valid N	Mean	Std Dev	F Prob	# who did not take alt rte	# who took alt rte
a.1	159	0.8	0.44	0.1769	40	119
b.1	160	0.9	0.29	0.3232	15	145

(mean of responses from 1 to 6)

	Valid N	Mean	Std Dev	F Prob
a.2	119	3.4	1.51	0.9166
b.2	145	3.5	1.60	0.9269

A16(B20). What are the 5 most important things that you might want a traffic information system to do for you? *(check 5 boxes, no more, no less)*

____ ❑$_1$ Tell me if traffic is heavier than usual
____ ❑$_2$ Tell me why traffic is heavier than usual
____ ❑$_3$ Tell me if traffic is lighter than usual
____ ❑$_4$ Tell me why traffic is lighter than usual
____ ❑$_5$ Tell me if there is an unexpected delay on my route
____ ❑$_6$ Tell me why there is an unexpected delay on my route
____ ❑$_7$ Tell me how long an unexpected delay on my route is expected to be
____ ❑$_8$ Tell me when there is NOT an unexpected delay on my route
____ ❑$_9$ Tell me the location of incidents that have occurred
____ ❑$_{10}$ Tell me the type of incidents that have occurred
____ ❑$_{11}$ Tell me the time that incidents occurred
____ ❑$_{12}$ Tell me the time that incidents are expected to be cleared
____ ❑$_{13}$ Tell me the location of construction
____ ❑$_{14}$ Tell me the duration of construction
____ ❑$_{15}$ Tell me if I should take an alternate route
____ ❑$_{16}$ Tell me why I should take an alternate route
____ ❑$_{17}$ Suggest an alternate route(s) for me to take
____ ❑$_{18}$ Other

Now, please rank the 5 boxes checked in the preceding question in order of importance by writing a number from 1 to 5 on the line to the left of each of the 5 boxes checked in that question: 1 is most important, 2 is next most important, and so on.

(mean of responses from 0 to 5; where 0 indicates item not selected)

	Valid N	Mean	Std Dev	F Prob
1	170	1.4	1.90	0.5500
2	170	1.0	1.73	0.3545
3	170	0.1	0.72	0.2329
4	170	0.0	0.38	0.3681
5	170	1.3	1.24	0.8344
6	170	0.8	1.50	0.9230
7	170	1.8	1.75	0.3606
8	170	0.1	0.64	0.8559
9	170	1.8	1.38	0.0180
10	170	0.5	1.24	0.4695
11	170	0.6	1.43	0.2957
12	170	1.2	1.77	0.5304
13	170	1.9	1.95	0.1529
14	170	0.4	1.28	0.4042
15	170	1.0	1.75	0.7937
16	170	0.1	0.64	0.0895
17	170	1.0	1.75	0.6200
18	170	0.0	0.39	0.4640

A17(B21). Would you want a traffic information system to provide you with information relevant only to where you want to go or for the whole metro area? *(check one)*

❑1 Provide me with information only for where I want to go
❑2 Provide me with information for the whole metro area

(mean of responses from 1 to 2)

	Valid N	Mean	Std Dev	F Prob
	170	1.4	0.50	0.4131

A18(B22). How much would you be willing to pay for a traffic information system that completely meets your needs? *(fill in the blank in each row)*

$_____1 If payment was a one time fee (answer in dollars total)
$_____2 If payment was on a per-use basis (answer in [fractions ofj dollars per use)
$_____3 If payment was on a monthly basis (answer in dollars per month)
$_____4 If payment was on an annual basis (answer in dollars per year)
$_____5 Other

(mean willingness to pay)

	Valid N	Mean	Std Dev	F Prob
1	112	117.0	124.35	0.1697
2	102	1.3	3.29	0.6569
3	116	6.8	6.59	0.5150
4	112	55.9	55.71	0.8291
5	23	5.5	18.39	0.8018

A19(B23). Who should provide traffic information? *(check one)*

❑0 Traffic information is not needed
❑1 Government
❑2 Private companies
❑3 Both government and private companies
❑4 Other

(mean of responses from 0 to 5)

	Valid N	Mean	Std Dev	F Prob
	169	2.6	0.68	0.0426

The mean response for this question has no real-world significance. To better understand subject response, please view the cross tabulation of the data in Appendix H.

A20(B24). How should traffic information be paid for? *(check all that apply)*

❑0 Traffic information is not needed

❑1 Gas tax
❑2 User fees
❑3 Advertising
❑4 Property tax
❑5 Subscription fee paid by individuals
❑6 Device purchase by individuals
❑7 Tax on employers
❑8 Vehicle Registration Tax
❑9 Sales tax
❑10 Other

(mean of responses 0 = info not needed and 1 = info needed)

	Valid N	Mean	Std Dev	F Prob	# who never listen	# who do listen
0	170	0.0	0.00	-	0	170

(mean of responses 0 = not selected and 1 = selected)

	Valid N	Mean	Std Dev	F Prob
1	170	0.2	0.41	0.8038
2	170	0.4	0.49	0.5307
3	170	0.3	0.48	0.1612
4	170	0.0	0.13	0.7253
5	170	0.5	0.50	0.7804
6	170	0.5	0.50	0.3820
7	170	0.1	0.28	0.8388
8	170	0.3	0.45	0.6420
9	170	0.1	0.26	0.6553
10	170	0.1	0.22	0.2675

A21(B25). What are the top five things that the government should be doing with transportation tax dollars? *(check 5 boxes, no more, no less)*

____ ❑1 Repair roadways (fill potholes, fix bridges, etc.)
____ ❑2 Add regular lanes to the expressways
____ ❑3 Add High Occupancy Vehicle lanes to the expressways
____ ❑4 Build new roads
____ ❑5 Beautify the roadways
____ ❑6 Add more roadside call boxes (for safety)
____ ❑7 Expand the freeway courtesy patrol (which helps motorists in need)
____ ❑8 Come to the aid of motorists in need faster
____ ❑9 Clear incidents from raodways faster
____ ❑10 Improve traffic information
____ ❑11 Add more Changeable Message Signs on the expressways
____ ❑12 Provide more public transit
____ ❑13 Provide rideshare coordination
____ ❑14 Other

Now, please rank the 5 boxes checked in the preceding question in order of importance by writing a number from 1 to 5 on the line to the left of each of the 5 boxes checked in that question: 1 is most important, 2 is next most important, and so on.

