Driver Response to the TetraStar Navigation Assistance System by Age and Sex

FAST-TRAC Phase III Deliverable

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the TetraStar Natural Use Study

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16. Abstract

This study is part of the evaluation of the FAST-TRAC operational test of an Intelligent Transportation System (ITS) in Michigan and is concerned with user perceptions and behaviors with Advanced Traveler Information Systems (ATIS). The use and perceptions of 60 subjects, of both sexes and three age groups (19-to-29, 30-to-64, and 65-to-80), who drove a project vehicle equipped with a TetraStar navigation assistance unit for one month in normal everyday conditions are reported. The same subjects had earlier driven test vehicles equipped with Ali-Scout, another ATIS navigation device, for one month. Subjects kept daily trip logs and completed a detailed survey about their uses, perceptions, and valuation of the TetraStar system and about comparison of this system against the Ali-Scout.

Overall, drivers liked the attributes and performance of the TetraStar system and rated them highly. Only the freeway ramp method of selecting destinations received consistently negative assessments. There were few significant differences in the use and perceptions of this system by sex and age group. However, men were more likely than women to want more navigation information, to be more distracted by the system and to want more advanced warning. Drivers in the oldest age group had greater problems in learning and using TetraStar. On average, subjects were willing to pay about $500 for this system in a new car, $350 to add it to their present car, and about $8.50 per day to have it in a rental car. Overwhelmingly, subjects preferred TetraStar over Ali-Scout, reporting that it provided more accurate route guidance and was easier to use and program.

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INTRODUCTION

The FAST-TRAC project was a multi-year implementation and evaluation of an Intelligent Transportation System (ITS) in Oakland County, Michigan. The FAST-TRAC system was comprised of two main components: an advanced traffic management system called SCATS that optimized network-wide signal timing based on real-time traffic conditions and two in-vehicle advanced traveler information systems (ATIS) that provided in-vehicle navigation assistance. These systems were Ali-Scout and TetraStar, both made by Siemens Corporation. The purpose of the user perceptions and behaviors element of FAST-TRAC was to understand how users perceived and valued the ATIS and to determine how they used the systems in their everyday driving in Oakland County. Specifically, we wanted to know if drivers perceived any advantages or disadvantages of the ATIS in their everyday driving, whether they experienced more or less stress, and whether they perceived changes in travel times. We also wanted to know if the users liked the systems well enough to consider purchasing them and, if so, what they would be willing to pay.

Four studies were conducted as part of this evaluation. In one study people drove, under identical conditions, between origin-destination pairs while using either Ali-Scout, TetraStar, or written instruction as a source of navigation assistance information. The three types of navigation assistance were compared by carefully tracking each vehicle's position, speed, and heading and through questionnaire responses (see Eby, Kostyniuk, Christoff, Hopp, & Streff, 1997 for complete study results). In a second study, several hundred Oakland County community members volunteered to have an Ali-Scout system installed in their vehicle and to use the system for up to one year. During this time, they were surveyed about their use and opinions of the system (Eby, Kostyniuk, Streff, & Hopp, 1997). In a third study, we examined the Ali-Scout ATIS by analyzing the self-reported uses and perceptions of subjects who drove a project-owned vehicle equipped with the Ali-Scout system for their every day driving for one month (Kostyniuk, Eby, Christoff, Hopp, & Streff, 1997). By loaning people project-owned vehicles, we could more closely control the age and sex of participants and get a

wider range of subject demographics than if subjects used their own vehicles. The fourth study, reported here, was similar to the previous study except that the TetraStar system was used and analyzed. The purpose of the present study was to better understand how people use and what they think about the TetraStar system when they used the system in their normal, everyday driving.

The TetraStar System

The TetraStar system was similar to other commercially available products such as GuideStar or PathMaster. TetraStar provided static route guidance only; that is, it determined the fastest route between some origin and destination without taking into account current traffic conditions. TetraStar determined the vehicle's location through an on-board global positioning system (GPS), dead-reckoning calculations, and map matching. The TetraStar unit consisted of a four inch, color liquid crystal display (LCD) and several control buttons. TetraStar provided visual and voice, turn-by-turn navigation assistance to the driver. Visual instructions consisted of an electronic map, in which a highlighted route to the user-specified destination and the vehicle's current location were shown, and driving-maneuver icons. The system also displayed the vehicle's heading, the Euclidian distance and direction to the destination, and the current status of the GPS signals.

By scrolling through a series of menus and options, the driver could enter destinations by selecting a street address, an intersection of two roads, a point of interest, a freeway entry/exit ramp, or a destination from a list of recently entered destinations. After selecting a destination, the driver had the option of choosing one of three routing criteria: shortest time route, a route that maximized the use of freeways, or a route that minimized the use of freeways.

As a trip started, TetraStar showed the map display, with a highlighted route, and both verbally and visually told the driver to "please proceed to the highlighted route," usually a few hundred yards from the vehicle's current location. Once the vehicle was on the route, TetraStar began-'displaying turn-by-turn instructions by showing the next required maneuver, its distance away, a countdown bar showing

the relative distance to the maneuver, and the name of the street where the maneuver would occur (an example display is shown in figure 1). During the trip the driver could switch between the maneuver icons and the map display by pressing a toggle button. Once the destination was within a few hundred yards, TetraStar switched to the map display which showed the highlighted route to the destination and the vehicle's current position. A voice message also told the driver that he or she was near the destination. If a driver failed to make a recommended turn, TetraStar automatically calculated a new route from the vehicle's current position.

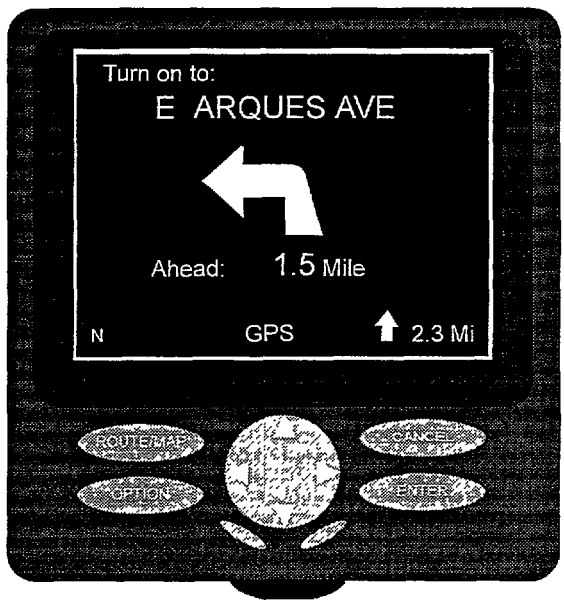


Figure 1: Illustration of TetraStar unit showing a left turn maneuver icon, street where maneuver will occur, distance to maneuver, distance and direction to destination, vehicle heading, and status of GPS signals.

METHODS

Design

There were two independent variables in the study: sex (male and female) and age group (19-to-29, 30-to-64, and 65-to-80 years of age). The age groups were selected to represent distinct groups of potential users of in-vehicle navigation assistance systems. Drivers under the age of 19 and over the age of 80 were excluded from participation because of their elevated crash risk. Participants were given a project-leased vehicle to drive as their own for a one-month period. During this period, subjects maintained a log of their trips and completed a questionnaire.

Subjects

So that we could compare driver response to TetraStar with driver response to a different navigation assistance system, 60 subjects were randomly selected (ten for each of the six conditions) from the 102 subjects who participated in an evaluation of the Ali-Scout ATIS (Kostyniuk et al., 1997). Thus, all subjects who participated in the present study had prior experience with in-vehicle navigation assistance technology. As discussed by Kostyniuk et al. (1997), the subjects who volunteered to participate, were recruited from the general population of drivers in southeastern Oakland County. In order to obtain the widest range of subject demographics as possible among licensed drivers, subjects were recruited at a Michigan Secretary of State (SOS) office in Troy, Michigan. As people stopped by the SOS office to take care of matters concerning their driver licenses or vehicles, they could stop by a booth staffed by our research team where they could find out about the advertised navigation study. Interested persons completed a short questionnaire on the amount of driving they did in the study area and their history of crashes and convictions (see appendix A for the complete recruitment questionnaire). Excluded from participation were potential subjects who indicated that they did less than one-half of their driving in southeastern Oakland county, had a drunk driving conviction, had a conviction related to use, distribution, or transportation of a controlled substance, more than six points on their driving record, more than one at-fault crash, or were serving a criminal/traffic sentence.

The driving records of the rest of the potential participants were checked through the SOS office. Again, those subjects not meeting the above criteria were excluded. Because of a lack of both younger and older people at the SOS office, the recruitment efforts were supplemented at Oakland University and Beaumont Hospital as necessary. Finally, those subjects in the previous study (Kostyniuk et al., 1997) that broke their participation agreements (n=11) were excluded from participating in the present study.

The average age of male study participants was 24.8 (sd=3.9) for the 19-to-29 year old age group, 44.3 (sd=8.3) for the 30-to-64 year old age group, and 70.1 (sd=3.8) for the 65-to-80 year old age group. The average age of the female participants was 20.8 (sd=2.6) for the 19-to-29 year old age group, 43.3 (sd=8.3) for the 30-to-64 year old age group, and 72.4 (sd=4.8) for the 65-to-80 year old age group. Table 1 shows the distribution of self-reported household income as a function of the six conditions in the study. Table 2 shows the distribution of self-reported highest level of education completed. Table 3 shows self-reported current employment status of study participants. Note that the numbers of respondents in each condition do not always add to 10 because some people declined to give us income, education level, and employment status, and three subjects in the 65-80 year old age group dropped out after beginning the study because of health reasons.

Table 1: Percentage and Number of Respondents (n) by Self-Reported Household Income, Sex and Age Group						
	Male			Female		
	19-29	30-64	65-80	19-29	30-64	65-80
Less than $15,000	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
$15,000 - $24,999	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	20.0 (2)	33.3 (2)
$25,000 - $34,999	25.0 (2)	14.3 (1)	33.3 (3)	10.0 (1)	20.0 (2)	16.7 (1)
$35,000 - $44,999	0.0 (0)	14.3 (1)	33.3 (3)	10.0 (1)	0.0 (0)	16.7 (1)
$45,000 - $54,999	12.5 (1)	14.3 (1)	22.2 (2)	10.0 (1)	10.0 (1)	16.7 (1)
$55,000 - $64,999	12.5 (1)	14.3 (1)	0.0 (0)	30.0 (3)	40.0 (4)	0.0 (0)
$65,000 - $79,999	12.5 (1)	0.0 (0)	11.1 (1)	10.0 (1)	10.0 (1)	16.7 (1)
$80,000 - $99,999	12.5 (1)	14.3 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
$100,000 or more	25.0 (2)	28.6 (2)	0.0 (0)	30.0 (3)	0.0 (0)	0.0 (0)

Table 2: Percentage and Number of Respondents (n) by Self-Reported Highest Level of Education Completed, Sex and Age Group						
	Male			Female		
	19-29	30-64	65-80	19-29	30-64	65-80
Less than a High School Diploma	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
High School Diploma or Equivalent	0.0 (0)	0.0 (0)	11.1 (1)	10.0 (1)	30.0 (3)	42.9 (3)
Some College	33.3 (3)	37.5 (3)	66.7 (6)	80.0 (8)	60.0 (6)	14.3 (1)
Bachelor's Degree	55.6 (5)	25.0 (2)	11.1 (1)	0.0 (0)	10.0 (1)	14.3 (1)
Some Graduate School	0.0 (0)	25.0 (2)	11.1 (1)	10.0 (1)	0.0 (0)	28.6 (2)
Graduate School	11.1	12.5	0.0	0.0	0.0	0.0

Table 3: Percentage and Number of Respondents (n) by Self-Reported Current Employment Status, Sex and Age Group						
	Male			Female		
	19-29	30-64	65-80	19-29	30-64	65-80
Employed Full-time	55.6 (5)	100.0 (8)	25.0 (2)	22.2 (2)	60.0 (6)	0.0 (0)
Employed Part-time	22.2 (2)	0.0 (0)	12.5 (1)	44.4 (4)	30.0 (3)	0.0 (0)
Full-time Student	22.2 (2)	0.0 (0)	0.0 (0)	22.2 (2)	0.0 (0)	0.0 (0)
Retired	0.0 (0)	0.0 (0)	62.5 (5)	0.0 (0)	0.0 (0)	85.7 (6)
Unemployed	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)
Other	0.0 (0)	0.0 (0)	0.0 (0)	11.1 (1)	0.0 (0)	14.3 (1)

Procedure

The study took place in seven monthly cycles from November 1996 through April 1997. During each cycle, five to ten subjects were given a project-leased, 1995 Mercury Sable equipped with the TetraStar system to use in their everyday driving for 28 days. During each cycle, at least one equipped vehicle was held in reserve in case a subject's vehicle needed to be replaced because of vehicle or TetraStar malfunction.

The following procedure was used for every subject in each cycle. Subjects were contacted, scheduled into a cycle, and given a day, time, and location for an orientation meeting where they would learn about the TetraStar system and get their test vehicle (i.e., the handoff meeting). To ensure that all the subjects' questions could be answered and paperwork easily completed, subjects attended a handoff meeting individually with a researcher.

Several activities took place at the handoff meeting. Since subjects were already familiar with the project and research staff, subjects were asked to meet the researcher at the location where the test vehicles were parked. The subject and researcher sat in the TetraStar-equipped vehicle and completed participation paperwork. All subjects who participated were required to sign two documents. The first document was an informed consent form which told the subject about the study activities and described his or her rights as an experimental subject, as required by the University of Michigan Institutional Review Board. The second document was a participation agreement. The complete text of the agreement can be found in appendix B. This agreement was developed in conjunction with the University of Michigan's Risk Management Department. The agreement stated that only the subject would be allowed to drive the test vehicle; the vehicle should be operated in accordance with Michigan traffic laws; the vehicle should not be used for illegal activity; the subject was responsible for traffic and parking violations incurred with the vehicle; and the subject was responsible for all fuel purchase during the test period. The agreement stated that the subject was responsible for contacting the researchers in the event of a crash or problems with the test vehicle.

The agreement also stated that the vehicle could not be used for extended trips or taken out of the state or country. The agreement limited the number of miles that the subject could put on the vehicle to 1,000, and stated that the subject agreed to pay $0.15 per mile if the 1,000 mile limit was exceeded. Finally, the agreement stated that the vehicle must be returned at the specified time. If the subject chose to stop participating by not completing the driver logs or other study instruments, the subject agreed to return the vehicle immediately. Once the forms were signed, the researcher reviewed the procedures to follow if there was a crash. Since the University of Michigan is self-insured, these procedures were set up by the University of Michigan Risk Management Department.

After the administrative issues were covered, the researcher conducted a brief overview of the system describing how to enter destinations, select a routing criteria, the types of guidance available, and the various types of information contained on the navigation assistance screens. The subject, under the researcher's guidance, then entered their home as a destination using the street address destination entry method.

After TetraStar training, subjects were told about the various research instruments they would be asked to complete. The first instrument was a questionnaire. Subjects were told that during their third week of participation, a questionnaire would be mailed to them. Survey questions were grouped into five categories that focused on use of the TetraStar system and comparisons between TetraStar and the previously used Ali-Scout. The complete study questionnaire can be found in appendix C.

The second study instrument was a driver log in which subjects kept a detailed record of driving behaviors and experiences with TetraStar for all 28 days of participation. Study participants were asked to keep a record of all trips in which they drove the TetraStar equipped vehicle. To do this, subjects were given a three-ring binder that contained instructions for completing the driver logs, 28 driver log sheets, and three stamped envelopes addressed to the researchers. The complete

text of the driver log instructions and a single driver log sheet can be found in appendix D. Subjects were instructed to complete one driver log sheet for each day of participation in the study. At the end of each week they were requested to mail in that weeks completed driver log sheets using the stamped and addressed envelopes that we provided. For the last week of participation, the remaining driver log sheets were returned with the vehicle.

On each daily driver log sheet, the subject was requested to record information about each trip taken. For each trip the subject recorded the origin, destination, trip purpose, trip length in miles, time of day, and whether they used TetraStar. The subjects were also asked to record any unusual driving experiences and other comments on a daily basis.

The meeting ended with the subject completing a vehicle inspection, much like one does when renting a car. The vehicle check-out form used for the inspection can be found in appendix E. On this form the subject indicated any vehicle damage, any missing equipment, and noted the mileage on the vehicle. After double-checking the vehicle mileage, the subject signed the form and was free to take the vehicle.

Once the subject had driven for ten days or their first week's worth of driver logs were received, he or she was contacted by a researcher to ensure that the vehicle and the TetraStar system were functioning properly. Those subjects who had incorrectly completed driver logs were again instructed on their use. Those who had not returned the logs were asked if they still wished to continue in the experiment and, if so, reminded that driver log completion was a requirement of continued participation. During the third week of participation, the survey was mailed to study participants. Subjects were asked to complete the survey and bring it back when they turned in the vehicle. They were also reminded of the time and place for vehicle return.

On the day scheduled for vehicle return, subjects were met by a researcher who performed a vehicle check-in (appendix E). The researcher collected the survey and the last week of driver logs. Those subjects who had not yet completed the survey were asked to do so before leaving. If a subject had driven more than the 1,000 miles allowed for their participation, the amount owed was calculated and they were requested to remit payment. Once the vehicle check-in was completed and the materials gathered, the subject was thanked and allowed to leave.

Between each monthly cycle, all vehicles were fueled, cleaned, and given a detailed test of function. Scheduled maintenance was performed if necessary. All destinations left inTetraStar's ten-item guidance history list were deleted.

RESULTS

User Survey

As mentioned previously, the survey was divided into five parts: TetraStar operation and displays, the TetraStar system, use of the TetraStar system, valuation, and comparison of TetraStar and Ali-Scout in-vehicle route guidance systems. The complete univariate results for each question by age group and sex can be found in appendix F.

TetraStar Operation and Displays

Frequency of Use

Subjects were asked to indicate how often they used TetraStar for trips in which they drove the TetraStar-equipped vehicle, using a scale anchored by the labels "never" for one and "always" for seven. A response of four indicated that the subject used the system on about one-half their trips. Overall, subjects reported frequent use of TetraStar (means were 19-to-29 male=5.9; 30-to-64 male=6.3; 65-to-80 male=6.3; 19-to-29 female=5.3; 30-to-64 female= 6.2; 65-to-80 female=5.6). There were no significant differences between age groups or sexes. Those subjects that did not answer "always" were asked to indicate why they sometimes did not use the system. In order of most frequent to least frequent, the reasons were:

- Many trips are very short (41.9 percent; n=31)
- Subject knew the way (23.0 percent; n=17)
- Unable to enter destination because not in database or did not know address or cross streets (13.5 percent; n=10)
- Did not think TetraStar would provide the fastest route (6.8 percent; n=5)
- Too much trouble to program (6.8 percent; n=5)
- Other miscellaneous reasons (8.1 percent; n=6)

Destination Selection

As mentioned previously, there were five ways for selecting destinations: street addresses, intersections, points of interest, freeway entrance/exit ramps, and destinations in a list of guidance history. Subjects were asked several questions about their preferences for and difficulty using the various methods for selecting destinations. Subjects were asked to rank the five methods of destination selection in order of how frequently they were used. A single relative frequency ranking score for each method was determined by multiplying the percentage of subjects giving a ranking by that ranking number (1 through 5). Within each method, these scores were summed. The method with the lowest score was rated as the most frequently used. The most frequently used destination selection method was street address with 78 percent of subjects giving it a ranking of one or two. The next most frequently used method was guidance history with 68 percent of subjects giving it a ranking of one or two. The third most frequently used method was intersections, with 34 percent of subjects ranking it one or two. The fourth most frequently used method was the points of interest list, with 12 percent of subjects ranking it one or two. The least used method was the freeway entrance/exit ramps, with only 4 percent of subjects ranking it one or two.

Subjects indicated their level of difficulty in selecting destinations using a scale anchored by the labels “very difficult to use” for one and “very easy to use” for seven. Subjects could also indicate that they did not use the method. The average responses for the five destination selection methods is shown in table 4 in order of highest to lowest overall ratings. As can be seen in this table, all of the destination selection methods were judged to be quite easy to use except for the freeway entrance/exit ramp method. There were no significant differences by age group or sex for any of the destination selection methods except a significant main effect of age group for the points of interest method [$F(2,45) = 6.22$; $p<.005$)] *Post* hoc comparisons showed that this effect resulted from subjects in the 19-to-29 year old age group reporting that the points of interest method was significantly easier to use than subjects in either of the other age groups.

Table 4: Average Rating for Ease of Use for Destination Selection Methods by Age Group and Sex (1 = very difficult to use; 7 = very easy to use)						
Method	**Male**			**Female**		
	19-29	**30-64**	**65-80**	**19-29**	**30-64**	**65-80**
Street addresses	6.4	6.5	5.8	5.6	6.8	5.7
Guidance history	6.2	7.0	5.8	5.6	6.3	5.2
Intersections	6.2	6.1	5.1	5.7	6.6	6.0
Points of interest	6.0	5.0	3.3	6.2	3.5	3.3
Freeway entry/exit	2.4	2.3	1.0	1.8	3.0	2.8

In order to select destinations with the TetraStar system, the driver needed to use the button on the front of the unit to scroll through options, select options, and change screens. We were interested in knowing how easy the destination selection system was to learn and use, whether it seemed to function properly, and the subject's overall impressions. Subjects were asked to indicate how easy or difficult the destination selection system was to learn and use by indicating their judgment on a seven-point scale. The scale was anchored with the labels "very difficult" for one and "very easy' for seven. Overall, subjects judged the destination entry system to be easy to learn (means were 19-to-29 male=6.6; 30-to-64 male=6.6; 65-to-80 male=4.9; 19-to-29 female=6.8; 30-to-64 female=6.7; 65-to-80 female=5.8) and easy to use (means were 19-to-29 male=6.7; 30-to-64 male=6.1; 65-to-80 male=5.7; 19-to-29 female=6.9; 30-to-64 female=6.7; 65-to-80 female=6.0). A two-way analysis of variance (ANOVA) on each variable showed that there was a significant main effect of age group for ease of learning [$F(2,46)=10.30$; $p<.0005$]. *Post hoc* analyses showed that this main effect resulted from the fact that drivers in the oldest age group reported significantly more difficulty learning the destination selection system than did drivers in the two younger age groups. There was also a significant main effect of age group for ease of use [$F(2,44)=3.69$; $p<.051$. *Post hoc* analyses showed that this effect resulted from the subjects in the 65-to-80 year old age group indicating the

destination selection system to be more difficult to use than subjects in the 19-to-29 year old age group. No other effects or interactions were significant.

Subjects were asked to indicate how often they thought the destination selection system functioned properly by indicating their judgment on a seven-point scale. The scale was anchored with the labels “never” for one and “always” for seven, with a judgment of four indicating that it functioned properly about 50 percent of the time. Overall, subjects thought that the destination selection system functioned properly most of the time (means were 19-to-29 male=6.0; 30-to-64 male=5.9; 65-to-80 male=5.3; 19-to-29 female=6.5; 30-to-64 female=5.6; 65-to-80 female=5.2). A two-way ANOVA revealed that there was a significant main effect of age group [$F(2,45)=3.76$; $p<.05$]. Post hocanalyses showed that this main effect occurred because subjects in the oldest age group reported less frequent proper function than subjects in the youngest age group. Subjects indicated their overall impression using a scale anchored by the labels “strongly disliked” for one and “strongly liked” for seven. Overall impressions were quite positive with no reliable difference between age groups or sexes (means were 19-to-29 male=6.2; 30-to-64 male=6.1; 65-to-80 male=5.5; 19-to-29 female=6.9; 30-to-64 female=5.9; 65-to-80 female=5.8).

Route Calculation

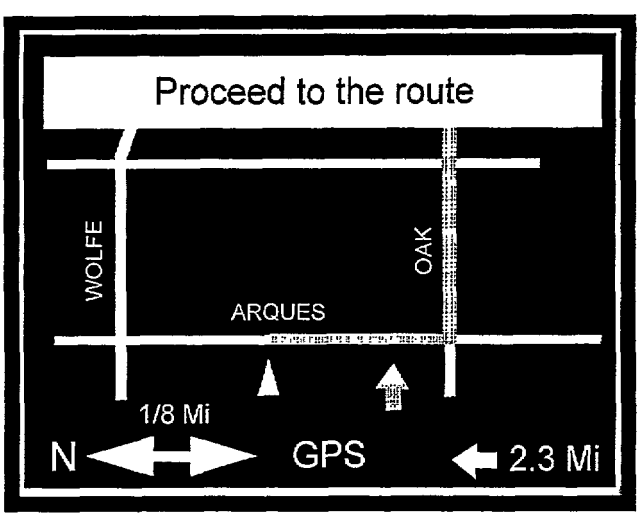
Once a destination was selected, TetraStar gave three options for routing: shortest time route, most use of freeways, and least use of freeways. We were interested in knowing how frequently the various options were used. Subjects were asked to rank the three methods of route calculation in order of how frequently they were used. A single relative frequency ranking score for each method was determined by multiplying the percentage of subjects giving a ranking by that ranking number (1 through 3). Within each method, these scores were summed. The method with the lowest score was rated as the most frequently used. The most frequently used method was the shortest time route, with 91.8 percent of subjects giving it a ranking of one. The second most frequently used method was most use of freeways, with 10.8 percent of subjects giving it a ranking of one. The

least frequently used method was least use of freeways, with 2.2 percent of subjects giving it a ranking of one.

List-of-Maneuvers Display

After calculating a route and prior to beginning a trip, drivers could press a button on TetraStar to see a list of the maneuvers to the selected destination. We were interested in knowing how often subjects used this feature. Considering all trips taken with TetraStar, subjects judged the frequency with which they used this feature on a scale anchored by the labels "never" for one and "'always" for seven. A response of four indicated that they looked at the maneuver list on about one-half of their trips. Overall, subjects reported using this feature on slightly less than one-half of their trips with no differences between sexes and age groups (means were 19-to-29 male=3.9; 30-to-64 male=3.1; 65-to-80 male=3.1; 19-to-29 female=3.3; 30-to-64 female=3.7; 65-to-80 female=3.5).

Proceed-to-the-Route Display

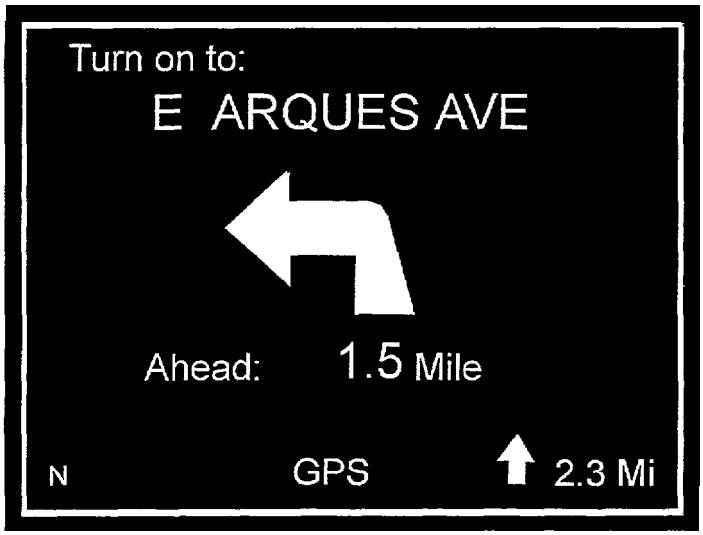


At the start of every trip taken with TetraStar, drivers were shown a display similar to the one at the left, Subjects were asked several questions about the TetraStar *proceed-to-the-route* display. On seven-point scales, subjects indicated level of difficulty in understanding the information, the level of distraction while driving, accuracy of guidance, frequency of proper function, and their overall impression of the display. Level of difficulty in understanding the display was rated using a scale anchored by the labels "very difficult" for one and "very easy,, for seven. Subjects reported that the display was

quite easy to understand (means were 19-to-29 male=6.0; 30-to-64 male=6.3; 65-to-80 male=5.8; 19-to-29 female=6.0; 30-to-64 female=6.2; 65-to-80 female=5.8), with no statistical differences between sexes or age groups. Subjects judged level of distraction using a scale anchored by the labels “very distracting” for one and “not at all distracting” for seven. Overall, subjects judged the display to produce only minimal distraction while driving, with no reliable differences between age groups or sexes (means were 19-to-29 male=4.7; 30-to-64 male=4.9; 65-to-80 male=5.3; 19-to-29 female=6.1; 30-to-64 female=6.1; 65-to-80 female=5.0). Subjects rated the accuracy of guidance using a scale anchored by the labels “very inaccurate” for one and “very accurate” for seven. Subjects indicated that the display was quite accurate, and there were no consistent differences between the age groups or sexes (means were 19-to-29 male=5.7; 30-to-64 male=6.0; 65-to-80 male=6.0; 19-to-29 female=5.6; 30-to-64 female=6.0; 65-to-80 female=6.0).

Subjects judged the frequency of proper function using a scale anchored by the labels “never” for one and “always” for seven. A response of four indicated proper function about 50 percent of the time. In general, subjects reported that the display functioned properly most of the time (means were 19-to-29 male=5.2; 30-to-64 male=5.8; 65-to-80 male=5.4; 19-to-29 female=5.7; 30-to-64 female=5.1; 65-to-80 female=5.3). No significant differences between age groups or sexes were discovered. Finally, subjects indicated their overall impression of the display using a scale anchored by the labels “strongly disliked” for one and “strongly liked” for seven. A response of four indicated that the subject neither liked nor disliked the display. Overwhelmingly, subjects indicated that they liked the display with no significant differences between age groups or sexes (means were 19-to-29 male=5.6; 30-to-64 male=6.3; 65-to-80 male=5.9; 19-to-29 female=6.0; 30-to-64 female=6.2; 65-to-80 female=6.2).

Next-Maneuver Display

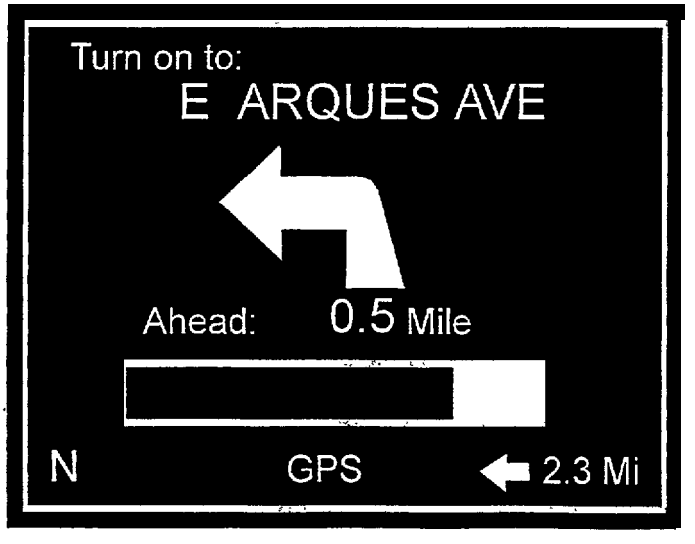


Once a driver was on the route, TetraStar began giving turn-by-turn instructions using a displays similar to the one on the left. Subjects were asked several questions about the TetraStar *next-maneuver* display. On seven-point scales, subjects indicated level of difficulty in understanding the information, sufficiency of the level of detail, the amount of advanced warning provided by the instructions, the level of distraction while driving, accuracy of guidance, and their overall impression of the display. Level of difficulty in understanding the display was rated using a scale anchored by the labels “very difficult, for one and “ very easy" for seven. Subjects reported that the display was very easy to understand (means were 19-to-29 male=6.7; 30-to-64 male=6.8; 65-to-80 male=6.6; 19-to-29 female=7.0; 30-to-64 female=6.9; 65-to-80 female=6.7), with no differences between sexes or age groups. Subjects judged the sufficiency of the amount of detail shown using a scale anchored by the labels “insufficient,, for one and “sufficient” for seven. Overall, subjects thought that the amount of detail shown was sufficient (means were 19-to-29 male=6.1; 30-to-64 male=6.8; 65-to-80 male=6.6; 19-to-29 female=6.9; 30-to-64 female=6.5; 65-to-80 female=6.7). The amount of advance warning provided was judged using a scale anchored by the labels “not enough” for one and "too much” for seven, with a response of four indicating that the advance warning was acceptable. In general, subjects reported that the amount of advance warning was a little more than what they preferred (means were 19-to-29 male=4.3; 30-to-64 male=5.3; 65-to-80 male=5.1; 19-to-29 female=4.3; 30-to-64 female=4.6; 65-to-80 female=5.3). A two-way ANOVA showed that there was a significant main effect of age group [$F(2,45)=4.24$; $p<.05$]. *Post hoc* analyses showed that this effect resulted from drivers in the oldest age

group reporting that the warning was provided too far in advance as compared to drivers in the youngest age group.

Subjects judged level of distraction using a scale anchored by the labels "very distracting" for one and "not at all distracting" for seven. Overall, subjects indicated that the display produced only minimal distraction while driving with no differences between age groups or sexes (means were 19-to-29 male=5.4; 30-to-64 male=6.3; 65-to-80 male=5.8; 19-to-29 female=6.4; 30-to-64 female=6.0; 65-to-80 female=6.4). Subjects rated the accuracy of guidance using a scale anchored by the labels "very inaccurate" for one and "very accurate" for seven. Subjects indicated that display was quite accurate (means were 19-to-29 male=5.7; 30-to-64 male=6.6; 65-to-80 male=5.9; 19-to-29 female=5.4; 30-to-64 female=6.1; 65-to-80 female=6.5). There were no consistent differences between the age groups or sexes. Finally, subjects indicated their overall impression of the display using a scale anchored by the labels "strongly disliked" for one and "strongly liked,, for seven. A response of four indicated that the subject neither liked nor disliked the display. Overwhelmingly, subjects indicated that they liked the display with no significant differences between age groups or sexes (means were 19-to-29 male=5.8; 30-to-64 male=6.6; 65-to-80 male=6.1; 19-to-29 female=6.4; 30-to-64 female=6.5; 65-to-80 female=6.3).