(mean of responses from 1 to 7)

	Valid N	Mean	Std Dev	F Prob
1	170	1.3	0.78	0.8722
2	170	1.2	1.69	0.4975
3	170	0.9	1.71	0.5767
4	170	1.4	1.72	0.0203
5	170	0.6	1.49	0.3444
6	170	0.4	1.22	0.8133
7	170	1.6	1.97	0.4476
8	170	1.0	1.73	0.6239
9	170	1.7	1.78	0.4774
10	170	1.8	1.89	0.7459
11	170	0.8	1.71	0.5431
12	170	1.4	1.76	0.1754
13	170	0.4	1.36	0.0575
14	170	0.2	0.82	0.5788

A22. For my *home-to-work* commute during the past 8 weeks, I accessed traffic information system(s) (all types together, including DIRECT): *(check one)*

❑1 Much Less Than Before the Test
❑2 Less Than Before the Test
❑3 Much Less Than Before the Test
❑4 About the Same as Before the Test
❑5 More Than Before the Test
❑6 Much More Than Before the Test

(mean of responses from 1 to 5)

	Valid N	Mean	Std Dev	F Prob
	169	3.6	0.77	0.0002

A23. For my *home-to-work* commute during the past 8 weeks, I accessed (the listed) traffic information system: *(check one box in each row)*

		Much Less Than Before the Test	Less Than Before the Test	About the Same as Before the	More Than Before the Test	Much More Than Before Much
1	Commercial Radio	❑1	❑2	❑3	❑4	❑5
2	Television	❑1	❑2	❑3	❑4	❑5
3	Changeable Message Signs	❑1	❑2	❑3	❑4	❑5
4	Other	❑1	❑2	❑3	❑4	❑5

(mean of responses from 1 to 5)

	Valid N	Mean	Std Dev	F Prob
1	169	3.2	0.70	0.8117
2	157	2.9	0.62	0.0080
3	162	3.1	0.54	0.2492
4	52	4.0	1.08	0.1596

A24(B26). For your *home-to-work* commute during the past 8 weeks, *which* traffic information system(s) did you typically use? *(check all that apply)*

❑0 Didn't use a traffic information system

❑1 Commercial Radio
❑2 Television
❑3 Expressway Changeable Message Signs
❑4 Other
❑5 DIRECT Project

(mean of responses 0 = didn't used and 1 = used)

	Valid N	Mean	Std Dev	F Prob	# who did not use	# who did use
0	138	1.0	0.00	-	0	138

(mean of responses 0 = did not use and 1 = used)

	Valid N	Mean	Std Dev	F Prob
1	169	0.9	0.25	0.2714
2	169	0.3	0.46	0.5713
3	169	0.4	0.48	0.1829
4	169	0.0	0.13	0.2175
5	135	0.8	0.41	0.0020

A25(B28). For your *home-to-work* commute during the past 8 weeks, *when* did you typically use traffic information system(s)? *(check one in each column)*

a. Commercial Radio
a.1 ❑0 Didn't use

a.2 ❑1 Used only before I left home
❑2 Used only during the trip
❑3 Used both before I left home and during the trip

b. DIRECT Project
b.1 ❑0 Didn't use

b.2 ❑1 Used only before I left home
❑2 Used only during the trip
❑3 Used both before I left home and during the trip

(mean of responses 0 = did not use and 1 = used)

	Valid N	Mean	Std Dev	F Prob	# who did not use	# who did use
a.1	170	1.0	0.11	0.5837	2	168
b.1	134	0.9	0.26	0.2023	10	124

(mean of responses from 1 to 3)

	Valid N	Mean	Std Dev	F Prob
a.2	168	2.5	0.52	0.4373
b.2	124	2.2	0.49	0.0469

The mean response for a.2 and b.2 of this question has no real-world significance. To better understand subject response, please view the cross tabulation of the data in Appendix H.

A26(B29). For your ***home-to-work* commute during the past 8 weeks, ***how would you describe*** your typical use of traffic information system(s)?** *(check one box in each row)*

	Home-to-Work Commute	a Did Not Use	b Used Less Than Once A Week	Used 1 Time A Week	Used A Few Times A Week	Used 1 Time A Day	Used 2 or More Times A Day
1	Commercial Radio	❑0	❑1	❑2	❑3	❑4	❑5
2	Television						
3	Changeable Message Signs						
4	Other						
5	DIRECT Project						

(mean of responses 0 = did not use and 1 = used)

	Valid N	Mean	Std Dev	F Prob	# who didn't use	# who used
1a	169	1.0	0.11	0.5886	2	167
2a	152	0.5	0.50	0.4224	84	68
3a	155	0.6	0.49	0.3405	61	94
4a	76	0.0	0.20	0.6658	73	3
5a	133	0.9	0.25	0.0163	9	124

(mean of responses from 1 to 5)

	Valid N	Mean	Std Dev	F Prob
1b	167	4.6	0.95	0.8656
2b	68	3.0	1.27	0.8366
3b	94	3.2	1.52	0.6831
4b	3	3.7	1.15	-
5b	124	4.2	1.24	0.0687

A27(B30). For your *home-to-work* commute during the past 8 weeks, to what extent did you rely on traffic information system(s) in *deciding when to leave home*? *(check one box in each row; if you did not use the system, check "DID NOT USE", if you did use the system, check one of the other-four boxes in the row)*

Home-to-Work Commute	a DID NOT USE	b DID NOT RELY ON AT ALL	DID NOT RELY ON VERY MUCH	RELY ON SOMEWHAT	RELY ON VERY MUCH
1 Commercial Radio	❑0	❑1	❑2	❑3	❑4
2 Television					
4 Other					
5 DIRECT Project					

(mean of responses 0 = did not use and 1 = used)

	Valid N	Mean	Std Dev	F Prob	# who didn't use	# who used
1a	169	0.6	0.49	0.6694	64	105
2a	163	0.5	0.50	0.2612	90	73
4a	124	0.2	0.37	0.1456	104	20
5a	132	0.5	0.50	0.5791	65	67

(mean of 1 to 4)

	Valid N	Mean	Std Dev	F Prob
1a	169	0.6	0.49	0.6694
2a	163	0.5	0.50	0.2612
4a	124	0.2	0.37	0.1456
5a	132	0.5	0.50	0.5791

A28(B31). For your *home-to-work* commute during the past 8 weeks, how many times did you *change the time you planned to leave home* because of a traffic information system? *(in each row check "DID NOT USE" this system or write a number: 0 if you used the system but didn't change your plans because of it, 1 if you used the system and changed your plans I time because of it, and so on)*

Home-to-Work Commute

1 Commercial Radio ❑0 DID NOT USE CHANGED ____ TIMES
2 Television
4 Other
5 DIRECT Project

(mean of responses 0 = did not use and 1 = used)

	Valid N	Mean	Std Dev	F Prob	# who didn't use	# who used
1a	170	0.6	0.50	0.3737	75	95
2a	163	0.4	0.49	0.4027	100	63
4a	139	0.2	0.39	0.8261	114	25
5a	130	0.4	0.49	0.9541	76	54

(mean of number of times)

	Valid N	Mean	Std Dev	F Prob
1b	95	2.0	3.66	0.3816
2b	63	1.5	3.17	0.3135
4b	25	0.1	0.40	0.5635
5b	54	0.2	1.37	0.3308

A29(B32). For your *home-to-work* commute during the past 8 weeks, to what extent did you rely on traffic information system(s) when you *chose a route before leaving home*? *(check one box in each row; if you did not use the system, check "DID NOT USE", if you did use the system, check one of the other four boxes in the row)*

Home-to-Work Commute	a DID NOT USE	b DID NOT RELY ON AT ALL	DID NOT RELY ON VERY MUCH	RELY ON SOMEWHAT	RELY ON VERY MUCH
1 Commercial Radio	❑0	❑1	❑2	❑3	❑4
2 Television					
4 Other					
5 DIRECT Project					

(mean of responses 0 = did not use and 1 = used)

	Valid N	Mean	Std Dev	F Prob	# who didn't use	# who used
1a	169	0.7	0.46	0.2400	52	117
2a	165	0.4	0.49	0.1736	100	65
4a	129	0.2	0.36	0.3470	110	19
5a	133	0.6	0.50	0.0541	57	76

(mean of 1 to 4)

	Valid N	Mean	Std Dev	F Prob
1b	117	2.9	1.08	0.5552
2b	65	2.5	1.02	0.1187
4b	19	1.4	0.84	0.9451
5b	76	2.0	1.08	0.1561

A30(B33). For your *home-to-work* commute during the past 8 weeks, how many times did you *change your route before leaving home* because of a traffic information system? *(in each row check "DID NOT USE" this system or write a number: 0 if you used the system but didn't change your route because of it, 1 if you used the system and changed your plans I time because of it, and so on)*

Home-to-Work Commute

1 Commercial Radio ❑0 DID NOT USE CHANGED ____ TIMES
2 Television
4 Other
5 DIRECT Project

(mean of responses 0 = did not use and 1 = used)

	Valid N	Mean	Std Dev	F Prob	# who didn't use	# who used
1a	169	0.6	0.49	0.0799	67	102
2a	163	0.4	0.49	0.5774	100	63
4a	142	0.2	0.36	0.5260	120	22
5a	132	0.5	0.50	0.0507	70	62

(mean of number of times)

	Valid N	Mean	Std Dev	F Prob
1b	102	2.1	3.41	0.5334
2b	63	1.7	3.54	0.0881
4b	22	0.1	0.64	0.3633
5b	62	0.4	0.86	0.3251

A31(B34). For your *home-to-work* commute during the past 8 weeks, how many times did you *change your route during the trip* because of a traffic information system? *(in each row check "DID NOT USE" this system or write a number: 0 if you used the system but didn't change your route because of it, 1 if you used the system and changed your plans I time because of it, and so on)*

Home-to-Work Commute

1 Commercial Radio ❑$_0$ DID NOT USE CHANGED ____ TIMES
3 Changeable Message Signs
4 Other
5 DIRECT Project

(mean of responses 0 = did not use and 1 = used)

	Valid N	Mean	Std Dev	F Prob	# who didn't use	# who used
1a	165	0.9	0.31	0.8939	18	147
3a	155	0.4	0.49	0.4252	91	64
4a	134	0.2	0.39	0.9561	109	25
5a	133	0.8	0.43	0.0441	32	101

(mean of number of times)

	Valid N	Mean	Std Dev	F Prob
1b	147	2.6	4.02	0.1079
3b	64	0.9	2.51	0.4075
4b	25	1.2	3.57	0.5887
5b	101	0.8	1.41	0.1514

A32(B35). For your *home-to-work* commute during the past 8 weeks, how many times did you *cancel your commute* because of a traffic information system? *(in each row check "DID NOT USE" this system or write a number: 0 if you used the system but didn't change your route because of it, 1 if you used the system and changed your plans I time because of it, and so on)*

Home-to-Work Commute

1 Commercial Radio ❑$_0$ DID NOT USE CHANGED ____ TIMES
2 Television
4 Other
5 DIRECT Project

(mean of responses 0 = didn't use and 1 = used)

	Valid N	Mean	Std Dev	F Prob	# who didn't use	# who used
1a	168	0.8	0.43	0.6009	40	128
2a	163	0.4	0.50	0.9009	94	69
4a	146	0.3	0.44	0.6737	107	39
5a	132	0.7	0.47	0.2904	42	90

(mean of number of times)

	Valid N	Mean	Std Dev	F Prob
1b	128	0.1	0.34	0.2667
2b	69	0.0	0.27	0.1592
4b	39	0.0	0.00	-
5b	90	0.0	0.32	0.3829

A33. For my *work-to-home* commute during the past 8 weeks, I accessed traffic information system(s) (all types together, including DIRECT): *(check one)*

❑$_1$ Much Less Than Before the Test
❑$_2$ Less Than Before the Test
❑$_3$ Much Less Than Before the Test
❑$_4$ About the Same as Before the Test
❑$_5$ More Than Before the Test
❑$_6$ Much More Than Before the Test

(mean of responses from 1 to 5)

	Valid N	Mean	Std Dev	F Prob
	170	3.7	0.77	0.0001

A34. For my *work-to-home* commute during the past 8 weeks, I accessed (the listed) traffic information system: *(check one box in each row)*

		Much Less Than Before the Test	Less Than Before the Test	About the Same as Before the	More Than Before the Test	Much More Than Before
1	Commercial Radio	❑$_1$	❑$_2$	❑$_3$	❑$_4$	❑$_5$
2	Television					
3	Changeable Message Signs					
4	Other					

(mean of responses from 1 to 5)

	Valid N	Mean	Std Dev	F Prob
1	169	3.3	0.70	0.8193
2	144	2.7	0.71	0.9616
3	157	3.0	0.69	0.7121
4	82	3.6	1.21	0.0608

A35(B36). For your *work-to-home* commute during the past 8 weeks, *which* traffic information system(s) did you typically use? *(check all that apply)*

❑$_0$ Didn't use a traffic information system

❑$_1$ Commercial Radio
❑$_2$ Television
❑$_3$ Expressway Changeable Message Signs
❑$_4$ Other
❑$_5$ DIRECT Project

(mean of responses 0 = didn't use and 1 = used)

	Valid N	Mean	Std Dev	F Prob	# who didn't use	# who used
0	170	1.0	0.13	0.7446	3	167

(mean of responses 0 = not selected and 1 = selected)

	Valid N	Mean	Std Dev	F Prob
1	167	1.0	0.15	0.5029
2	167	0.0	0.20	0.2495
3	167	0.3	0.46	0.0973
4	167	0.0	0.17	0.7317
5	134	0.8	0.41	0.0020