Execute-Maneuver Display



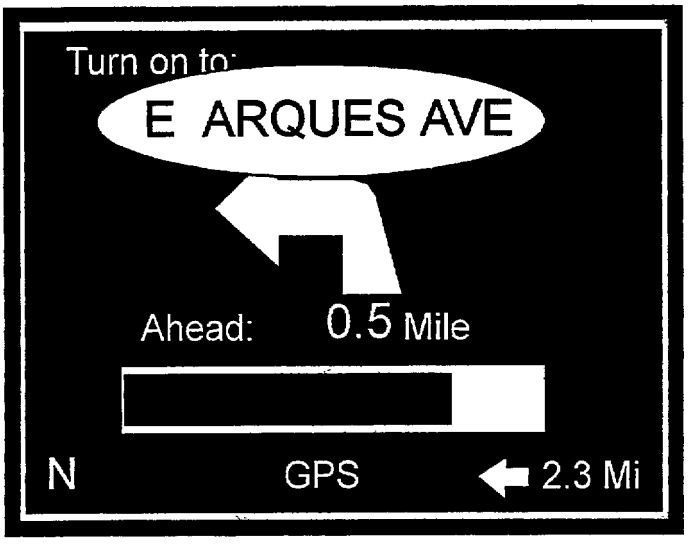
When the driver neared the maneuver, TetraStar showed a display similar to the one on the left. Subjects were asked several questions about the TetraStar *execute-maneuver* display. On seven-point scales, subjects indicated level of difficulty in understanding the information, sufficiency of the

amount of detail, the amount of advance warning provided by the instructions, the level of distraction while driving, accuracy of guidance, and their overall impression of the display. Level of difficulty in understanding the display was rated using a scale anchored by the labels “very difficult” for one and “very easy” for seven, Subjects reported that the display was very easy to understand (means were 19-to-29 male=6.5; 30-to-64 male=6.9; 65-to-80 male=6.6; 19-to-29 female=7.0; 30-to-64 female=6.9; 65-to-80 female=6.8). There were no statistical differences among age groups but there was a consistent difference between sexes [$F(1,45)=5.56$; *$p<.05$].* Men judged the display to be more difficult to understand than women. Subjects judged the sufficiency of the amount of detail shown using a scale anchored by the labels “insufficient” for one and “sufficient” for seven. Overall, subjects thought that the amount of detail shown was sufficient (means were 19-to-29 male=6.2; 30-to-64 male=6.9; 65-to-80 male=6.6; 19-to-29 female=7.0; 30-to-64 female=6.4; 65-to-80 female=6.7). There were no significant differences between sexes or among age groups. The amount of advance warning provided was judged using a scale anchored by the labels “not enough” for one and “too much” for seven, with a response of four indicating that the advance warning was acceptable. In general, subjects reported that the amount of advance warning was slightly more than what they preferred with no consistent differences by age groups or sexes (means were 19-to-29 male=4.3; 30-to-64 male=4.9; 65-to-80 male=5.0; 19-to-29 female=4.4; 30-to-64 female=4.8; 65-to-80 female=4.7).

Subjects judged level of distraction using a scale anchored by the labels “very distracting” for one and “not at all distracting” for seven. Overall, subjects thought that the display produced only minimal distraction while driving (means were 19-to-29 male=5.1; 30-to-64 male=6.3; 65-to-80 male=5.3; 19-to-29 female=6.5; 30-to-64 female=6.4; 65-to-80 female=6.2). A two-way ANOVA showed no difference between age groups and a significant main effect of sex [$F(1,45)=5.70$; $p<.05$], with men reporting a greater level of distraction than women. Subjects rated the accuracy of guidance using a scale anchored by the labels “very inaccurate” for one and “very accurate” for seven. Subjects indicated that display was quite accurate and there were no consistent differences among the age groups

or between the sexes (means were 19-to-29 male=5.7; 30-to-64 male=6.6; 65-to; 80 male=5.7; 19-to-29 female=5.8; 30-to-64 female=6.1; 65-to-80 female=6.6). Subjects indicated their overall impression of the display using a scale anchored by the labels “strongly disliked,, for one and “strongly liked” for seven. A response of four indicated that the subject neither liked nor disliked the display. Overwhelmingly, subjects indicated that they liked the display with no significant differences by age group or sex (means were 19-to-29 male=5.6; 30-to-64 male=6.6; 65-to-80 male=5.9; 19-to-29 female=6.4; 30-to-64 female=6.4; 65-to-80 female=6.3).

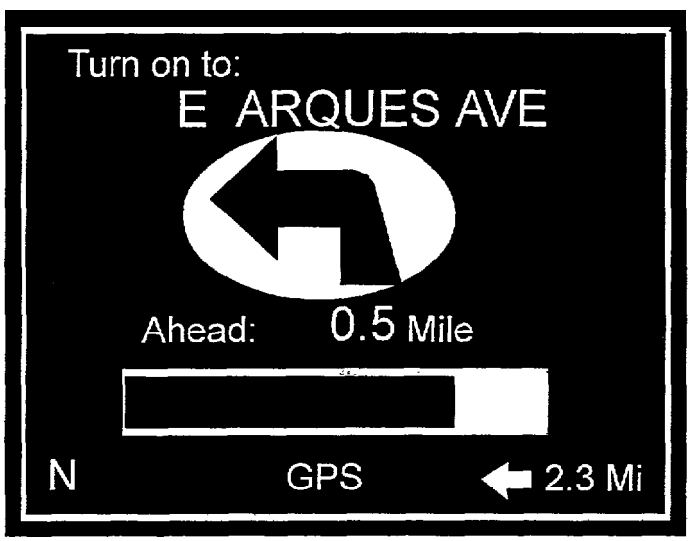
Turn-by-Turn Instructions: Street-Name Component



Both the next- and execute-maneuver displays showed the *street -name* (highlighted in the figure on the left) where the maneuver was to occur. We were interested in knowing how easy or difficult the name was to read, how much distraction it caused while driving, and the accuracy of this display component. Level of difficulty in reading the street name was rated using a scale anchored by the labels ‘very difficult,, for one and “very easy,, for seven. Subjects reported that the display was very easy to read with no consistent differences found between sexes or age groups (means were 19-to-29 male=6.5; 30-to-64 male=6.8; 65-to-80 male=6.0; 19-to-29 female=6.8; 30-to-64 female=6.8; 65-to-80 female=6.7). Subjects judged level of distraction using a scale anchored by the labels “very distracting” for one and “not at all distracting” for seven. Overall, subjects thought the street names produced very little distraction while driving (means were 19-to-29 male=5.6; 30-to-64 male=6.8; 65-to-80 male=5.6; 19-to-29 female=6.9; 30-to-64 female=6.5; 65-to-80 female=6.3). A two-way ANOVA showed that there was a significant main effect

of sex only [F(1,46)=4.46; *p<.05],* with men reporting greater distraction than women. Subjects rated the street name accuracy using a scale anchored by the labels "very inaccurate" for one and ‘ very accurate" for seven.Subjects indicated that the street names were quite accurate (means were 19-to-29 male=6.1; 30-to-64 male=6.8; 65-to-80 male=5.9; 19-to-29 female=5.7; 30-to-64 female=6.2; 65-to-80 female=6.7). There were no consistent differences between the age groups or sexes.

Turn-by-Turn instructions: Turn-Arrow Component

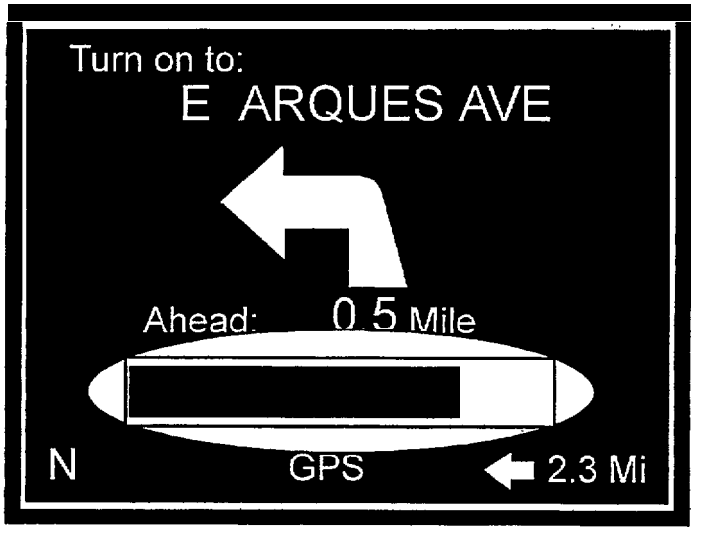


Both the next- and execute-maneuver displays indicated the required maneuver through the use of *turn-arrow* icons. The figure on the left shows the arrow used for a left-turn. We were interested in knowing how easy or difficult the arrow icons were to understand, the sufficiency of the level of detail shown, how much distraction they caused while driving, and the accuracy of this display component. Level of difficulty in the turn-arrow component was rated using a scale anchored by the labels “very difficult” for one and “very easy,, for seven. Subjects reported that the display component was very easy to understand (means were 19-to-29 male=6.8; 30-to-64 male=6.8; 65-to-80 male=6.4; 19-to-29 female=7.0; 30-to-64 female=6.8; 65-to-80 female=7.0). A two-way ANOVA showed a significant main effect of sex [F(1,46)=4.65; p<.05] with men reporting greater difficulty understanding the turn arrows than women. No other effects or interactions were significant. Subjects judged the sufficiency of the amount of detail shown using a scale anchored by the labels “insufficient” for one and “sufficient” for seven. Overall, subjects thought that the amount of detail shown was sufficient (means were 19-to-29 male=6.0; 30-to-64 male=6.9; 65-to-80 male=6.4; 19-to-29

female=7.0; 30-to-64 female=6.6; 65-to-80 female=7.0). A two-way ANOVA revealed a significant main effect of sex [F(1,46)=5.05; *p<.05).* Reports by men showed that they thought that the level of detail was less sufficient than reports by women. There was no significant main effect of age group.

Subjects judged level of distraction using a scale anchored by the labels "very distracting" for one and "not at all distracting" for seven. Overall, subjects thought that the display produced very little distraction while driving (means were 19-to-29 male=5.6; 30-to-64 male=6.6; 65-to-80 male=5.6; 19-to-29 female=6.7; 30-to-64 female=6.4; 65-to-80 female=6.3). No significant main effects were discovered. Subjects rated the component's accuracy using a scale anchored by the labels "very inaccurate" for one and "very accurate" for seven. Subjects indicated that the display was quite accurate and there were no consistent differences by age group or sex (means were 19-to-29 male=6.1; 30-to-64 male=6.6; 65-to-80 male=5.9; 19-to-29 female=6.2; 30-to-64 female=6.1; 65-to-80 female=6.7).

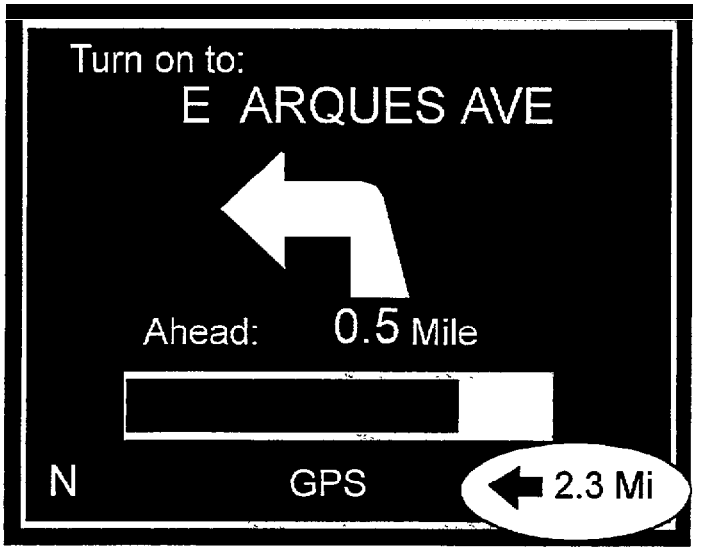
Turn-by-Turn Instructions: Countdown-Bar Component



The execute-maneuver display indicated the relative distance to the required maneuver through the use of a *countdown bar* (see the figure on the left) that decreased in siie as the vehicle neared the location of the maneuver. We were interested in knowing how easy or difficult the countdown bar was to understand, the sufficiency of the level of detail shown, the amount of advance warning provided, how much distraction it caused while driving, and the accuracy of this display component. Level of difficulty in the countdown bar component was rated using a

scale anchored by the labels ‘very difficult” for one and “very easy,, for seven. Subjects reported that the display component was very easy to understand (means were 19-to-29 male=6.2; 30-to-64 male=7.0; 65-to-80 male=6.5; 19-to-29 female=6.9; 30-to-64 female=6.8; 65-to-80 female=6.8). No significant main effects were found. Subjects judged the sufficiency of the amount of detail shown using a scale anchored by the labels “insufficient” for one and “sufficient” for seven. Overall, subjects thought that the amount of detail shown was mostly sufficient with no consistent difference between sexes or age groups (means were 19-to-29 male=5.8; 30-to-64 male=7.0; 65-to-80 male=6.5; 19-to-29 female=6.9; 30-to-64 female=6.6; 65-to-80 female=6.8). The amount of advance warning provided was judged using a scale anchored by the labels “not enough” for one and "too much” for seven, with a response of four indicating that the advance warning was acceptable. In general, subjects reported that the amount of advance warning was slightly more than what they preferred with no consistent differences by age group or sex (means were 19-to-29 male=4.7; 30-to-64 male=4.5; 65-to-80 male=5.4; 19-to-29 female=4.5; 30-to-64 female=4.9; 65-to-80 female=5.2). Subjects judged level of distraction using a scale anchored by the labels “very distracting” for one and “not at all distracting” for seven. Overall, subjects thought that the display produced very little distraction while driving (means were 19-to-29 male=5.5; 30-to-64 male=6.4; 65-to-80 male=5.1; 19-to-29 female=6.6; 30-to-64 female=6.8; 65-to-80 female=6.3). A two-way ANOVA revealed a significant main effect of sex [$F(1,46)=9.48$; $p<.005$]. This effect resulted from the fact that women judged the countdown bar to be much less distracting than did men. There were no other significant main effects or interactions. Subjects rated the component’s accuracy using a scale anchored by the labels “very inaccurate” for one and “very accurate” for seven. Subjects indicated that the display was quite accurate and there were no consistent differences between the age groups or sexes (means were 19-to-29 male=5.9; 30-to-64 male=6.8; 65-to-80 male=6.4; 19-to-29 female=6.0; 30-to-64 female=6.0; 65-to-80 female=6.7).

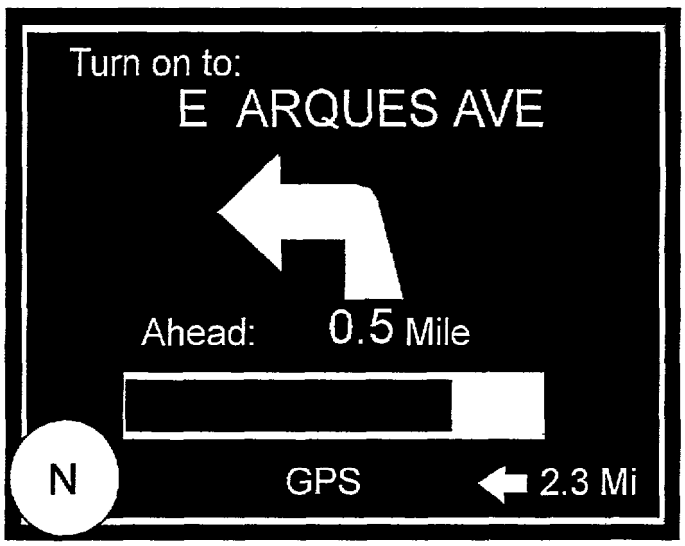
Turn-by-Turn Instructions: Distance-and-Direction-to-Destination Component



The next- and execute-maneuver displays always indicated the actual driving *distance* and crow fly *direction to the destination (see* the highlighted component in the figure on the left). We were interested in knowing how easy or difficult this component was to understand, the sufficiency of the level of detail shown, the level of usefulness in guidance, how much distraction'it caused while driving, and the accuracy of this display component. Level of difficulty in understanding the component was rated using a scale anchored by the labels "very difficult" for one and "very easy,, for seven. Subjects reported that the display component was very easy to understand (means were 19-to-29 male=6.0; 30-to-64 male=7.0; 65-to-80 male=6.3; 19-to-29 female=7.0; 30-to-64 female=6.9; 65-to-80 female=6.7). No significant main effects were found. Subjects judged the sufficiency of the amount of detail shown using a scale anchored by the labels "insufficient" for one and "sufficient" for seven. Overall, subjects thought that the amount of detail shown was mostly sufficient with no consistent differences by sex or age group (means were 19-to-29 male=5.4; 30-to-64 male=6.9; 65-to-80 male=6.0; 19-to-29 female=6.5; 30-to-64 female=6.6; 65to-80 female=5.8). Subjects judged the level of usefulness in guidance using a scale anchored by the labels "not at all useful" for one and "extremely useful,, for seven. Overall, subjects found the distance and direction to the destination component to be quite useful in guidance (means were 19-to-29 male=5.4; 30-to-64 male=6.9; 65-to-80 male=6.0; 19-to-29 femalec6.5; 30-to-64 female=6.6; 65-to-80 female=5.8). There were no significant differences between age groups or sexes. Subjects judged level of distraction using a scale anchored by the labels "very distracting" for one and "not at all distracting" for seven. Overall, subjects indicated that the display produced very little distraction

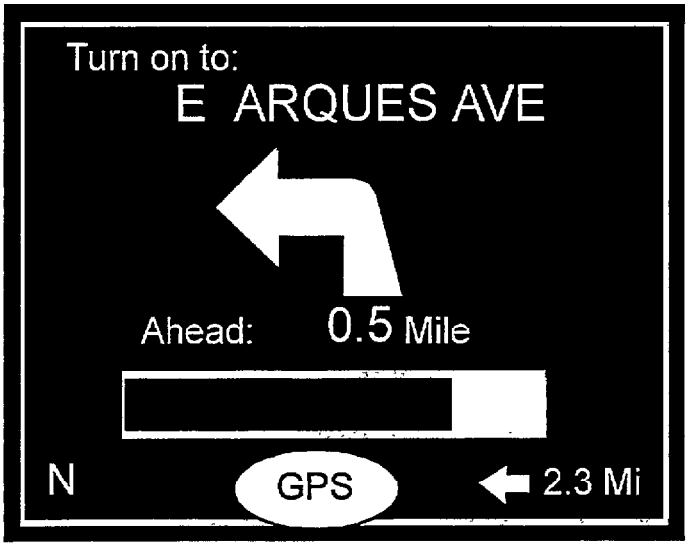
while driving with no significant main effects (means were 19-to-29 male=5.8; 30-to-64 male=6.6; 65-to-80 male=5.3; 19-to-29 female=6.4; 30-to-64 female=6.6; 65-to-80 female=5.8). Subjects rated the component's accuracy using a scale anchored by the labels "very inaccurate" for one and "very accurate" for seven. Subjects indicated that the distance-and-direction-to-destination component was quite accurate, and there were no consistent differences among the age groups or between the sexes (means were 19-to-29 male=6.2; 30-to-64 male=6.8; 65-to-80 male=6.1; 19-to-29 female=5.7; 30-to-64 female=6.4; 65-to-80 female=6.3).