A36(B38). For your *work-to-home* commute during the past 8 weeks, *when* did you typically use (Commercial Radio before only) traffic information system(s)? *(check one in each column)*

a. Commercial Radio
a.1 ❑0 Didn't use
a.2 ❑1 Used only before I left home
❑2 Used only during the trip
❑3 Used both before I left home and during the trip

b. DIRECT Project
b.1 ❑0 Didn't use
a.2 ❑1 Used only before I left home
❑2 Used only during the trip
❑3 Used both before I left home and during the trip

(mean of responses 0 = did not use and 1 = used)

	Valid N	Mean	Std Dev	F Prob	# who didn't use	# who used
a.1	169	1.0	0.13	0.7308	3	166
b.1	135	0.9	0.30	0.3648	13	122

(mean of responses from 1 to 3)

	Valid N	Mean	Std Dev	F Prob
a.2	166	2.4	0.49	0.0378
b.2	122	2.3	0.49	0.0443

The mean response for part a.2 of this question has no real-world significance. To better understand subject response, please view the cross tabulation of the data in Appendix H.

A37(B39). For your *work-to-home* commute during the past 8 weeks, *how would you describe* your typical use of traffic information system(s)? *(check one box in each row)*

	Work-to-Home Commute	a Did Not Use	b Used Less Than Once a Week	Used 1 Time a Week	Used a Few Times a Week	Used 1 Time a Day	Used 2 or More Times a Day
1	Commercial Radio	❑0	❑1	❑2	❑3	❑4	❑5
2	Television						
3	Changeable Message Signs						
4	Other						
5	DIRECT Project						

(mean of responses 0 = did not use and 1 = used)

	Valid N	Mean	Std Dev	F Prob	# who didn't use	# who used
1a	170	1.0	0.17	0.7303	5	165
2a	154	0.1	0.33	0.5376	135	19
3a	152	0.5	0.50	0.3284	72	80
4a	110	0.1	0.25	0.9022	103	7
5a	131	0.9	0.31	0.1128	14	117

(mean of responses from 1 to 5)

	Valid N	Mean	Std Dev	F Prob
1b	165	4.6	0.76	0.2585
2b	19	3.2	1.23	0.0909
3b	80	3.4	1.49	0.8515
4b	7	3.0	1.29	0.4375
5b	117	4.3	1.10	0.4435

A38(B40). For your *work-to-home* commute during the past 8 weeks, to what extent did you rely on traffic information system(s) in *deciding when to leave work*? *(check one box in each row; if you did not use the system, check "DID NOT USE", if you did use the system, check one of the other four boxes in the row)*

Work-to-Home Commute	a DID NOT USE	b DID NOT RELY ON AT ALL	DID NOT RELY ON VERY MUCH	RELY ON SOMEWHAT	RELY ON VERY MUCH
1 Commercial Radio	❑0	❑1	❑2	❑3	❑4
2 Television					
4 Other					
5 DIRECT Project					

(mean of responses 0 = did not use and 1 = used)

	Valid N	Mean	Std Dev	F Prob	# who didn't use	# who used
1a	170	0.6	0.49	0.7713	69	101
2a	164	0.2	0.41	0.7435	129	35
4a	140	0.2	0.42	0.5870	109	31
5a	134	0.5	0.50	0.5988	67	67

(mean of responses from 1 to 4)

	Valid N	Mean	Std Dev	F Prob
1b	101	1.9	1.09	0.5675
2b	35	1.3	0.64	0.4888
4b	31	1.3	0.83	0.4869
5b	67	1.6	0.91	0.3101

A39(B41). For your *work-to-home* commute during the past 8 weeks, how many times did you *change the time you planned to leave work* because of a traffic information system? *(in each row check "DID NOT USE" this system or write a number: 0 if you used the system but didn't change your plans because of it, 1 if you used the system and changed your plans I time because of it, and so on)*

Work-to-Home Commute

1 Commercial Radio ❑0 DID NOT USE CHANGED ____ TIMES
2 Television
4 Other
5 DIRECT Project

(mean of responses 0 = did not use and 1 = used)

	Valid N	Mean	Std Dev	F Prob	# who didn't use	# who used
1a	169	0.6	0.50	0.8023	74	95
2a	164	0.1	0.35	0.8359	141	23
4a	148	0.1	0.34	0.8016	128	20
5a	134	0.4	0.50	0.0375	76	58

(mean of number of times)

	Valid N	Mean	Std Dev	F Prob
1a	95	1.0	3.06	0.3290
2a	23	0.1	0.46	0.0444
4a	20	1.6	4.88	0.5258
5b	58	0.2	0.96	0.4712

A40(B42). For your *work-to-home* commute during the past 8 weeks, to what extent did you rely on traffic information system(s) when you *chose a route before leaving work*? *(check one box in each row: if you did not use the system, check "DID NOT USE", if you did use the system, check one of the other four boxes in the row)*

	Work-to-Home Commute	a DID NOT USE	b DID NOT RELY ON AT ALL	DID NOT RELY ON VERY MUCH	RELY ON SOMEWHAT	RELY ON VERY MUCH
1	Commercial Radio	❑0	❑1	❑2	❑3	❑4
2	Television					
4	Other					
5	DIRECT Project					

(mean of responses 0 = did not use and 1 = used)

	Valid N	Mean	Std Dev	F Prob	# who didn't use	# who used
1a	169	0.6	0.49	0.4683	64	105
2a	164	0.1	0.33	0.1259	144	20
4a	146	0.2	0.37	0.7908	123	23
5a	135	0.5	0.50	0.0176	65	70

(mean of responses from 1 to 5)

	Valid N	Mean	Std Dev	F Prob
1b	105	2.6	1.22	0.6902
2b	20	1.4	0.67	0.8298
4b	23	2.0	1.15	0.9588
5b	70	2.1	1.12	0.9893

A41(B43). For your *work-to-home* commute during the past 8 weeks, how many times did you *change your route before 1eaving work* because of a traffic information system? *(in each row check "DID NOT USE" this system or write a number: 0 if you used the system but didn't change your route because of it, 1 if you used the system and changed your route I time because of it, and so on)*

Work-to-Home Commute

1 Commercial Radio ❑0 DID NOT USE CHANGED ____ TIMES
2 Television
4 Other
5 DIRECT Project

(mean of responses 0 = did not use and 1 = used)

	Valid N	Mean	Std Dev	F Prob	# who didn't use	# who used
1a	165	0.6	0.50	0.5347	73	92
2a	159	0.1	0.31	0.7674	142	17
4a	143	0.2	0.38	0.9504	119	24
5a	134	0.5	0.50	0.1383	70	64

(mean of number of times)

	Valid N	Mean	Std Dev	F Prob
1b	92	1.5	2.65	0.4082
2b	17	0.1	0.24	0.0857
4b	24	1.0	2.87	0.5231
5b	64	0.8	2.19	0.3567

A42(B44). For your *work-to-home* commute during the past 8 weeks, how many times did you *change your route during the trip* because of a traffic information system? *(in each row check "DID NOT USE" this system or write a number: 0 if you used the system but didn't change your route because of it, 1 if you used the system and changed your route I time because of it, and so on)*

Work-to-Home Commute

1 Commercial Radio ❑0 DID NOT USE CHANGED ____ TIMES
2 Television
4 Other
5 DIRECT Project

(mean of responses 0 = didn't use and 1 = used)

	Valid N	Mean	Std Dev	F Prob	# who didn't use	# who used
1a	169	0.9	0.29	0.6645	15	154
3a	157	0.3	0.48	0.7182	103	54
4a	137	0.2	0.39	0.3907	112	25
5a	135	0.8	0.36	0.1942	21	114

(mean of number of times)

	Valid N	Mean	Std Dev	F Prob
1b	154	2.6	3.46	0.7275
3b	54	1.1	2.95	0.3469
4b	25	0.6	2.08	0.7076
5b	114	1.0	1.48	0.8115

A43(B45). To what extent do you agree or disagree with the following statement: "Traffic information systems could be improved to the point that they completely meet my needs for traffic information." *(check one box in each row; if you do not know about a system or do not have opinions on it, check* ***"****AM NOT FAMILIAR WITH SYSTEM****". otherwise check one of the other five boxes in each row.)***

	a AM NOT FAMILIAR WITH SYSTEM	b STRONGLY DISAGREE	SOMEWHAT DISAGREE	NEITHER	SOMEWHAT AGREE	STRONGLY AGREE
1 Commercial Radio	❑0	❑1	❑2	❑3	❑4	❑5
2 Television						
3 Changeable Message Signs						
4 Other						
5 DIRECT Project						

(mean of responses 0 = not familiar and 1 = familiar)

	Valid N	Mean	Std Dev	F Prob	# not familiar	# familiar
1a	169	1.0	0.00	-	6	163
2a	159	0.8	0.37	0.7620	26	133
3a	161	1.0	0.20	0.9112	7	154
4a	91	0.4	0.48	0.2981	58	33
5a	133	1.0	0.09	0.3714	1	132

(mean of responses from 1 to 5)

	Valid N	Mean	Std Dev	F Prob
1b	169	4.0	1.03	0.8523
2b	133	3.0	1.33	0.5321
3b	154	3.4	1.35	0.9955
4b	33	3.1	0.96	0.8899
5b	132	4.2	1.02	0.0796

A44(B46). During the past 8 weeks, which traffic information system did you *rely on the most* in making decisions for your commute? *(check only one)*

a. ❑ Did not rely on any traffic information system

b. ❑$_1$ Commercial Radio
❑$_2$ Television
❑$_3$ Expressway Changeable Message Signs
❑$_4$ Other
❑$_5$ DIRECT Project

(mean of responses 0 = didn't rely on and 1 = relied on)

	Valid N	Mean	Std Dev	F Prob	# didn't rely on	# did rely on
a	166	1.0	0.20	0.4177	7	159

(mean of responses from 1 to 4)

	Valid N	Mean	Std Dev	F Prob
b	159	1.6	1.31	0.0000

The mean response for part b of this question has no real-world significance. To better understand subject response, please view the cross tabulation of the data in Appendix H.

A45(B47). Which traffic information system do you *like the best*? *(check only one)*

❑$_1$ Commercial Radio
❑$_2$ Television
❑$_3$ Expressway Changeable Message Signs
❑$_4$ Other
❑$_5$ No Preference
❑$_5$ DIRECT Project

	Valid N	Mean	Std Dev	F Prob
	169	1.8	1.69	0.0307

The mean response for this question has no real-world significance. To better understand subject response, please view the cross tabulation of the data in Appendix H.

A46(B49). Are you familiar with a *Commercial Radio* traffic information system? (By familiar we mean know about and have opinions on the system, whether or not you use the system in your decision making.) *(check one)*

❑$_0$ NO: PLEASE GO TO QUESTION (B55)A52; DO NOT ANSWER ~~QUESTIONS (B50)A47 THROUGH (B54)A51.~~
❑$_1$ YES: PLEASE GO TO THE NEXT QUESTION (QUESTION (B50)A47 BELOW).

(mean of responses from 0 to 1)

	Valid N	Mean	Std Dev	F Prob
	161	1.0	0.22	0.9432

A47(B50). If you are familiar with *Commercial Radio* traffic information system(s), please indicate the extent to which you agree or disagree with the following items. *(check one box* in *each row)*

	The ***Commercial Radio*** traffic information system:	STRONGLY DISAGREE	SOMEWHAT DISAGREE	NEITHER	SOMEWHAT AGREE	STRONGLY AGREE
1	works reliably	❑1	❑2	❑3	❑4	❑5
2	includes all the info I need to know					
3	is specific to my commute					
4	provides reliable information					
5	provides accurate information					
6	reports incidents soon after they happen					
7	presents reports frequently enough					
8	is easy to use					
9	is convenient to use					
10	catches my attention					
11	is distracting					
12	gives the reason for delays					
13	gives the expected length of delays					
14	provides information on demand					
15	suggests appropriate alternate routes					

(mean of responses from 1 to 5)

	Valid N	Mean	Std Dev	F Prob
1	160	3.9	0.88	0.4207
2	160	3.1	1.15	0.9461
3	160	2.8	1.21	0.0547
4	158	3.7	0.91	0.3955
5	160	3.7	0.85	0.4624
6	160	3.3	1.01	0.9896
7	160	3.6	1.22	0.6590
8	160	4.5	0.59	0.3323
9	160	4.5	0.72	0.2798
10	160	4.0	0.88	0.1181
11	158	1.9	0.90	0.3746
12	160	3.8	0.74	0.5215
13	158	2.6	1.05	0.2403
14	160	1.5	0.80	0.2575
15	160	2.4	1.15	0.2899

A48(B51). Have you used a *Commercial Radio* traffic information system in the past 8 weeks? *(check one)*

❑0 NO. PLEASE GO TO QUESTION (B54)A51; DO NOT ANSWER QUESTIONS (B52)A49 AND (B53)A50.
❑1 YES. PLEASE GO TO THE NEXT QUESTION (QUESTION (B52)A49 ON THE NEXT PAGE).