Turn-by-Turn Instructions: Current-Heading Component



The next- and execute-maneuver displays always indicated the *current heading* of the vehicle using compass heading letters (see the highlighted component in the figure on the left). We were interested in knowing if drivers understood what this component was indicating. We did this by asking subjects to select the function from a list of four possibilities: direction that the vehicle is heading, direction to the destination, direction to the next maneuver, and direction to the nearest traffic signal. Overall, 77.1 percent of respondents correctly indicated that the letter in the lower left corner of the display showed the vehicle's heading, 18.1 percent reported that it meant the direction to the destination, and 4.2 percent thought it was the direction to the next maneuver. Contingency table analysis revealed no difference in correct responses by age group or sex.

Turn-by-Turn Instructions: GPS Component



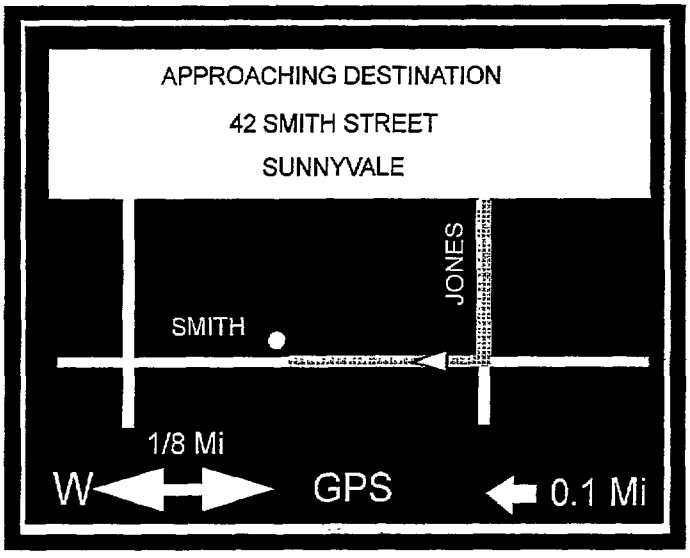
The next- and execute-maneuver displays always indicated the current status of the *GPS* satellite signals by displaying "GPS" in either red, yellow, or green (see the highlighted component in the figure on the left). Red lettering meant that there was no GPS reception, yellow meant that the signals were fair, and green indicated that the signals were precise. We were interested in knowing if drivers understood what this component was indicating. We did this by asking subjects to select the component's function from a list of four possibilities: the color of the next traffic signal, the amount of congestion on the roadway, the strength of the satellite signals used for locating the vehicle, and initials of the inventor. Overall, 95.7 percent of subjects correctly reported that the color of the letters "GPS" indicated the strength of the satellite signals, 2.2 percent reported that they thought it indicated level of congestion, and 2.2 percent thought it meant the initials of the inventor. Contingency table analyses showed that there were no differences in correct responding by age group or sex.

Electronic-Map Display

At any time while driving to a destination, a person could press a button on the TetraStar unit that would toggle between the next-maneuver display screen and an *electronic-map* display. This latter display showed an electronic map of the area in which they were driving, the driver's current position located on a map, and the route they were following highlighted on the map. We were interested in knowing how often subjects used this feature and what their preferred presentation mode was for getting guidance information. Considering all trips taken with TetraStar, subjects judged the frequency with which they used this feature on a scale

anchored by the labels "never" for one and "always" for seven. A response of four indicated that they looked at the electronic map on about one-half their trips. Overall, subjects reported using this feature on slightly more than one-half their trips with no differences by sex or age group (means were 19-to-29 male=5.9; 30-to-64 male=4.8; 65-to-80 male=4.1; 19-to-29 female=4.1; 30-to-64 female=3.7; 65-to-80 female=4.3). Subjects indicated their preference for getting guidance information by selecting one of three options: maneuver display, electronic-map display, or no preference. Overall, 61.1 percent of subjects indicated that they preferred to get guidance information from a map display and 38.9 percent indicated a preference for the maneuver display. Contingency table analyses showed that there were no differences in stated preference by age group or sex.

Arrival-at-Destination Display



When the driver neared the destination, TetraStar showed a display that indicated the destination address, the destination location on a map, the vehicle's current position, and a highlighted route to the destination. The figure on the left shows an example *arrival-at-destination* display. We were interested in knowing how easy or difficult this component was to understand, the accuracy of the guidance, their overall impression, and the amount of difficulty they had finding destinations once the arrival display was shown. Level of difficulty in understanding the display was rated using a scale anchored by the labels "very difficult" for one and "very easy" for seven. Subjects reported that the display was very easy to understand (means were 19-to-29 male=6.4; 30-to-64 male=7.0; 65-to-80 male=6.3; 19-to-29 female=6.8; 30-to-64 female=6.8; 65-to-80 female=6.8). There were no differences differences among age groups or between sexes. Subjects rated the display

accuracy of guidance using a scale anchored by the labels 'very inaccurate" for one and "very accurate" for seven. Subjects indicated that the display provided quite accurate guidance, and there were no consistent differences by age group or sex (means were 19-to-29 male=6.1; 30-to-64 male=6.5; 65-to-80 male=6.3; 19-to-29 female=5.8; 30-to-64 female=6.6; 65-to-80 female=6.5). Subjects indicated their overall impression of the display using a scale anchored by the labels "strongly disliked" for one and "strongly liked" for seven. A response of four indicated that the subject neither liked nor disliked the display. Overwhelmingly, subjects indicated that they liked the display, with no significant differences by age group or sex (means were 19-to-29 male=5.8; 30-to-64' male=6.5; 65:to-80 male=6.4; 19-to-29 female=6.6; 30-to-64 female=6.7; 65-to-80 female=6.7). Finally, subjects judged the amount of difficulty they had finding destinations once they were shown the arrival display using a scale anchored by the labels "always had difficulty" for one and "never had difficulty" for seven. A response of four indicated difficulty about 50 percent of the time. Subjects reported having difficulty on only a very small percentage of their trips (means were 19-to-29 male=5.9; 30-to-64 male=6.4; 65-to-80 male=6.9; 19-to-29 female=6.1; 30-to-64 female=6.5; 65-to-80 female=6.8). A two-way ANOVA showed that there was a significant main effect of age group [$F(2,45)=3.63$; $p<.05$]. *Post hoc* analyses showed that this age group effect resulted from subjects in the youngest age group reporting greater difficulty finding final destinations than drivers in the oldest age group. There were no other significant effects.

The TetraStar System

Visual Displays and Concepts

Subjects were asked several questions about TetraStar's visual displays and concepts as a whole. On seven-point scales, subjects were asked to rate the ease or difficulty for reading and understanding the displays, sufficiency of the advance warning and accuracy of guidance, whether they helped subjects find their way, their overall impression, and the level of distraction caused by the displays in several driving conditions. Level of difficulty in reading the displays while driving and while the vehicle was still was rated using **a** scale anchored by the labels "very

difficult" for one and "very easy" for seven. Subjects reported that the display was fairly easy to read while driving (means were 19-to-29 male=5.7; 30-to-64 male=6.3; 65-to-80 male=4.3; 19-to-29 female=5.9; 30-to-64 female=6.6; 65-to-80 female=6.0) and very easy to read while the vehicle was still (means were 19-to-29 male=6.7; 30-to-64 male=6.9; 65-to-80 male=6.3; 19-to-29 female=6.8; 30-to-64 female=7.0; 65-to-80 female=6.8) There were no significant differences among age groups or between sexes on either of these measures. Level of difficulty in understanding the displays was rated using a scale anchored by the labels “very difficult” for one and “very easy,, for seven. Subjects reported that the display was very easy to understand with no significant difference by age group or sex (means were 19-to-29 male=6.5; 30-to-64 male=7.0; 65-to-80 male=6.4; 19-to-29 female=6.7; 30-to-64 female=6.8; 65-to-80 female=6.6). The sufficiency of advance warning provided and accuracy of guidance was judged using scales anchored by the labels “insufficient” for one and “sufficient” for seven. In general, subjects reported that the amount of advance warning was sufficient (means were 19-to-29 male=5.7; 30-to-64 male=6.1; 65-to-80 male=6.4; 19-to-29 female=6.6; 30-to-64 female=6.3; 65-to-80 female=6.5), and the accuracy of guidance was fairly sufficient (means were 19-to-29 male=6.0; 30-to-64 male=6.5; 65-to-80 male=6.1; 19-to-29 female=5.4; 30-to-64 female=6.1; 65-to-80 female=6.7).

Subjects indicated the frequency with which the visual displays helped them find their way using a scale anchored by the labels “always” for one and “never’, for seven. A response of four meant that the subject thought the displays helped them find their way about 50 percent of the time. Subjects reported that the displays helped them find their way most of the time (means were 19-to-29 male=3.3; 30-to-64 male=2.1; 65-to-80 male=4.5; 19-to-29 female=2.8; 30-to-64 female=3.5; 65-to-80 female=3.5). There were no significant main effects on this measure. Subjects indicated their overall impression of the visual displays using a scale anchored by the labels “strongly disliked” for one and “strongly liked” for seven. A response of four indicated that the subject neither liked nor disliked the display. Subjects indicated that they strongly liked the display with no significant differences by age

group or sex (means were 19-to-29 male=6.4; 30-to-64 male=6.6; 65-to-80 male=6.1; 19-to-29 female=6.3; 30-to-64 female=6.6; 65-to-80 female=5.8).

Subjects judged the level of distraction caused by TetraStar's visual displays under the following driving conditions: at night, during daylight hours, in heavy traffic, in light traffic, when traveling along freeways, and when traveling along nonfreeway roads. Judgments were made using a scale anchored by the labels "very distracting" for one and "not at all distracting" for seven. Table 5 shows the mean level of distraction reported for each driving condition by age group and sex. As shown in this figure, subjects thought that ttie visual displays produced very little distraction while driving under any of the conditions investigated. Two-way ANOVAs calculated separately on each condition showed significant main effects of sex for driving at night [F(1,45)=9.31; *p<.005],* driving during daylight hours [F(1,46)=7.68; p<.01], driving in heavy traffic [F(1,46)=4.46; *p<.05],* and driving in light traffic [F(1,46)=4.76; p<.05]. In all cases, the significant effect resulted from men reporting greater distraction than women. There was also a significant main effect of age group for driving during daylight hours [F(2,46)=3.21; p<.05]. *Post hoc* analyses showed that this effect resulted from drivers in the oldest age group reporting significantly greater distraction than drivers in the middle age group. All other effects and interactions were nonsignificant.

Table 5: Average Ratings for Level of Distraction Caused by TetraStar's Visual Displays for Several Driving Conditions by Age Group and Sex (1=very distracting; 7=not at all distracting)

DrivingCondition	Male			Female		
	19-29	30-64	65-80	19-29	30-64	65-80
At night	5.6	5.9	5.4	6.8	6.7	6.6
Daylight	5.2	6.4	5.0	6.9	6.6	5.8
Light traffic	5.8	6.3	5.6	6.9	6.7	6.0
Heavy traffic	5.2	6.1	4.8	6.6	6.4	5.8
Freeways	6.1	6.5	6.1	6.7	6.7	5.8
Nonfreeways	5.6	6.1	5.8	6.7	6.7	6.0

Voice Guidance

Subjects were asked several questions about TetraStar's voice guidance feature. On seven-point scales, subjects were asked to rate the ease or difficulty for hearing and understanding the instructions, sufficiency of the amount of information and advance warning, the level of distraction while driving, their opinion of the voice sound, and their overall impression. Level of difficulty in hearing and understanding the instructions was rated using scales anchored by the labels "very difficult" for one and "very easy" for seven. Subjects reported that the voice instructions were very easy to hear (means were 19-to-29 male=6.1; 30-to-64 male=6.0; 65-to-80 male=6.6; 19-to-29 female=6.7; 30-to-64 female=6.7; 65-to-80 female=7.0) and very easy to understand (means were 19-to-29 male=5.9; 30-to-64 male=6.5; 65-to-80 male=6.9; 19-to-29 female=6.8; 30-to-64 female=6.9; 65-to-80 female=7.0). Two-way ANOVAs calculated separately on each factor showed that there was a significant main effect of sex for ease of hearing [$F(1,46)=4.62$; *p<.05]* and ease of understanding [$F(1,46)=7.13$; *p<.02].* In both cases the effect was produced by men reporting greater difficulty than women. There was also a significant main effect of age group for difficulty understanding the voice instructions [$F(2, 46)=3.71$; *p<.05]. Post hoc* analyses showed that this effect resulted from drivers in the oldest age group reporting less difficulty in understanding than drivers in the youngest age group. All other main effects and interactions were nonsignificant.

The sufficiency of amount of information and advance warning provided was judged using scales anchored by the labels "insufficient" for one and "sufficient" for seven. In general, subjects reported that the amount of information given was sufficient (means were 19-to-29 male=6.0; 30-to-64 male=6.4; 65-to-80 male=6.5; 19-to-29 female=6.9; 30-to-64 female=6.7; 65-to-80 female=7.0) and the advance warning given was sufficient (means were 19-to-29 male=5.6; 30-to-64 male=6.4; 65-to-80 male=6.3; 19-to-29 female=6.8; 30-to-64 female=6.5; 65-to-80 female=6.3). Two-way ANOVAs calculated separately on each factor showed that

there was a significant main effect of sex for amount of information given [F(1,46)=8.35; p<.01]. This effect was produced by men reporting that the amount of information was less sufficient than reports by women. All other main effects and interactions were nonsignificant.

Subjects judged level of distraction using a scale anchored by the labels "very distracting" for one and "not at all distracting" for seven. Overall, subjects thought that the voice guidance feature produced very little distraction while driving (means were 19-to-29 male=4.6; 30-to-64 male=6.5; 65-to-80 male=6.5; 19-to-29 female=6.3; 30-to-64 female=6.2; 65-to-80 female=7.0). A two-way ANOVA showed that there was a significant main effect of age group [F(2,45)=4.74; p<.02]. *Post hoc* analyses showed that this effect resulted from drivers in the youngest age group reporting significantly more distraction than drivers in the oldest age group. Subjects indicated their impression of the voice sound and their overall impression of the voice guidance feature using scales anchored by the labels 'strongly disliked" for one and "strongly liked" for seven. In general, subjects indicated a fairly strong positive regard for the sound of the voice (means were 19-to-29 male=3.8; 30-to-64 male=5.1 ; 65-to-80 male=6.1; 19-to-29 female=6.0; 30-to-64 female=5.6; 65-to-80 female=6.8) and highly positive impressions of the voice guidance feature overall (means were 19-to-29 male=5.2; 30-to-64 male=6.0; 65-to-80 male=6.4; 19-to-29 female=6.6; 30-to-64 female=6.3; 65-to-80 female=7.0). Two-way ANOVAs showed that there were-significant main effects of sex for voice sound [F(1,46)=8.90; *p<.005]* and for overall impression [F(1,45)=12.49; *p<.002].* In both cases the effect resulted from female drivers having more positive impressions than male drivers. There was also a significant main effect of age group for sound of the voice [F(2,46)=5.76; p<.01] and overall impression [F(2,45)=4.12; p<.05] *Post hoc* analyses showed that these main effects were produced by drivers in the oldest age group reporting more positive impressions than drivers in the youngest age group.