(mean of responses 0 = no and 1 = yes)

	Valid N	Mean	Std Dev	F Prob
	158	1.0	0.19	0.6754

A49(B52). Please indicate theextent to which you agree or disagree with the following statements. *(check one box* in *each row)*

	I found that using the ***Commercial Radio*** traffic information system:	STRONGLY DISAGREE	SOMEWHAT DISAGREE	NEITHER	SOMEWHAT AGREE	STRONGLY AGREE
1	satisfied my need for information.	❑1	❑2	❑3	❑4	❑5
2	helped me make better trip choices.					
3	made my commute less stressful.					
4	reduced my driving time.					
5	made my driving time more certain.					
6	made my arrival time more certain.					
7	helped me avoid congestion.					
8	helped me avoid unexpected delays.					
9	on the whole, improved my commute.					

(mean of responses from 1 to 5)

	Valid N	Mean	Std Dev	F Prob
1	156	3.7	0.99	0.9461
2	156	3.8	0.87	0.3868
3	156	3.5	0.88	0.3338
4	156	3.2	1.00	0.8554
5	156	3.2	1.00	0.3812
6	156	3.2	0.98	0.5871
7	156	3.7	0.89	0.9951
8	156	3.6	0.94	0.9593
9	156	3.7	0.86	0.4419

A50(B53). What are the 5 most important things that would improve the existing *Commercial Radio* traffic information system that you use most often? *(check 5 boxes, no more, no less)*

____ ❑1 Make the system work more reliably.
____ ❑2 Make the information more complete (tell more of the things I need to know),
____ ❑3 Make the information more specific to my commute (exclude irrelevant info).
____ ❑4 Make the information more reliable.
____ ❑5 Make the information more accurate.
____ ❑6 Report incidents sooner after they happen.
____ ❑7 Present traffic reports more frequently.
____ ❑8 Make the system easier to use.
____ ❑9 Make the system more convenient to use.
____ ❑10 Make the system more able to catch my attention.
____ ❑11 Make the system less distracting.
____ ❑12 Give the reason for an unexpected delay.
____ ❑13 Give the expected length of an unexpected delay.
____ ❑14 Make the systems provide information on demand.
____ ❑15 Suggest appropriate alternate routes when an unexpected delay arises.
____ ❑16 Other (please specify):_____
____ ❑17 No improvement possible.

Now, please rank the 5 boxes checked in the preceding question in order of importance by writing a number from 1 to 5 on the line to the left of each of the 5 boxes checked in that question: 1 is most important, 2 is next most important, and so on.

(mean of responses from 0 to 5; where 0 indicates item not selected)

	Valid N	Mean	Std Dev	F Prob
1	156	0.4	1.21	0.5014
2	156	1.7	1.81	0.4358
3	156	1.3	1.77	0.9257
4	156	0.8	1.50	0.1978
5	156	1.0	1.55	0.3544
6	156	1.7	1.61	0.4241
7	156	1.1	1.64	0.9810
8	156	0.0	0.08	0.3828
9	156	0.1	0.53	0.6706
10	156	0.2	0.84	0.9995
11	156	0.1	0.69	0.2245
12	156	1.0	1.68	0.1118
13	156	2.2	1.83	0.0883
14	156	1.1	1.55	0.8230
15	156	1.9	1.99	0.0458
16	156	0.2	0.76	0.8071
17	156	0.0	0.08	0.4051

A51(B54). Why didn't you use a *Commercial Radio* traffic information system during the past 8 weeks? *(check all that apply)*

❑$_0$ I didn't know of any systems that I could use.

❑$_1$ Available systems do not work reliably.
❑$_2$ The information was not complete enough (it did not tell me enough of the things I need to know).
❑$_3$ Not enough of the information was specific to my commute.
❑$_4$ The information is not reliable.
❑$_5$ The information is not accurate.
❑$_6$ The systems do not report incidents soon enough after they happen.
❑$_7$ The systems do not present reports frequently enough.
❑$_8$ The systems are too hard to use.
❑$_9$ The systems are too inconvenient to use.
❑$_{10}$ The systems do not catch my attention.
❑$_{11}$ The systems are distracting.
❑$_{12}$ The information does not give the reason for a delay.
❑$_{13}$ The information does give the expected length of a delay.
❑$_{14}$ The information the systems provide is not available on demand.
❑$_{15}$ The information does not suggest appropriate alternate routes.
❑$_{16}$ Other
❑$_{17}$ I wouldn't take an alternate route even if I had information.
❑$_{18}$ I know the area well enough to get by without help.
❑$_{19}$ I rarely encounter a serious traffic problem.
❑$_{20}$ I rely on a different traffic information system.

(mean of responses 0 = didn't know of any and 1 = knew of)

	Valid N	Mean	Std Dev	F Prob	# didn't know any	# did know of
0	7	0.9	0.38	0.3403	1	6

(mean of responses 0 = not selected and 1 = selected)

	Valid N	Mean	Std Dev	F Prob
1	7	0.3	0.49	0.4900
2	7	0.4	0.53	0.4632
3	7	0.1	0.38	0.6049
4	7	0.3	0.49	0.2178
5	7	0.3	0.49	0.2178
6	7	0.6	0.53	0.1512
7	7	0.3	0.49	-
8	7	0.0	0.00	-
9	7	0.0	0.00	-
10	7	0.0	0.00	-
11	7	0.0	0.00	-
12	7	0.1	0.38	0.3403
13	7	0.1	0.38	0.3403
14	7	0.1	0.38	0.3403
15	7	0.1	0.38	0.3403
16	7	0.1	0.38	0.3403
17	7	0.0	0.00	-
18	7	0.0	0.00	-
19	7	0.0	0.00	-
20	7	0.1	0.38	0.3403

A52. (Based on your familiarity with *DIRECT Project* traffic information system(s), please indicate the extent to which you agree or disagree with the following items: *(check one box* in *each row)*

	The ***DIRECT Project*** traffic information system:	STRONGLY DISAGREE	SOMEWHAT DISAGREE	NEITHER	SOMEWHAT AGREE	STRONGLY AGREE
1	works reliably	❑1	❑2	❑3	❑4	❑5
2	includes all the info I need to know					
3	is specific to my commute					
4	provides reliable information					
5	provides accurate information					
6	reports incidents soon after they happen					
7	presents reports frequently enough					
8	is easy to use					
9	is convenient to use					
10	catches my attention					
11	is distracting					
12	gives the reason for delays					
13	gives the expected length of delays					
14	provides information on demand					
15	suggests appropriate alternate routes					

(mean of responses from 1 to 5)

	Valid N	Mean	Std Dev	F Prob
1	130	1.9	1.21	0.0052
2	130	2.1	1.18	0.0876
3	130	3.6	1.37	0.8299
4	130	2.5	1.36	0.0091
5	130	2.6	1.40	0.0233
6	130	2.4	1.33	0.0000
7	130	2.7	1.67	0.0001
8	130	4.2	1.01	0.0165
9	130	4.2	1.00	0.0062
10	130	3.7	1.24	0.0000
11	130	3.0	1.34	0.0031
12	130	3.2	1.41	0.1730
13	130	3.0	1.46	0.1221
14	130	2.5	1.55	0.0036
15	130	1.9	1.04	0.3095

A53. Please indicate the extent to which you agree or disagree with the following statements. *(check one box* in *each row)*

	I found that using the ***DIRECT Project*** traffic information system:	STRONGLY DISAGREE	SOMEWHAT DISAGREE	NEITHER	SOMEWHAT AGREE	STRONGLY AGREE
1	satisfied my need for information.	❑1	❑2	❑3	❑4	❑5
2	helped me make better trip choices.					
3	made my commute less stressful.					
4	reduced my driving time.					
5	made my driving time more certain.					
6	made my arrival time more certain.					
7	helped me avoid congestion.					
8	helped me avoid unexpected delays.					
9	on the whole, improved my commute.					

(mean of responses from 1 to 5)

	Valid N	Mean	Std Dev	F Prob
1	131	2.0	1.24	0.0047
2	131	2.3	1.36	0.0259
3	131	2.3	1.23	0.0105
4	131	2.3	1.28	0.0685
5	131	2.3	1.23	0.0101
6	131	2.3	1.22	0.0090
7	131	2.4	1.35	0.0662
8	131	2.4	1.35	0.1422
9	131	2.3	1.31	0.0192

A54. What are the 5 most important things that would improve the existing *DIRECT Project* traffic information system that you use most often? *(check 5 boxes, no more, no less)*

____ ❑1 Make the system work more reliably.
____ ❑2 Make the information more complete (tell more of the things I need to know),
____ ❑3 Make the information more specific to my commute (exclude irrelevant info).
____ ❑4 Make the information more reliable.
____ ❑5 Make the information more accurate.
____ ❑6 Report incidents sooner after they happen.
____ ❑7 Present traffic reports more frequently.
____ ❑8 Make the system easier to use.
____ ❑9 Make the system more convenient to use.
____ ❑10 Make the system more able to catch my attention.
____ ❑11 Make the system less distracting.
____ ❑12 Give the reason for an unexpected delay.
____ ❑13 Give the expected length of an unexpected delay.
____ ❑14 Make the systems provide information on demand.
____ ❑15 Suggest appropriate alternate routes when an unexpected delay arises.
____ ❑16 Other (please specify):_____
____ ❑17 No improvement possible.

Now, please rank the 5 boxes checked in the preceding question in order of importance by writing a number from 1 to 5 on the line to the left of each of the 5 boxes checked in that question: 1 is most important, 2 is next most important, and so on.

(mean of responses from 0 to 5; where 0 indicates item not selected)

	Valid N	Mean	Std Dev	F Prob
1	136	1.4	1.39	0.2761
2	136	1.5	1.91	0.0204
3	136	0.5	1.36	0.1132
4	136	1.2	1.55	0.4766
5	136	1.4	1.75	0.3689
6	136	1.2	1.62	0.0602
7	136	1.1	1.69	0.0021
8	136	0.2	0.95	0.2239
9	136	0.4	1.17	0.6110
10	136	0.2	0.90	0.0011
11	136	0.6	1.43	0.0004
12	136	0.5	1.35	0.5146
13	136	1.0	1.71	0.5198
14	136	1.1	1.64	0.0158
15	136	1.5	1.95	0.4675
16	136	0.4	0.93	0.6987
17	136	0.0	0.00	-

A55. To what extent do you agree or disagree with the following statement: "Based on the information I was given, I believe the information system tested in DIRECT operated as it was intended to." *(check one)*

❑1 Strongly Disagree ❑2 Somewhat Disagree ❑3 Somewhat Agree ❑4 Neither ❑5 Strongly Agree

(mean of responses from 1 to 5)

	Valid N	Mean	Std Dev	F Prob
	134	2.2	1.32	0.0303

A56. Which line best describes yourexperience in operating the DIRECT system?*(check one)*

❑1 I found the system Very Difficult to Use
❑2 I found the system Somewhat Difficult to Use
❑3 I found the system Neither Easy nor Difficult to Use
❑4 I found the system Somewhat Easy to Use
❑5 I found the system Very Easy to Use

(mean of responses from 1 to 5)

	Valid N	Mean	Std Dev	F Prob
	134	4.2	1.12	0.0059

A57. Overall, the DIRECT traffic information system is a significant improvement over (the listed) existing traffic information system.

		a AM NOT FAMILIAR WITH SYSTEM	b STRONGLY DISAGREE	SOMEWHAT DISAGREE	NEITHER	SOMEWHAT AGREE	STRONGLY AGREE
1	Commercial Radio	❑0	❑1	❑2	❑3	❑4	❑5
2	Television						
3	Changeable Message Signs						
4	Other						

(mean of responses 0 = not familiar and 1 = familiar)

	Valid N	Mean	Std Dev	F Prob	# not familiar with	# familiar with
1a	132	1.0	0.09	0.3566	1	131
2a	129	0.7	0.45	0.6984	35	94
3a	130	0.9	0.33	0.6836	16	114
4a	61	0.3	0.43	0.9021	46	15

(mean of responses from 1 to 5)

	Valid N	Mean	Std Dev	F Prob
1b	131	1.9	1.33	0.0077
2b	94	2.7	1.55	0.0469
3b	114	2.9	1.46	0.1379
4b	15	2.1	1.25	0.3592

A58. Overall, I prefer the DIRECT traffic information system to (the listed) existing traffic information system.

		a AM NOT FAMILIAR WITH SYSTEM	b STRONGLY DISAGREE	SOMEWHAT DISAGREE	NEITHER	SOMEWHAT AGREE	STRONGLY AGREE
1	Commercial Radio	❑0	❑1	❑2	❑3	❑4	❑5
2	Television						
3	Changeable Message Signs						
4	Other						

(mean of responses 0 = not familiar and 1 = familiar)

	Valid N	Mean	Std Dev	F Prob	# not familiar with	# familiar with
1a	131	1.0	0.09	0.3613	1	130
2a	128	0.7	0.44	0.9066	33	95
3a	127	0.9	0.36	0.3701	19	108
4a	62	0.2	0.43	0.8686	47	15

(mean of responses from 1 to 5)

	Valid N	Mean	Std Dev	F Prob
1b	130	1.8	1.28	0.0040
2b	95	2.8	1.57	0.0944
3b	108	2.9	1.50	0.1556
4b	15	1.9	1.33	0.4873

A59. Overall, how satisfied were you with the DIRECT traffic information system available to you during the past 8 weeks? *(check one)*

Very Dissatisfied
Somewhat Dissatisfied
Neither Satisfied nor Dissatisfied
Somewhat Satisfied
Very Satisfied

(mean of responses from 1 to 5)