Visual Versus Voice Guidance Instructions

We were interested in knowing what TetraStar users' preferences were for receiving guidance instructions. Subjects indicated their preference by selecting one of four options from a list: voice alone, visual alone, voice and visual together, or no preference. Overall, 90.4 percent indicated a preference for voice and visual information together, 3.8 percent reported a preference for voice alone, 3.8 percent indicated a preference for visual alone, and 1.9 percent had no preference. Contingency table analyses showed that there were no significant differences in stated preference by age group or sex.

Frequency of Following Guidance Instructions

As a way of assessing TetraStar's usefulness, we were interested in determining how frequently drivers followed the recommended maneuvers provided by the system. Subjects judged the frequency with which they followed TetraStar turn recommendations using a scale anchored by the labels "never" for one and "always" for seven. A response of four indicated that they followed recommendations about one-half of the time. Overall, subjects reported following instructions about two-thirds of time with no differences between sexes or among age groups (means were 19-to-29 male=4.9; 30-to-64 male=5.3; 65-to-80 male=5.1; 19-to-29 female=5.3; 30-to-64 female=5 1; 65-to-80 female=5.2). Those subjects that did not follow turn recommendations all of the time, were asked to indicate the frequency with which several factors were related to their decision not to follow the turn recommendations. Subjects indicated the frequency using scales anchored by the labels "never" for one and "always,, for seven. Table 6 shows the average frequency rating for each factor (listed from most frequent to least frequent) as a function of sex and age group. A two-way ANOVA calculated on each condition separately showed that there were no significant main effects or interactions except for a main effect of age group for the belief that the turn would take them into traffic congestion [$F(2,43)=3.36$; $p<.05$] *Post hoc* analyses showed that this effect resulted from the fact that younger drivers reported that this reason was less frequent in the decision not to follow a recommended turn than judgments of drivers in the middle age group.

Table 6: Average Ratings for Frequency with Which Each Reason was involved in Deciding not to Follow TetraStar Turn Recommendation by Age Group and Sex (1 = never; 7 = always)						
Method	**Male**			**Female**		
	19-29	**30-64**	**65-80**	**19-29**	**30-64**	**65-80**
Knew of a faster route	5.5	6.0	5.8	4.9	5.6	4.6
Needed to make unscheduled stops	3.5	2.5	4.0	3.3	3.6	4.0
Believed turn would take them into traffic congestion	4.2	4.3	13.0	3.6	4.0	1.6
Believed turn would take them away from destination	2.0	4.0	3.8	2.6	4.0	3.4
No room to merge	1.4	1.9	2.2	1.4	2.7	1.2
Turn recommendation was not clear	1.8	1.3	2.3	1.6	1.9	1.6
Turn recommendation suggested too late	2.6	2.0	1.5	1.1	2.0	1.2
Other	3.0	5.3	4.3	5.7	5.5	4.0

Potential Benefits of TetraStar

In-vehicle navigation assistance systems have the potential to provide several benefits to the user by improving their driving as compared to driving without the system. We were interested in knowing what benefits, or lack of benefits, they thought they received by using the TetraStar system. Subjects compared their driving with TetraStar to their driving without the system on travel time, congestion avoidance, driving safety, and fuel consumption using scales anchored by the labels “reduced” for one and “increased” for seven. A response of four indicated that the system produced no change. Table 7 shows the average judgments for each potential benefit by sex and age group. As can be seen in this table, subjects reported that TetraStar slightly reduced their travel times and had little effect on congestion avoidance, driving safety, or fuel consumption. Two-way ANOVAs calculated on each potential benefit separately showed that there were no main effects or interactions except for a main effect of sex for travel time [$F(1,46)=7.63$; $p<.01$]. This main effect resulted from the fact that women reported a greater reduction in travel time than men.

Table 7: Average Ratings for How TetraStar Affected Several Potential Benefits When Compared to Driving without TetraStar by Age Group and Sex (1 = never; 7 = always)						
Method	**Male**			**Female**		
	19-29	**30-64**	**65-80**	**19-29**	**30-64**	**65-80**
Travel time	3.2	3.9	4.4	2.8	3.0	2.8
Congestion avoidance	4.3	3.9	3.7	4.4	4.0	3.2
Driving safety	3.1	3.8	4.3	4.0	3.9	3.8
Fuel consumption	3.7	3.4	5.0	4.0	3.7	3.3

TetraStar as a Whole

Considering everything about the TetraStar system, we were interested in knowing how easy or difficult the system was to learn and understand; the sufficiency of information given and advance warning provided; the accuracy of guidance; whether the system helped drivers find their way, reduced their travel times, and functioned properly; the level of distraction while driving, and the driver's overall impression. Level of difficulty in learning and understanding the system was rated using a scale anchored by the labels "very difficult" for one and "very easy" for seven. Subject reported that the system was fairly easy to learn (means were 19-to-29 male=6.6; 30-to-64 male=6.8; 65to-80 maIe=5.5; 19-to-29 female=6.9; 30-to-64 female=6.9; 65to-80 female=5.5), and fairly easy to understand (means were 19-to-29 male=6.6; 30-to-64 male=6.9; 65-to-80 male=5.6; 19-to-29 female=6.9; 30-to-64 female=6.9; 65-to-80 female=5.5). Two-way ANOVAs showed significant main effects of age group for ease of learning [$F(2,46)=14.10$; $p<.0001$], and for ease of understanding [$F(2,46)=17.94$; $p<.0001$]. *Post hoc* analyses showed that both effects resulted from drivers in the oldest age group having significantly more difficulty both learning and understanding the system than drivers in either of the other age groups. No other main effects or interactions were significant.

Subjects judged the sufficiency of the amount of information given and advance warning provided using scales anchored by the labels “insufficient” for one and “sufficient” for seven. Overall, subjects thought that the amount of information given was sufficient (means were 19-to-29 male=6.2; 30-to-64 male=6.6; 65-to-80 male=5.6; 19-to-29 female=6.7; 30-to-64 female=6.7; 65-to-80 female=6.8), and that the advance warning provided was sufficient (means were 19-to-29 male=5.7; 30-to-64 male=6.4; 65-to-80 male=6.1; 19-to-29 female=6.6; 30-to-64 female=6.2; 65-to-80 female=6.3). Two-way ANOVAs showed that there was a main effect of sex for amount of information given [$F(1,46)=5.32$; $p<.05$]. This effect resulted from men reporting that the amount of information was less sufficient than did the reports of women. Subjects rated the accuracy of guidance providedby TetraStar using a scale anchored by the labels “very inaccurate” for one and “very accurate” for seven. Subjects indicated that the system provided fairly accurate guidance and there were no consistent differences among the age groups or between the sexes (means were 19-to-29 male=5.9; 30-to-64 male=6.5; 65-to-80 male=5.9; 19-to-29 female=5.2; 30-to-64 female=5.9; 65-to-80 female=5.7).

Subjects indicated the strength of their agreement that the TetraStar system helped them find their way, reduced their travel time, and functioned properly using scales anchored by the labels “strongly disagree” for one and “strongly agree” for seven. Subjects reported that they generally agreed that TetraStar helped them find their way (means were 19-to-29 male=5.7; 30-to-64 male=6.3; 65-to-80 male=5.8; 19-to-29 female=6.0; 30-to-64 female=6.5; 65-to-80 female=5.5), somewhat agreed that TetraStar reduced their travel times (means were 19-to-29 male=4.6; 30-to-64 male=4.3; 65-to-80 male=4.5; 19-to-29 female=5.3; 30-to-64 female=4.9; 65-to-80 female=4.5), and generally agreed that TetraStar functioned properly (means were 19-to-29 male=5.3; 30-to-64 male=6.3; 65-to-80 male=5.1; 19-to-29 female=5.4; 30-to-64 female=4.6; 65-to-80 female=4.8). There were no significant main effects or interactions on any of these measures. Subjects judged the level of distraction caused by TetraStar using a scale anchored by the labels “very distracting” for one and “not at all distracting” for seven. Overall, subjects thought that the system produced only minimal distraction while driving with no

differences between age groups or sexes (means were 19-to-29 male=5.3; 30-to-64 male=6.1; 65-to-80 male=5.5; 19-to-29 female=6.4; 30-to-64 female=6.4; 65-to-80 female=5.5). Finally, subjects indicated their overall impression of the system using a scale anchored by the labels “strongly disliked” for one and “strongly liked” for seven. A response of four indicated that the subject neither liked nor disliked the system. Overwhelmingly, subjects indicated that they strongly liked the TetraStar system with no significant differences between age groups or sexes (means were 19-to-29 male=6.4; 30-to-64 male=6.8; 65-to-80 male=6.4; 19-to-29 female=6.5; 30-to-64 female=6.5; 65-to-80 female=5.7).

Use of the TetraStar System

Use by Type of Trip

Subjects judged the frequency with which they used TetraStar for commuting trips, work-related (non-commuting) trips, recreational trips, and other personal trips using a scale anchored by the labels “never” for one and “always” for seven. A response of four indicated that TetraStar was used on that type of trip about one-half of the time. Table 8 shows the average frequency rating (listed in order of highest to lowest frequency) for each trip type by age group and sex. As can be seen in this table, TetraStar was used frequently for each type of trip. Two-way ANOVAs showed that there were significant main effects of age group for commuting trips [$F(2,43)=10.29$; $p<.0005$], work-related trips [$F(2,42)=4.11$; $p<.05$], and other personal trips [$F(2,46)=3.42$; $p<.05$]. *Post hoc* analyses showed that drivers in the oldest age group used TetraStar less frequently for commuting trips than drivers in other age groups; drivers in the oldest age-group used TetraStar less frequently for work-related trips than drivers in the middle age group; and drivers in the youngest age group used TetraStar less frequently for other personal trips than drivers in the other two age groups. No other main effects or interactions were significant.

Table 8: Average Ratings of How Frequently TetraStar Was Used for Various Trip Purposes by Age Group and Sex (1 = never; 7 = always)						
Trip Purpose	**Male**			**Female**		
	19-29	**30-64**	**65-80**	**19-29**	**30-64**	**65-80**
Personal	5.5	6.3	6.0	5.5	6.2	6.7
Recreational	5.9	6.0	5.5	5.8	6.0	6.8
Commuting to work/school	6.5	6.8	3.4	5.9	7.0	4.0
Work related (noncommuting)	6.2	5.8	2.3	4.2	5.8	4.0

Driving with TetraStar as Compared to Driving Without TetraStar

We were interested in knowing how use of the TetraStar system changed drivers' attention to several driving-related factors; how the TetraStar system affected the emotional responses of drivers; and how the TetraStar system affected the drivers' frequency of several unsafe driving maneuvers. Subjects rated the extent to which driving with TetraStar, as compared to driving without TetraStar, changed their attention to traffic conditions, traffic signals, road signs, street signs, street addresses, speedometer, mirrors, and the fuel gauge. Subjects rated each of the factors using scales anchored by the labels "much less attention" for one and "much more attention" for seven. A response of four indicated that TetraStar produced no change in attention. Table 9 shows the average responses (listed in order of highest overall rating to lowest) for each factor as a function of age group and sex. As can be seen in this table, TetraStar produced a slight increase in attention to traffic conditions, street signs, road signs, and street addresses and generally no change in attention to the rest of the factors. Two-way ANOVAs calculated on each factor separately showed that there were significant main effects of age group for attention to traffic signals [$F(2,45)=5.21$; $p<.01$]. *Post hoc* analyses showed that this effect occurred because drivers in the middle age group reported an increase in attention to traffic signals whereas drivers in both of the other two groups reported no change. There were also significant main effects of sex for attention to mirrors [$F(1,46)=4.19$; $p<.05$] and fuel gauge [$F(1,46)=4.22$; $p<$

.051. In both cases, the effect resulted from women reporting a slight increase in attention whereas men reported a slight decrease.

Table 9: Average Ratings of How TetraStar Changed a Driver' s Attention to Several Driving-Related Factors by Age Group and Sex (1 = much less attention; 7 = much more attention)

Factor	Male			Female		
	19-29	30-64	65-80	19-29	30-64	65-80
Street signs	4.7	4.5	4.5	4.5	6.1	4.4
Street addresses	3.8	4.4	4.4	4.8	5.8	4.0
Traffic conditions	4.5	4.1	4.4	4.6	4.6	4.3
Road signs	4.1	4.4	4.0	3.9	4.8	4.2
Traffic signals	4.0	4.5	3.9	3.9	4.6	3.8
Fuel gauge	4.0	3.8	3.6	4.3	4.3	4.3
Speedometer	3.9	3.8	3.8	4.0	4.1	4.5
Mirrors	3.9	3.9	3.6	4.0	4.1	4.5

Subjects rated the extent to which driving with TetraStar, as compared to driving without TetraStar, changed the following feelings while driving: nervousness, confidence, confusion, attentiveness, safety, stress, relaxation, and frustration. Subjects rated each of the factors using scales anchored by the labels "always less with TetraStar" for one and "always more with TetraStar" for seven. A response of four indicated that TetraStar produced no change. Table 10 shows the average responses to each factor as a function of age group and sex listed from highest rating to lowest. As can be seen in this table, use of TetraStar produced a slight increase in feelings of confidence, attentiveness, safety, and relaxation. Use of TetraStar also produced slight decreases in feelings of nervousness, confusion, stress, and frustration. There were no significant main effects or interactions for any of these factors.

Table 10: Average Ratings of How TetraStar Changed Several Feelings While Driving as Compared to Driving without TetraStar by Age Group and Sex (1 = always less with TetraStar; 7 = always more with TetraStar)

Factor	Male			Female		
	19-29	30-64	65-80	19-29	30-64	65-80
Confident	5.5	5.5	4.9	4.9	4.1	4.8
Safe	4.0	5.0	4.1	4.5	5.1	4.8
Relaxed	4.7	3.8	4.9	5.1	4.7	4.3
Attentive	4.1	4.1	4.5	3.9	4.5	5.0
Stressed	4.0	3.5	2.9	2.6	2.5	3.7
Frustrated	3.7	2.8	3.0	3.3	2.7	3.2
Nervous	3.6	3.1	2.9	2.6	2.7	2.7
Confused	3.3	3.1	2.8	2.9	2.6	2.5

Subjects rated the extent to which driving with TetraStar, as compared to driving without TetraStar, changed their frequency of experiencing crashes, missed stop signs, running red lights, running off of the road, and crossing lane markers. Subjects rated each of these factors using scales anchored by the labels “always less with TetraStar” for one and “always more with TetraStar” for seven. A response of four indicated that TetraStar produced no change. Table 11 shows the average rating for each factor, listed from greatest to least decrease, as a function of age group and sex. As can be seen in this table, use of TetraStar produced a slight decrease in experiences of crashes, missed stop signs, running red lights, running off of the road, and crossed lane markers. There were no significant main effects or interactions for any factor.

Table 11: Average Ratings of How TetraStar Changed a Driver' s Frequency of Experiencing Several Traffic-Safety-Related Situations as Compared to Driving without TetraStar by Age Group and Sex (1 = always less with TetraStar; 7 = always more with TetraStar)						
Factor	**Male**			**Female**		
	19-29	**30-64**	**65-80**	**19-29**	**30-64**	**65-80**
Crashes	3.5	3.3	3.5	3.7	2.3	2.6
Crossed lane marker	3.6	3.8	3.0	4.1	2.3	2.6
Ran off road	3.5	3.8	3.0	4.1	2.4	2.6
Missed stop signs	3.4	3.8	3.3	4.0	2.5	2.6
Ran red light	3.4	4.1	3.0	4.0	2.6	2.6

Valuation

Value of Various Types of Route Guidance

We were interested in knowing how users of TetraStar valued various types of route guidance including TetraStar. Subjects were asked to rate the following sources of route guidance information: standard road map, verbal directions from a passenger, verbal directions from other people , written directions, and TetraStar. Rating were completed using scales anchored by the labels "poor" for one and "excellent" for seven. Table 12 shows the average rating for each source of route guidance information, listed from highest to lowest rating, by age group and sex. Several trends can be found in this table. First, all sources of route guidance information were given positive ratings overall. Second, verbal directions from either another person or a passenger were given the lowest ratings. Third, the route guidance information provided by TetraStar was the highest rated of all sources with average judgments close to excellent. Two-way ANOVAs calculated on each source separately showed that there was a significant main effect of sex for verbal directions from a passenger [F(1,45)=4.10; p<.O5]. Women judged this source of route guidance information to be of higher quality than did men. There were no other significant effects found.

Table 12: Average Ratings for Several Sources of Route Guidance Information by Age Group and Sex (1 = poor; 7 = excellent)						
Source of Route Guidance Information	**Male**			**Female**		
	19-29	**30-64**	**65-80**	**19-29**	**30-64**	**65-80**
TetraStar	6.6	6.8	6.4	6.3	6.3	6.8
Written directions	5.7	5.0	4.6	5.0	5.7	6.2
Standard road map	5.7	5.4	5.3	5.1	4.7	5.8
Verbal directions (passenger)	4.3	5.3	3.3	4.9	4.7	5.8
Verbal directions (other person)	3.9	4.0	3.7	4.2	4.1	5.2

Subjects were asked to indicate which of the same sources of route guidance information they would like to use while driving in an unfamiliar area. Subjects made this judgment using scales anchored by the labels “definitely would not like” for one and “definitely would like” for seven. Table 13 shows the average ratings for each source, listed from highest rating to lowest, by age group and sex. As can be seen in this table, all sources of route guidance information were acceptable to drivers in unfamiliar areas. Subjects judged the two kinds of verbal instructions to be the ones they would least like to have and TetraStar to be the source of route guidance information they would most like to have. There were no significant main effects or interactions for any source of route guidance information.

Table 13: Average Ratings for Desire to Use Several Sources of Route Guidance Information While Driving in an Unfamiliar Area by Age Group and Sex (1 = definitely would not like; 7 = definitely would like)						
Source of Route Guidance Information	**Male**			**Female**		
	19-29	**30-64**	**65-80**	**19-29**	**30-64**	**65-80**
TetraStar	6.8	7.0	6.6	6.8	6.9	6.8
Written directions	5.7	4.8	4.6	5.5	5.8	6.5
Standard road map	5.5	5.8	5.4	5.0	4.8	6.2
Verbal directions (passenger)	4.5	4.8	4.0	4.8	4.8	5.8
Verbal directions (other person)	4.2	4.0	3.3	4.0	4.8	5.0

Value of TetraStar Nation wide

Subjects were asked to assume that TetraStar was available nationwide. We were interested in knowing how useful subjects thought the system would be for various types of trips. Subjects indicated the usefulness of TetraStar for commuting, out-of-town vacation trips, out-of-town business trips, and for local driving using scales anchored by the labels “not at all useful” for one and “extremely useful” for seven. Table 14 shows the average responses for the four type of trips by age group and sex listed in order of highest to lowest rating. As shown in this table, subjects thought that TetraStar would be most useful for out-of-town vacation and business trips. Subjects also indicated that TetraStar would not be that useful for local driving. There were no significant main effects or interactions.

Table 14: Average Ratings of TetraStar Usefulness for Various Trip Types by Age Group and Sex (1 = not at all useful; 7 = extremely useful)						
Trip type	**Male**			**Female**		
	19-29	**30-64**	**65-80**	**19-29**	**30-64**	**65-80**
Out-of-town vacation	7.0	6.8	6.9	7.0	6.8	6.7
Out-of-town business	7.0	6.8	6.9	7.0	6.8	6.7
Commuting	4.7	4.8	5.4	4.3	6.3	4.5
Local driving	4.0	4.6	4.4	4.4	5.2	3.8

Willingness to Pay

Subjects were asked how much they would be willing to pay for TetraStar as an option on a new car, to add TetraStar to their present car, and per day for having TetraStar on a rental car by indicating a dollar amount for each situation. Table 15 shows the average dollar amount indicated for each situation by age group and sex. Overall, subjects indicated that they were willing to pay an average of $503 (s&$346) for TetraStar as an option on a new car, $357 (s&$311) to add TetraStar to their present vehicle, and $8.50 (s&$14.60) per day to have TetraStar on a rental vehicle. Two-way ANOVAs calculated on each variable separately showed that there were no significant differences in willingness to pay by age group or sex.

Table 15: Average Dollar Amount Subjects Were Willing to Pay for TetraStar in Three Situations by Age Group and Sex						
Situation	**Male**			**Female**		
	19-29	**30-64**	**65-80**	**19-29**	**30-64**	**65-80**
Option on a new car	725	513	384	509	410	390
Add to present car	410	400	242	414	293	325
Per day as option on a rental car	18	5	5	9	7	3

Importance of Potential Benefits from Systems Like TetraStar

Subjects were asked to consider the operation of systems such as TetraStar and rate the importance of such system on fuel savings, reduced air pollution, traffic safety, relief of highway congestion, accurate route guidance, traffic diverted into neighborhoods, ease of use, and quick updates of road conditions. Subjects rated these factors using scales anchored by the labels "not at all important" for one and "extremely importaM, for seven. The average importance rating for each factor by age group and sex is shown in table 16, listed in order of highest to lowest rating. Two-way ANOVAs calculated on each factor separately revealed significant main effects of sex for fuel savings [$F(1,46)=9.29$; $p<.005$], air pollution [$F(1,46)=7.58$; $p<.01$], traffic safety [$F(1,46)=4.64$; $p<.05$], relief of traffic congestion [$F(1,46)=4.72$; $p<.05$], accuracy of route guidance [$F(1,46)=6.52$; $p<.02$], and ease of use [$F(1,46)=8.60$; $p<.01$]. In all cases, the significant effect resulted from women judging the factor to be of greater importance than men . All other main effects and interactions were nonsignificant.

Table 16: Average Ratings of Importance for Factors in the Operation of TetraStar-Like Systems by Age Group and Sex (1 = not at all important; 7 = extremely important)

Situation	Male			Female		
	19-29	30-64	65-80	19-29	30-64	65-80
Accurate route guidance	6.7	6.9	6.4	7.0	7.0	6.8
Ease of use	6.5	6.9	6.1	6.8	6.9	7.0
Quick updates of road conditions	6.5	6.9	6.1	6.8	6.9	7.0
Relief of congestion	5.3	3.6	3.9	5.4	6.2	4.8
Traffic safety	4.4	3.6	4.3	4.9	6.0	4.8
Traffic diverted into neighborhoods	4.2	4.6	4.6	4.2	5.4	4.8
Fuel savings	1.9	2.5	2.9	4.4	4.3	3.8
Reduced air pollution	2.1	3.1	2.1	3.9	4.2	4.0

Subject Suggestions for TetraStar Improvement

Subjects were asked to make two suggestions about how they would like to see TetraStar improved. Forty-four subjects made 75 suggestions. The suggestions were categorized by content and are summarized by sex and age group in table 17. Note that the percentages reported in this table indicate the percentage of people within each sex and age group condition that made the particular suggestion. Since respondents could make more than one suggestion, the percentages within each age group and sex condition will not add up to 100. A complete list of the comments in verbatim format can be found in appendix F.

The most frequent type of suggestion was various ways to improve the methods of destination selections. Subjects wanted the scrolling task to be made easier, the list of points of interest to be more comprehensive, and an increase in the number of destinations that can be held in the guidance history list. The second most frequent suggestion was to improve the location of the TetraStar unit in the vehicle. Suggestions included integrating the display unit into the vehicle dashboard or to provide TetraStar navigation information in a “heads-up,” windshield display. Subjects in the oldest age group indicated that it was difficult to read the bottom line on the screen and suggested larger letters or a bigger screen. The third most common type of suggestion was to improve system performance. Respondents wanted TetraStar to acquire satellite signals more quickly and not lose them as easily. They also wanted the route recalculation to be faster. The next most frequent suggestion was for the inclusion of traffic conditions in routing and for routes that really are the fastest. Remaining suggestions were for more accurate and updated road data bases and for more detailed information, such as the street names or the distance to destination to be announced by the TetraStar voice.

Table 17: Improvements Suggested by Subjects by Percent of Responses within Each Sex and Age Group Category (number of respondents)						
Suggestion	**Male**			**Female**		
	19-29	**30-64**	**65-80**	**19-29**	**30-64**	**65-80**
Improve ways of entering destinations	25.0	44.4	66.7	50.0	12.5	40.0
Improve display unit location	12.5	33.3	66.7	25.0	12.5	40.0
Improve performance	50.0	33.3	0.0	25.0	62.5	0.0
Better routing	37.5	33.3	0.0	25.0	25.0	20.0
Improve road database	25.0	0.0	11.8	25.0	25.0	0.0
Expand voice functions	12.5	33.3	0.0	12.5	0.0	20.0
Other	12.5	0.0	11.8	12.5	12.5	2.0

Comparison of TetraStar and Ali-Scout Route Guidance Systems

Because all subjects had extensive experience with TetraStar and the navigation assistance system called Ali-Scout (see Kostyniuk et al., 1997 for a review and evaluation of the Ali-Scout system), subjects were asked to compare the two systems on several measures. We were interested in knowing which system gave the subject the most positive impression, or whether they had no preference on thirteen aspects of in-vehicle route guidance. Table 18 shows the percentage of subjects who indicated a preference and which system they preferred. As can be seen in this table, TetraStar was the clearly preferred system for every feature investigated except for reduction of travel time and congestion avoidance. In these cases the majority of subjects indicated that there was no difference in their impressions of the systems. Categorical analysis showed no differences in impressions by age group or sex, except for a main effect of age group for reduction in travel time [$x^2(4)=13.12$; $p<.02$]. *Post hoc* analyses showed that this effect occurred because subjects in the youngest age group indicated that Ali-Scout was better for travel time reduction while subjects in the other two age groups indicated no preference.

Table 18: Percent of Subjects Indicating Which ATIS Gave Them the More Positive Impression by In-Vehicle Guidance Feature			
Route Guidance Feature	TetraStar Better	Ali-Scout Better	No Preference
Overall appearance	90.2	2.0	7.8
Ease of learning	90.4	1.9	7.7
Quality of visual displays	94.2	0.0	5.8
Quality of verbal messages	67.3	5.8	26.9
Ease of selecting/entering destinations	92.3	3.9	3.9
Ease of finding start of route	88.5	1.9	9.6
Accuracy of guidance	86.5	1.9	11.5
Getting lost avoidance	75.0	1.9	23.1
Ease of finding destinations	92.3	3.9	3.9
Traffic congestion avoidance	16.0	26.0	58.0
Travel time reduction	42.3	7.7	50.0
Clarity of guidance instructions	88.5	0.0	11.5
Size of guidance area	98.1	0.0	1.9

We were also interested in knowing which of the systems the subject thought performed better, or whether they had no preference, on the calculation of routes. Table 19 shows the percentage of subjects who indicated a preference and which system they preferred. As can be seen in this table, the majority of drivers thought TetraStar performed the best in the recommendation of routes that were the fastest and the shortest. More subjects thought Ali-Scout performed better at providing the least congested routes than TetraStar, but the majority of drivers indicated that the systems were the same. As expected, since neither system is designed to provide scenic routes or ones that minimize turns, the largest majority of drivers indicated no difference in performance on these route types. Categorical analysis showed no statistically significant main effects or interaction for any type of route.

Table 19: Percent of Subjects Indicating Which ATIS Performed Better on the Recommendation of Several Types of Routes			
Route Type	TetraStar Better	Ali-Scout Better	No Preference
Fastest routes	68.6	11.7	19.6
Shortest distance routes	76.5	3.9	19.6
Least traffic congestion routes	18.4	22.5	59.2
Most scenic routes	22.9	2.1	75.0
Least number of turns routes	28.6	12.2	59.2

We were interested in knowing which system subjects would prefer to have, or whether they would have no preference, in several purchase/rental conditions. The percentage of subjects selecting each system is shown in table 20. As can be seen in this table, TetraStar was the preferred system by nearly all subjects for putting the system on their present vehicle, having it as an option on a rental vehicle, and for having it as an option on a new vehicle. Categorical analysis showed that these preferences did not vary significantly as a function of age group or sex.

Table 20: Percent of Subjects Indicating Which ATIS They Would Prefer to Have in Three Purchase/Rental Situations			
Situation	TetraStar	Ali-Scout	No Preference
Put in your present car	94.2	0.0	5.8
As an option on a rental car	96.1	0.0	3.9
As an option on a new car	98.1	0.0	1.9

Finally, we asked the subjects to consider everything about the two systems they tested and to indicate which system they preferred overall or whether they had no preference. Subjects indicated an overwhelming preference for the TetraStar in-vehicle navigation assistance system (98.1 percent of subjects), with no subjects selecting Ali-Scout and 1.9 percent of subjects indicating no preference. Subjects were also asked to state their reasons for their preference. Overall, there were 100

comments, 98 of which were reasons for preferring the TetraStar system, and two reasons for no preference. One of the latter was from a subject who commented that he liked the precision of the latitude/longitude coordinates available in the Ali-scout. The other was from a subject who indicated that she did not like programming either system and saw no need for such systems in familiar areas, although she acknowledged that they may be useful in unfamiliar areas. The comments from subjects who preferred the TetraStar system were categorized and are summarized in the table 21. The percentages in the table are based on the number of people who responded to this question within each sex and age group condition giving that reason. Most respondents offered more than one reason. The most frequent reason given for preferring the TetraStar system over the Ali-Scout was navigational accuracy. The second and third most frequent comments indicated that subjects thought the TetraStar system was easier to use and to program than the Ali-Scout system. The remaining reasons for preferring TetraStar over Ali-Scout included comments about TetraStar having a larger coverage area, having better ways of displaying information, being easier to learn, providing “better” guidance to destinations, and automatically recalculating routes when the driver did not follow a recommendation. All reasons, listed verbatim, can be found in appendix F.

Table 21: Percent of People Giving Reasons for Preferring TetraStar over ALI-Scout by Category, Sex, and Age Group (Number of Respondents)						
Reason	**Male**			**Female**		
	19-29 (7)	**30-64 (10)**	**65-80 (7)**	**19-29 (10)**	**30-64 (10)**	**65-80 (6)**
TetraStar more accurate	57.1	50.0	85.1	60.0	30.0	50.0
TetraStar easier to use	0.0	70.0	28.6	50.0	70.0	16.7
TetraStar easier to program	42.9	20.0	28.6	40.0	20.0	33.3
Liked the screen and map	42.9	10.0	0.0	40.0	30.0	0.0
TetraStar covered larger area	28.6	20.0	0.0	20.0	10.0	16.7
TetraStar easier to learn	0.0	10.0	14.3	10.0	30.0	0.0
TetraStar gets you to destination not just in area of destination	0.0	10.0	28.6	0.0	20.0	0.0
Liked the route recalculate feature	0.0	10.0	14.3	0.0	10.0	0.0

Driver Logs

Study participants were asked to keep records of all trips in which they drove the test vehicle. As mentioned previously, subjects were given a package containing a three-ring binder with driver log instructions, a driver log sheet for each day of participation (see appendix D), and three stamped, addressed envelopes for the weekly return of driver log sheets. Participants were asked to mail the completed driver log sheets to UMTRI each week for the first three weeks and to turn in the log sheets for the fourth week when they returned the vehicle. For each trip in the test vehicle, subjects were asked to record the origin and destination, trip purpose, time of day when the trip began, trip length in miles, and whether or not TetraStar was used. In addition, subjects were asked to record any unusual experiences or problems using the TetraStar system.

Number of Trips per Day

Counting all driver logs received, 4,486 trips were recorded in the study. Table 22 shows the average daily number of trips per person and the number of

subject days for each of the four weeks of participation by sex and age group. Overall, the average number of trips driven with the test vehicle was 3.58 trips per day. A repeated-measures ANOVA revealed a significant main effect of week number [F(3,377)=17.14 p<.0001]. *Post hoc* tests indicated that subjects reported more trips per day at the beginning of their test period than at the end. As in the similar study with a different navigation assistance device (Kostyniuk et al., 1997), the higher reported use at the beginning of the test period relative to the last week is most likely the result of a novelty effect; that is, subjects took extra trips just to "test-out" the navigation capabilities of TetraStar in the first week of participation. Support for this conclusion was provided in the driver log trip comments where subjects indicated they tested out the system during the start of their test vehicle driving. No other effects were significant.

Table 22: Average Number of Reported Trips per Day and Number of Person Days (n) by Week Number, Sex, and Age Group

Week Number	Male			Female		
	19-29	30-64	65-80	19-29	30-64	65-80
One	3.29 (70)	4.11 (70)	3.57 (63)	4.36 (63)	3.31 (70)	3.90 (49)
Two	2.80 (70)	3.50 (70)	3.87 (63)	4.63 (63)	2.80 (70)	3.49 (49)
Three	2.31 (68)	3.36 (63)	3.10 (59)	3.13 (63)	2.93 (62)	2.38 (41)
Four	2.28 (39)	5.11 (27)	3.97 (29)	3.90 (42)	5.28 (18)	2.41 (17)

Use by Time of Day

The time of day when subjects drove the TetraStar-equipped vehicles was explored by categorizing reported trip start times into time periods that are associated with different levels of traffic congestion. These periods were: 6:31 AM to 8:30 AM (AM peak period); 8:31 AM to 11:30 AM (AM base period); 11:31 AM

to 1:30 PM (noon); 1:31 PM to 4:30 PM (PM base period); 4:31 PM to 6:30 PM (PM peak period); 6:31 PM to 11:30 PM (evening); and 11:31 PM to 6:30 AM (night). The distribution of the trips made with the TetraStar vehicles by sex and age group is shown in figure 2. As can be seen in this figure, there is a clear difference in the frequency of trip-making by time of day between age groups, with drivers in the younger two age groups tending to travel at different times than drivers in the oldest age group. Drivers in the oldest age group made a greater proportion of their trips in the morning than drivers in the two age groups. These patterns of trip making by time of day are the ones expected and show that subjects tended to use the test vehicles in their everyday, natural driving.