	Valid N	Mean	Std Dev	F Prob
1b	130	1.8	1.28	0.0040

A60. How much would you be willing to pay for the DIRECT traffic information system available to you during the past 8 weeks? *(fill in the blank in each row)*

$_____$_1 If payment was a one time fee (answer in dollars total)
$_____$_2 If payment was on a per-use basis (answer in [fractions of] dollars per use)
$_____$_3 If payment was on a monthly basis (answer in dollars per month)
$_____$_4 If payment was on an annual basis (answer in dollars per year)
$_____$_5 Other

(mean of willingness to pay)

	Valid N	Mean	Std Dev	F Prob
1	90	34.3	75.98	0.0138
2	82	0.5	2.33	0.4475
3	85	2.0	3.94	0.5373
4	89	16.4	28.10	0.1344
5	50	0.0	0.00	-

A61. How likely is it that you would buy the DIRECT traffic information system available to you during the past 8 weeks if the total cost over the first two years was (the amounts listed below)? *(check one box in each row)*

	Total cost over the first two years	VERY UNLIKELY	SOMEWHAT UNLIKELY	NEITHER	SOMEWHAT LIKELY	VERY LIKELY
1	$50	❑1	❑2	❑3	❑4	❑5
2	$100					
3	$500					
4	$1,000					

(mean of responses from 1 to 5)

	Valid N	Mean	Std Dev	F Prob
1	129	2.2	1.56	0.1293
2	125	1.8	1.37	0.0738
3	124	1.3	0.70	0.0379
4	124	1.1	0.38	0.0275

After: Please continue to the "Keirsey Temperament Sorter" on the next three pages. Circle either "a" or "b" for each question.

(mean of 0 = not this type and 1 = this type)

	Valid N	Mean	Std Dev	F Prob	# with this temperament
NF	151	0.1	0.26	0.6320	11
NT	151	0.0	0.18	0.2435	5
SJ	151	0.9	0.35	0.5143	130
SP	151	0.0	0.18	0.4527	5

Under the Keirsey-Bates classification, four main temperament types are distinguished, each being identified by a pair of letters: NF, NT, SJ, and SP.

Age (determined from driver recruitment process)

(mean of 0 = not this type and 1 = this type)

	Valid N	Mean	Std Dev	F Prob
	173	42.6	8.85	0.8982
Cats	173	3.7	0.95	0.9392

Gender (determined from driver recruitment process)

(mean of 0 = not this type and 1 = this type)

	Valid N	Mean	Std Dev	F Prob
	173	0.5	0.50	0.5312

AGEGEN categorization

1: Female in 20s
2: Female in 30s
3: Female in 40s
4: Female in 50s
5: Male in 20s
6: Male in 30s
7: Male in 40s
8: Male in 50s

(mean of 8 categories)

	Valid N	Mean	Std Dev	F Prob
	172	4.9	2.30	0.4562

A62(B85). If you like, please make any additional comments (either about DIRECT or traffic information in general).[Use the back of the page if you need more space.]

Subject response to this question is included in the third section of this appendix

Summary of Subject Comments

Subject comments from Appendix H have been categorized and summarized in Table G1 by test group and period.

During the course of the seven rotations of drivers for the DIRECT project, subjects had several opportunities to provide feedback on their experiences with the various systems. First, participants had an opportunity to write comments on the before questionnaire. They also participated in a brief telephone interview approximately one week into their test period. Drivers had another chance to write comments on the after questionnaire. Then, they participated in a final telephone interview after returning the project vehicle. In addition, drivers kept notebooks throughout their test period to record comments. These questionnaire, interview, and notebook comments are summarized in the table below:

Table G1: Summary of Subject Comments

	AHAR							LPHAR							Phone							RDS/SCA						
Comment	1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7
no messages received	x	x		x																		x						
no traffic message received	x	x	x																									
not updated																				x	x							
message outdated											x				x					x	x	x					x	
message inaudible	x	x	x		x							x		x	x		x				x					x		
message inaccurate																								x				
no message - specific incident	x	x		x		x		x			x		x			x	x	x	x					x				x
message repeated >1 day	x		x				x	x	x		x		x							x		x						
received test messages	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
messages repetitive/too many interrupts	x	x			x			x							x						x	x	x	x		x		
messages late	x																										x	
should be time-stamped	x	x							x				x		x	x				x							x	
no message - construction	x												x															
static	x		x					x	x	x	x	x					x					x	x	x	x	x	x	x
should say why there are tie-ups	x																						x					
should say available alt. rtes	x			x							x												x				x	
received traffic messages	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
like the voice																												
no messages - AM commute					x																							
no messages - PM commute		x					x																					
message repeated after incident cleared		x	x		x	x		x			x														x			
should say if traffic is good		x											x							x							x	
message had wrong date		x	x						x																			
messages strongest/clearest near downtown		x																										
messages too infrequent			x	x				x	x	x	x	x	x		x	x	x	x	x				x	x	x	x	x	
broadcast range too limited			x		x	x																			x			
like interrupt feature			x		x						x	x													x		x	
like override switch			x																								x	
system unreliable					x	x		x				x	x		x	x	x	x		x	x	x	x				x	
message too late/ to divert						x		x					x											x	x	x		

Table G1: Summary of Subject Comments (continued)

Comment	AHAR							LPHAR							Phone							RDS/SCA						
	1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7
message caused me to divert						x							x		x		x					x						
should say how long an incident might last						x									x											x	x	
should be timely								x	x											x								
should be relevant to my commute								x															x			x		
broadcasts fade in & out								x																				
flashing lights easy to locate								x				x	x															
flashing lights should be more noticeable								x																				
provided easy access to information								x																				
should say how traffic is moving								x																				
tuning the radio was easy								x																				
flashing lights difficult to locate								x	x	x	x		x															
should have a default message													x		x					x				x				
should allow for user feedback - updates															x													
menu system easy to use															x		x	x										
like on-demand feature																x						x	x					
busy signal too often																x				x	x							
unsafe - had to look away from the road																	x											
could not leave messages - mailbox full																		x		x					x			

In all rotations, drivers stated that there were not enough messages broadcast during their test period. The greatest risk of the DIRECT project was that there would be too few incidents for the purposes of the test. Drivers also noted that traffic information updates have a certain level of entertainment value. In general, travelers like to know what is going on throughout the local transportation network. Given that the drivers were experiencing a new technology that gave information only if traffic patterns deviated significantly from usual conditions, drivers expressed uncertainty over whether their system was functioning if they did not receive regular updates. Overall, driver satisfaction seemed to improve in the latter test periods. Users of all systems preferred to receive regular traffic updates even if there were no major incidents to report. Most drivers felt that their particular system was easy to use, and they liked they concept of an interrupt feature to report route-specific traffic information as a supplement to traditional commercial radio broadcasts.