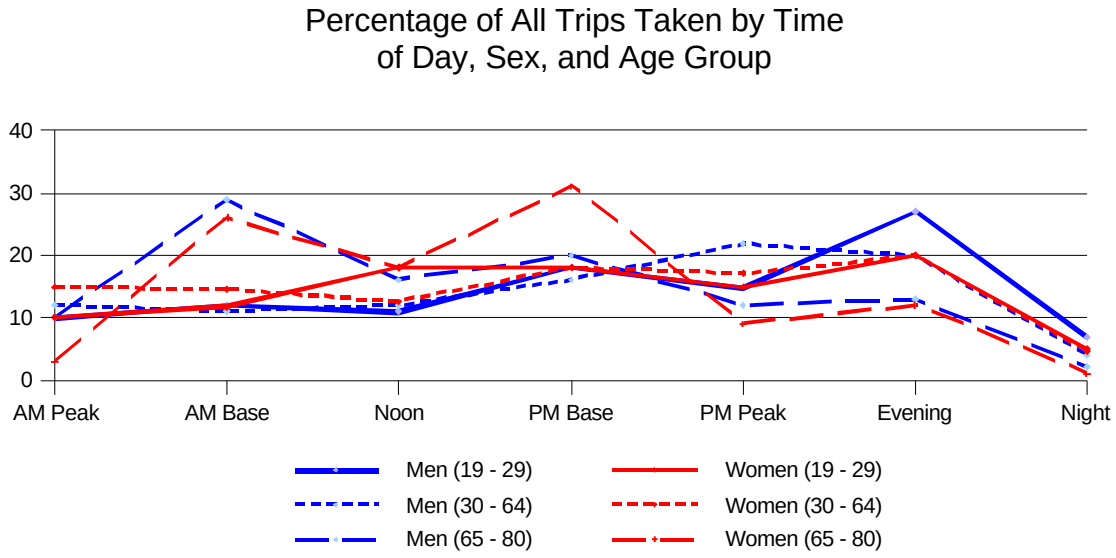


Figure 2: Percentage of all trips taken by time of day, sex, and age group.

Use by Type of Trip

The types of trips for which the TetraStar-equipped vehicle was used were tallied for each sex and age group category. Table 23 shows trip purpose, listed in order of greatest to least overall frequency, by sex and age group. As expected, the distribution of trip purposes shown in this table is quite similar to the distribution

found with these subjects in the previous study (Kostyniuk et al., 1997). Overall, about 52 percent of trips in the test vehicle were to home or work.

Frequency of TetraStar Use

For each trip taken, subjects were asked to report if the TetraStar unit was used. Overall, the TetraStar was used in 85.6 percent of the 4,367 trips for which this information was available. Table 24 shows the percentage of reported trips in which TetraStar was used and the total number of trips for which this information was reported, by week, sex, and age group. A high frequency of TetraStar use was found for all age groups and both sexes.

Table 23: Trip Purpose as Percentage of Reported Trips by Sex and Age Group

Trip Purpose	Male			Female		
	19-29	30-64	65-80	19-29	30-64	65-80
Home	36.2	35.2	37.5	33.7	36.6	35.7
Work	25.7	27.0	7.0	13.1	21.6	3.8
Shopping	7.0	12.5	14.5	11.7	10.8	16.7
Personal business	8.7	10.1	13.2	11.5	10.3	11.6
Social/recreational	9.2	5.2	10.1	9.9	7.8	8.8
Eat meal	5.3	5.6	9.1	4.6	5.8	6.6
Serve passenger	1.2	2.0	2.9	6.3	3.4	10.6
School	6.2	0.0	0.0	8.1	0.0	0.0
Church	0.3	0.9	2.6	0.4	1.9	2.8
Medical	0.2	1.0	2.7	0.6	0.7	2.6
Unknown/Other	0.2	0.4	0.4	0.1	0.5	0.6

Table 24: Percentage and Number (n) of Reported Trips in Which TetraStar was used by Week, Sex, and Age Group						
Week	**Male**			**Female**		
	19-29	**30-64**	**65-80**	**19-29**	**30-64**	**65-80**
One	89.1 (230)	92.7 (286)	91.9 (211)	81.9 (299)	96.5 (230)	82.7 (153)
Two	86.7 (195)	84.0 (244)	84.5 (232)	76.3 (287)	94.8 (193)	85.5 (165)
Three	86.5 (156)	81.1 (185)	91.1 (179)	67.9 (184)	89.2 (176)	81.7 (93)
Four	95.5 (88)	83.1 (130)	84.2 (114)	72.4 (163)	94.7 (94)	85.7 (28)

Problems or Unusual Driving Experiences

Study participants were asked to indicate on the daily driver log sheet any unusual driving experiences or problems that they encountered while using the TetraStar system. There were 390 comments recorded. These comments were analyzed for content and sorted into categories. The verbatim comments can be found in appendix G. Listed in order of overall most frequent to least frequent, the frequency and percentage of each type of comment by sex and age group is shown in table 25. Overall, the most frequent comment, accounting for 17.0 percent of all comments, was that the TetraStar system worked well. The second most frequent comment, accounting for 16.4 percent of the comments was that TetraStar could not acquire satellites for GPS positioning or that " TetraStar did not know where it was" (which was the case when satellite signals were not of sufficient accuracy for a long enough period of time for good vehicle positioning). The third most commonly reported comment, accounting for nearly 16 percent of comments, was that the subject was not satisfied with the route selected by TetraStar. Subjects indicated that the TetraStar-selected route was either not the fastest, not the shortest, led them into traffic congestion, or was simply incorrect. In a few cases, the subjects indicated that they followed a route, even though they did not agree with it, and were surprised that it was a better route than one they would have chosen on their own. Nearly 13 percent of the comments were reports of problems

with the TetraStar unit. Several of these noted that the unit would not turn on in cold weather or that it would not turn off when the engine was turned off. Twelve percent of the comments reported that TetraStar correctly recalculated a new route after the vehicle left the route originally recommended. Problems with the map data base accounted for about 11 percent of the comments. These included errors in the street names, not finding their destination in the points of interest, and finding that their destination is out of the data base range. About four percent of the comments were concerned with erroneous instructions for U-turns. Included were comments about instructions to make unnecessary U-turns and incorrect instructions when such turns were needed.

Table 25 : Frequency and Percentage of Driver Log Comments by Category, Sex, and Age Group

Category	Male			Female		
	19-29	**30-64**	**65-80**	**19-29**	**30-64**	**65-80**
TetraStar worked well	11 (13.9)	15 (21.7)	17 (33.3)	1 (2.4)	7 (9.3)	17 (23.0)
No satellites, TetraStar navigation lost	15 (19.0)	6 (8.7)	0 (0.0)	9 (21.4)	27 (36.0)	7 (9.5)
Did not agree with route selected by TetraStar	17 (21.5)	11 (15.9)	11 (21.6)	13 (31.0)	3 (4.0)	8 (10.8)
Problems with TetraStar unit	5 (6.3)	9 (13.0)	7 (13.7)	4 (9.5)	13 (17.3)	12 (16.4)
TetraStar recalculated route	9 (11.3)	10 (14.5)	4 (7.8)	4 (9.5)	11 (14.7)	8 (10.8)
Map database incorrect or Insufficient	6 (7.6)	10 (14.5)	5 (9.8)	7 (16.7)	10 (13.3)	7 (9.5)
Wrong instructions for "Michigan left" turn or U-turn	5 (6.3)	7 (10.1)	1 (2.0)	0 (0.0)	0 (0.0)	2 (2.7)
Other	11 (13.9)	1 (1.4)	6 (11.8)	4 (9.5)	4 (5.3)	13 (17.6)

SUMMARY AND CONCLUSIONS

The purpose of the study was to determine how people use, what they think about, and what they would be willing to pay for the TetraStar in-vehicle navigation system. This study investigated these factors as a function of both sex and three age groups (19-to-29, 30-to-64, and 65-to-80 years old) by loaning volunteers test vehicles to use in their everyday driving for one month. Sixty people participated (10 in each gender and age group category). Volunteers completed a questionnaire and maintained a daily record of their driving and experiences with TetraStar.

TetraStar Operation and Displays

Overall, people were quite satisfied with the operation and displays of TetraStar. All subjects reported fairly frequent use of TetraStar, with about 20 percent reporting that they used TetraStar for every trip taken with the test vehicle. Subjects reported that four of the five destination entry methods were easy to use, with the street addresses the easiest to use. Subjects considered the freeway entrance/exit method quite difficult to use. When asked about frequency of method use, subjects reported that the street address method was used most frequently followed by the guidance history method. The freeway entrance/exit ramp method was used least frequently and judged to be the most difficult to use. One possible explanation for this may be that users had to be fairly knowledgeable about the freeway ramp to use this method. In TetraStar, the user selects freeways from a list ordered by designation and number (i.e., I-96, M-59, US-23), and then scrolls through a list of cross street name at the entrance/exits. Quite often people know the freeway by its name, such as Lodge or Ford Freeway, or its number, such as 23, but not as US-23. Furthermore, many people remember exits by the exit number not the street name. Collectively, either one or both of these issues would make using the freeway exit/entrance method of destination selection difficult to use. These results suggest that names of numbers of freeways should be included, that exit numbers should be included, and that cross streets should be listed by city or area. However, the method may also have received low ratings because people simply do not consider exit or entrance ramps as destinations but rather as

intermediate points on the route to a destination. If so, this result would suggest that the entrance/exit ramp destination selection method should not be included on updates of TetraStar.

When asked about the TetraStar destination selection system, that is the use of buttons to scroll through options and select screens, subjects reported that it was quite easy to learn, quite easy to use, functioned properly most of the time, and left them with a very positive impression. However, we also found that drivers of the oldest age group reported greater difficulty learning and using the destination selection system and reported more problems than those in the youngest age group. This age group difference probably resulted from the fact that members of the oldest age group had less experience with technology, in particular computers (which use a keyboard), than members of the other age groups. An alternative possibility is that age-related cognitive decline may have hampered these drivers ability to understand and use the system as efficiently as younger drivers.

We found that drivers had an overwhelming preference for shortest time routes. Very few drivers reported using the most- or least-use-of-freeways options for calculating routes. There were no discernable trends for route calculation preference by age group or sex. Two possibilities may account for this preference. First, drivers may be concerned primarily with getting to destinations as quickly as possible and other routing options are not needed. Second, the use or lack of use of freeways are not routing criteria that are important to drivers. If, however, other criteria were available, such as turn minimization or maximization of scenery, people may have selected these options frequently.

Subjects also reported that the proceed-to-route, next-maneuver, execute-maneuver, arrival-at-destination, turn-arrow, countdown-bar, distance-and-direction-to-destination, current-heading, and GPS displays were all quite easy to understand. Subjects also reported that the street-name display was easy to read. However, men had more difficulty understanding the execute-maneuver and turn-

arrow displays than women. There were no age differences in understanding these displays.

Subjects reported that the amount of detail in the next-maneuver, execute-maneuver, turn-arrow, countdown-bar, and distance-and-direction-to-destination was generally sufficient. Men reported less sufficiency of detail for the turn arrow display than did women. There were no age differences in the reported level of detail.

The study showed that the proceed-to-route, next-maneuver, execute-maneuver, street-name, turn-arrow, countdown-bar, and distance-and-direction-to-destination displays caused only minimal distraction to people while driving. Men, however, reported greater levels of distraction than women for the execute-maneuver, turn-arrow, and countdown-bar displays. Again, no age differences were found for level of distraction.

When asked about the amount of advance warning, subjects reported that next-maneuver, execute-maneuver, and countdown-bar displays provided warnings that were slightly more than what was preferred. Drivers in the oldest group reported less satisfaction with the advance warning than driver in the youngest age group.

Overall, people reported that the proceed-to-route, next-maneuver, execute-maneuver, arrival-at-destination, street-name, turn-arrow, countdown-bar, and distance-and-direction-to-destination displays to be quite accurate. There were no differences between sexes or age groups on these measures. For the proceed-to-route, next-maneuver, execute-maneuver, and arrival-at-destination displays, subjects indicated their overall impressions. Impressions were strongly positive for all displays with no age group or sex differences.

Finally, subjects were asked about the frequency with which they looked at the maneuver listing before starting a trip and the electronic map once they were on the route. In both cases, drivers reported using the feature on about one-half

of their trips. When asked about their preferred way for getting guidance information about two-thirds of drivers indicated a preference for an electronic map.

The TetraStar System as a Whole

As might be expected from the responses for the individual displays and display components, subjects reported that the visual displays and concepts as a whole were fairly easy to read under a variety of conditions; very easy to understand; and provided advance warning that was generally sufficient with sufficient accuracy of guidance. There were no differences among age groups or between sexes. Subjects also indicated that the displays helped them find their way about one-half the time, that their overall impressions were strongly positive, and that the displays caused little distraction while driving under a variety of driving environments. Again, there were no age group or sex effects except for level of distraction for driving at night, during the day, in heavy traffic, and in light traffic. In all cases, men reported higher levels of distraction while driving than women.

Subjects were also quite positive in their assessment of the voice guidance feature of Ali-Scout. Respondents reported that the voice was very easy to hear and understand; the information and advance warning were sufficient; the voice produced only minimal distraction while driving; the sound of the voice was generally liked; and the overall impressions were highly positive. There were several differences between sexes and age groups on these measures. Men, as compared to women, reported greater difficulty in hearing and understanding the voice instructions. Men also reported that the amount of information was less sufficient than did women. Men liked the voice less than women and their overall impression of the voice was less positive than that of women. Drivers in the oldest age group reported less difficulty understanding voice instructions, less distraction while driving, and more positive impressions of the voice feature overall than drivers in the youngest age group. Drivers also indicated a strong preference for receiving guidance instructions through both visual and voice than by either voice or visual alone.

Considering both the visual displays and the voice guidance, subjects reported following TetraStar recommendations about one-half the time, with no differences among the age groups or between the sexes. Of those not following the recommendations all the time, subjects reported that the most common reason for not following a recommendation was that they "knew of a faster route," followed by "need to make unscheduled stops along the way." The first reason suggests a lack of confidence in TetraStar's ability to provide the fastest route. The second reason suggests that people either do not plan their trips in advance, do not want to take the time to program all of their trips into TetraStar, or both.

Subjects reported that, as compared to their driving without TetraStar, the TetraStar system did not produce changes in congestion avoidance, driving safety, and fuel consumption. TetraStar did, however, seem to produce a slight perceived reduction in travel times. There were no differences between age groups or sexes on these measures except for an effect of sex for travel time. Women reported greater perceived decreases in travel times than did men.

When the entire TetraStar system was considered as a whole, again subjects' responses were quite positive. Subjects found the system to be fairly easy to learn and understand; to provide a generally sufficient amount of information and advance warning; to be fairly accurate, and to produce little distraction while driving. Men reported that the amount of information was less sufficient than did women. Older drivers reported significantly more difficulty learning and understanding the system than did drivers in either of the younger age groups. This age effect highlights the importance of remembering that many older users of ATIS do not have the experience with computers and other electronic technology that younger drivers have and that this experience may be the key in learning and understanding other new electronic technology.

Use of the TetraStar System

As shown by the driver logs, subjects used the Ali-Scout system quite frequently during their month of participation regardless of age group or sex.

Driver log data showed that drivers in the oldest age group tended to use the test vehicle and TetraStar at times of day that were different from the times of drivers in the other age groups. When type of trip was considered, use of TetraStar varied by age group. When trips home are not considered, the two younger age groups used TetraStar for school or work commuting most frequently, while those in the oldest age group used the system most frequently for recreational and personal business. These results were confirmed by the driver log data. Collectively, these results highlight the fact that older drivers have distinctly different travel patterns and were quite willing to use TetraStar to assist their travel.

Subjects reported that, when compared to their non-TetraStar driving, their use of the TetraStar system produced little to no change in their attention to traffic signals, fuel gauge, traffic conditions, traffic signs, street signs, street addresses, speedometer, or mirrors. Drivers reported that TetraStar did produce a slight increase in attention to traffic conditions, street signs, road signs, and street addresses. Drivers in the middle age group reported a greater increase in attention to traffic signals while women reported greater increase in attention to mirrors and the fuel gauge. Drivers reported that the TetraStar system slightly increased their feelings of confidence, attentiveness, safety, and relaxation while driving, and decreased their feelings of nervousness, confusion, stress, and frustration. There were no differences between sexes or age groups. In sum, the TetraStar system seemed to improve the general driving experience for users.

Finally, as judged by self-report, the TetraStar system was safe for drivers to use. Subjects reported that TetraStar produced slight decreases in the frequency of several crash-related incidents, and no subject reported being in a crash or in a TetraStar-related near crash.

Valuation

In general, subjects rated TetraStar as both a great source of route-guidance information and one they would use in an unfamiliar area. When asked about the usefulness of TetraStar for various types of trips, subjects indicated that

TetraStar would be most useful for out-of-town vacation and out-of-town business trips. They rated commuting and local nonwork driving lowest. These results point out the fact that the majority of users do not perceive great benefit of a route-guidance system in familiar, everyday trips. Rather, they want guidance in areas that are visited less often or with which they are completely unfamiliar.

When asked about willingness to pay, we found that subjects were willing to pay about $500 to have the system placed in a new car, about $350 to add it to their present car, and $8.50 per day to have it as an option on a rental car. There were no differences between age groups or sexes on the amount people were willing to pay for TetraStar.

Subjects were asked to consider the potential benefits of systems such as TetraStar. Subjects reported that the most important benefit would be a system that provided accurate route guidance. The second was that the system be easy to use. Least important were the society-wide benefits of reduced air-pollution and fuel savings. Thus, subjects in this study placed the highest importance of ITS benefits on factors related to the individual rather than factors related to the community in which they drove.

While subjects were generally quite happy with the TetraStar system, when asked about how they would improve the system, they offered several suggestions. The most common suggestion was to improve the destination selection system. In particular, subjects wanted the scrolling option to be easier, they wanted the points-of-interest list to be more comprehensive, and they wanted the guidance history list to hold more destinations.

Comparison of TetraStar and Ali-Scout Route Guidance Systems

Overwhelmingly, drivers in the study preferred the TetraStar system over the Ali-Scout system except for avoiding traffic congestion or finding the least congested routes. This difference for traffic congestion is not surprising since the Ali-Scout system was designed to take into account potential traffic conditions

when determining routes, whereas the TetraStar system was not. When asked about preferences for purchasing the systems, nobody chose Ali-Scout for putting it in a new vehicle, adding it to a current vehicle, or getting it on a rental car. The top reasons people gave for preferring TetraStar over Ali-Scout were that they believed that TetraStar provided more accurate route guidance, was easier to use while driving, and was easier for selecting destinations.

Conclusions

Overall, this study showed that the TetraStar system was received positively by nearly all drivers. Subjects were quite happy with the system's attributes and performance, and they used the system frequently for a variety of trip purposes. They reported that, in general, TetraStar improved their driving experience and seemed to reduce their travel times. The only feature that received consistently negative assessment was the freeway entrance/exit ramp method of selecting destinations. People thought this feature was difficult to use and thus did not use it. Most likely the negative response to this feature was related to the fact that people do not generally think of freeway ramps as destinations or know enough about exits and entrances to use this feature.

The study showed that there were several differences between sexes. These differences were usually related to the fact that men wanted more navigation information, were more distracted by the system, and and wanted more advance warning. There were also several differences between the drivers in the oldest age group and members of the other two age groups. Few of the oldest drivers were employed and consequently they had different travel patterns than younger drivers. They used the system for different types of trips during different times of the day than drivers in the younger two age groups. More importantly, drivers in the oldest age group had greater problems in learning, understanding, and using the system. These results show clearly that older drivers form a distinct group of potential ATIS users. In order to market ITS to this group, their unique travel patterns and level of experience with technology should be considered.

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Eby, D.W., Kostyniuk, L.P., Christoff, C.C, Hopp, M.L. and Streff, F.M. (1997). *An On-the-Road Comparison of In-vehicle Navigation Assistance Systems: The FAST-TRAG Troika Study.* Ann Arbor, Ml: The University of Michigan Transportation Research Institute. (Report No. 97-05).

Eby, D.W., Kostyniuk, L.P., Streff, F.M. and Hopp, M.L. *(1997). Evaluating the Perceptions and Behaviors of Ali-Scout Users in a Naturalistic Setting.* Ann Arbor, Ml: The University of Michigan Transportation Research Institute. (Report No. 97-08).

Kostyniuk, L.P., Eby, D.W., Christoff, C., Hopp, M.L., and Streff, F.M. (1997). *The FAST-TRAG Natural Use Leased-Car Study: An Evaluation of User Perceptions and Behaviors of Ali-Scout by Age and Gender.* Ann Arbor, Ml: The University of Michigan Transportation Research Institute. (Report No. 97-09).

APPENDIX A:
SUBJECT RECRUITMENT QUESTIONNAIRE

FAST-TRAC Participation Survey
The University of Michigan
Transportation Research Institute

What is your full name? _____

What is your daytime phone number? _____

What is your home address? _____

_____

_____

What is the name and address of your workplace?

_____

_____

_____

Please write your date of birth in the space provided.

Month _____ Day _____ Year _____

Please indicate your gender by placing an X in the appropriate box.

❑ Male ❑ Female

Do you currently have a valid Michigan Driver License?

❑ Yes ❑ No

Please write your full *Driver License Number* in the space provided:

_____

How many years of driving experience do you have?

_____ Years

Approximately how many miles do you drive in a year?

_____ Miles

Do you currently own or lease your own vehicle?

❑ Yes ❑ No

What percent of your driving is within the FAST-TRAC study area (see map)?
Please circle the most appropriate point on the scale below.

0% 50% 100%

How many points do you currently have on your driving record?

_____ Points

In the last seven years, have you been convicted of an alcohol-related driving offense?

❑ Yes ❑ No

Have you ever been convicted of any crimes related to the use, distribution, or transportation of a controlled substance?

❑ Yes ❑ No

In the last seven years, have you been involved in a crash that was your fault?

❑ Yes ❑ No

Are you currently completing a sentence for a criminal and/or traffic offense (e.g., on parole, on probation, finishing community service)?

❑ Yes ❑ No

APPENDIX B:
PARTICIPATION AGREEMENT

Agreement between
The University of Michigan
and person volunteering to participate as a subject in the Test vehicle Natural Use Study of the FAST-TRAC Project

A person, the subject, selected as a participant for the Test vehicle Natural Use Study of the FAST-TRAC project will be given a car to use as a personal vehicle for one month. The vehicle is a 1995 Mercury Sable, leased by the University of Michigan for the FAST-TRAC project. The requirements for participation in the experiment are detailed in the Informed Consent Form and consist of filling out a driver log, participating in several surveys and a group interview. The following is a set of conditions, specific to the test vehicle, that the you must agree to before becoming a subject in the study and receiving the test vehicle. Your participation in the study and the use of the test vehicle will be terminated for failure to follow the terms in this agreement.

CONDITIONS FOR USE OF THE TEST-CAR

1. The subject may not let anyone else drive the test vehicle.

2. The subject must operate the test vehicle in accordance with the traffic laws of the State of Michigan.

3. The subject and all passengers in the test vehicle must use seat belts.

4. The subject cannot drive the test vehicle while impaired by alcohol or controlled substances.

5. The subject and all occupants cannot use the test vehicle for illegal activities.

6. The subject is fully responsible for his/her driving. The TetraStar device is simply a supplemental navigation device.

7. The subject may not drive the test vehicle in excess of 1000 miles in one month. If this mileage is exceeded, the subject must pay $0.15 per mile over the 1000 mile limit. If the subject has the vehicle for less than one month, the allowable mileage will be pro-rated.

8. The subject is to use the test vehicle in the local area only and may not use the test vehicle for extended trips, vacations, or take the test vehicle out-of-state or out of the country.

9. The subject is responsible for fuel purchase during the time they have the test vehicle.

10. The subject is responsible for paying all parking tickets issued to the test vehicle during the time the test vehicle is in the subject' s possession.

11. The subject is to keep the test vehicle clean and not damage the interior.

12. The subject is responsible for reporting any problems with the test vehicle to the FAST-TRAC Project Coordinator at the Social and Behavioral Analysis Division of the University of Michigan Transportation Research Institute at (313) 763-2466, as soon as possible.

13. In case of an accident involving the test vehicle, the subject must notify the FAST-TRAC Project Coordinator at the Social and Behavioral Analysis Division of the University of Michigan at (313) 763-2466 as soon as possible.

14. The subject must return the test vehicle at the end of the time specified.

15. If the subject chooses to stop participating in the experiment by not completing the driver logs, surveys and other experimental procedures, he/she must return the test vehicle.

I have read and understand the conditions listed above and agree to abide by them.

_____

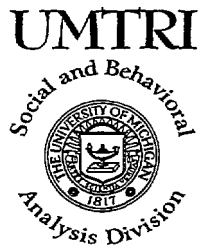
Signature of Subject

_____

Date

APPENDIX C:
STUDY QUESTIONNAIRE

TETRASTAR USER SURVEY



FAST-TRAC PROJECT
OAKLAND COUNTY, MICHIGAN

NAME _____

DATE _____

A. TetraStar Operation and Displays

As a participant in the FAST-TRAC Project, you have been driving a vehicle equipped with an electronic route-guidance system called TetraStar. In this section, we would like to learn what you think about the different parts of the system.

A1. Since you have had a TetraStar equipped vehicle, how often have you used TetraStar for trips in which you drove this vehicle? Please circle the most appropriate number on the scale provided.

Never						Always
1	2	3	4	5	6	7

If you did not answer always, we would like to learn why you sometimes did not use the system. Please check all that apply.

- ❑ Many trips are very short.
- ❑ Too much trouble to program the destinations.
- ❑ I did not think TetraStar provided the fastest route.
- ❑ I did not think TetraStar provided accurate guidance.
- ❑ I knew the way.
- ❑ Other, please specify

(If you never used TetraStar during this evaluation, please skip to question D1).

A2. The TetraStar system offers several options for telling TetraStar where you want to go. These options are:

Street Address--Selecting a destination by entering the city and street address of where you want to go.

Intersections--Selecting a destination by entering the city and name of two streets that cross.

Points of Interest--Selecting a destination from a list of points of interest that are sorted by name, distance, or city.

Freeway Entrance/Exit Ramps--Selecting a destination by entering a freeway and street for either entering or exiting the freeway.

Guidance History--Selecting a destination that you have been to from a list of recent destinations.

We are interested in knowing which of these options you used most often for entering new destinations. Please rank them from one (most frequent) to five (least frequent) according to how often you used them.

Street Addresses _____
Intersections _____
Points of Interest _____
Freeway Entrance/Exit Ramps _____
Guidance History _____

A3. Entering and Selecting Destinations

We also are interested in knowing how easy or difficult you found each method of selecting destinations. Please rate each of the five methods by circling the most appropriate number on the scales provided.*(If you did not use a particular method, then place an X in the box.)*

	Did not use	**Very difficult to use**						**Very easy to use**
a. Street Address	❑	1	2	3	4	5	6	7
b. Intersections	❑	1	2	3	4	5	6	7
c. Points of Interest	❑	1	2	3	4	5	6	7
d. Freeway Entry/Exit	❑	1	2	3	4	5	6	7
e. Guidance History	❑	1	2	3	4	5	6	7

A4. In order to select destinations using TetraStar, you must use the buttons on the front of the unit to scroll through options, select options, and change screens.

Please rate the following characteristics of the TetraStar **Destination Selection System** by circling the most appropriate number on the scales provided.

	Very difficult						**Very easy**
a. Easy or Difficult to Learn	1	2	3	4	5	6	7
b. Easy or Difficult to Use	1	2	3	4	5	6	7
	Never						**Always**
c. Functioned Properly	1	2	3	4	5	6	7
	Strongly disliked						**Strongly liked**
d. Overall Impression	1	2	3	4	5	6	7

A5. Calculating a Route

Once a destination has been selected, TetraStar gives you three options for your route. These options are:

Shortest Time Route--the route that will get you to your destination in the least amount of time using all possible roads.

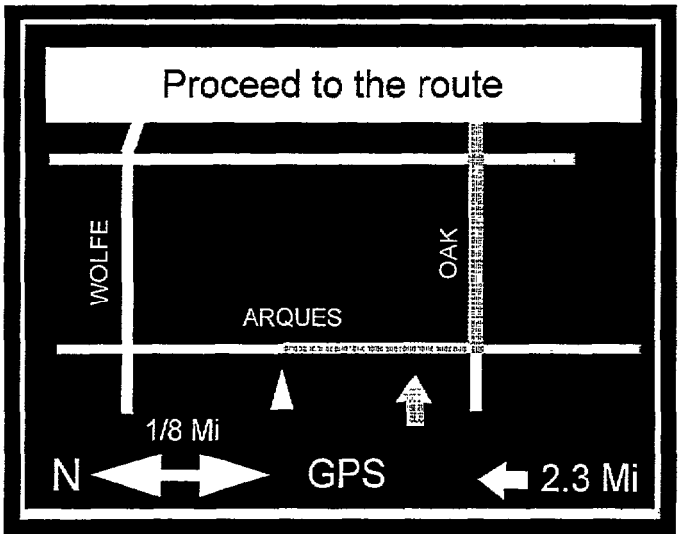
Most Use of Freeways--the route that uses freeways as much as possible.

Least Use of Freeways--the route that avoids freeways as much as possible.

We are interested in knowing which of these options you used most often for calculating a route. Please rank them from one (most frequent) to three (least frequent) according to how often you used them.

Shortest Time Route _____
Most Use of Freeways _____
Least Use of Freeways _____

A6. This is an example of the TetraStar system's **Proceed to the Route** display, which is shown at the beginning of a trip. Please rate the following characteristics of this display by circling the most appropriate number on the scales provided.

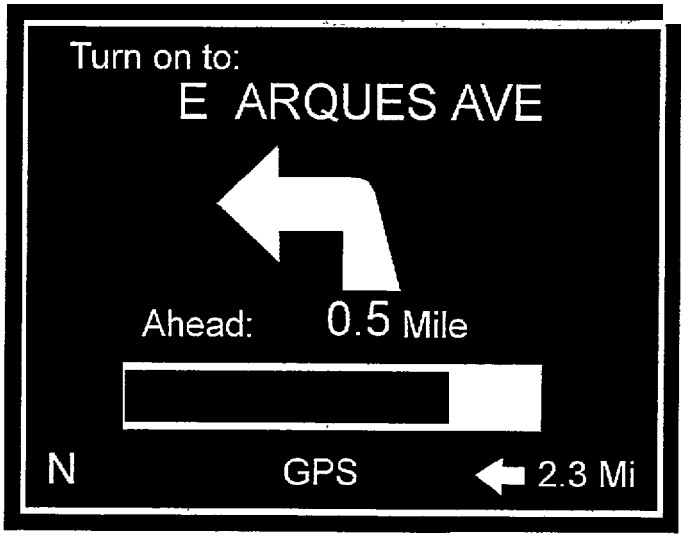


a. Easy or Difficult to Understand	**Very difficult** **1**	**2**	**3**	**4**	**5**	**6**	**Very easy** **7**
b. Distraction While Driving	**Very distracting** 1	**2**	**3**	**4**	**5**	**6**	**Not at all distracting** **7**
c. Accuracy of Guidance	**Very inaccurate** **I**	**2**	**3**	**4**	**5**	**6**	**Very accurate** **7**
d. Functioned Properly	**Never** 1	2	3	4	5	**6**	**Always** **7**
e. Overall Impression	**Strongly disliked** 1	**2**	**3**	**4**	**5**	**6**	**Strongly liked** **7**

A7. The following is an example of the TetraStar system's **Next Maneuver** display, which shows the type of maneuver, the street where the maneuver will occur, the distance to the maneuver, and other information. Please rate the following characteristics of this display by circling the most appropriate number on the scales provided.

a. Easy or Difficult to Understand	**Very difficult** 1	2	3	4	5	6	**Very easy** 7
b. Amount of Detail Shown	**Insufficient** 1	2	3	4	5	6	**Sufficient** 7
c. Advance Warning Provided	**Not enough** 1	2	3	4	5	6	**Too much** 7
d. Distraction While Driving	Very **distracting** 1	2	3	4	5	6	**Not at all distracting** 7
e. Accuracy of Guidance	**Very inaccurate** 1	2	3	4	5	6	**Very accurate** 7
f. Overall Impression	**Strongly disliked** 1	2	3	4	5	6	**Strongly liked** 7

A8. The following is an example of the TetraStar system's **Execute Maneuver** display, which is shown as you approach the location for a recommended maneuver. Please rate the following characteristics of the TetraStar system's **Execute Maneuver** display.



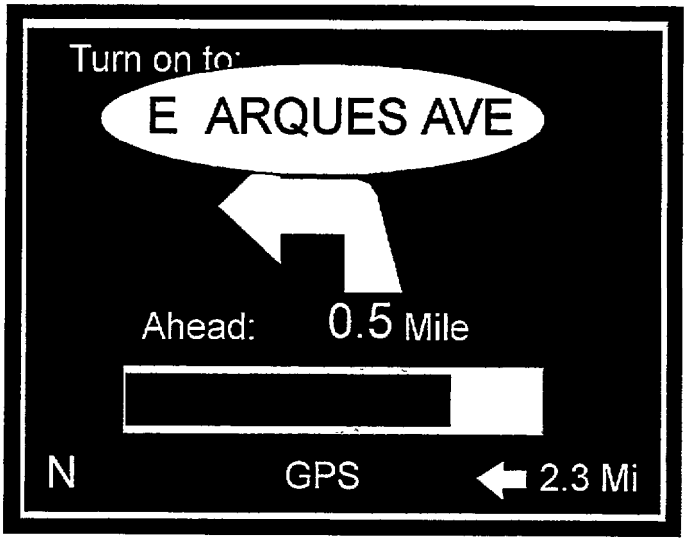
a. Easy or Difficult to Understand	**Very difficult** 1	2	3	4	5	6	**Very easy** 7
b. Amount of Detail Shown	**Insufficient** 1	2	3	4	5	6	**Sufficient** 7
c. Advance Warning Provided	**Not enough** 1	2	3	4	5	6	**Too much** 7
d. Distraction While Driving	**Very distracting** 1	2	3	4	5	6	**Not at all distracting** 7
e. Accuracy of Guidance	**Very inaccurate** 1	2	3	4	5	6	**Very accurate** 7
f. Overall Impression	**Strongly disliked** 1	2	3	4	5	6	**Strongly liked** 7

A9. When TetraStar is showing a **Next Maneuver** display it is possible to take a look at the trip TetraStar has calculated by scrolling through all the required maneuvers to get to a destination. Considering all the trips taken with TetraStar, how often did you use this feature? Please circle the most appropriate number on the scale provided.

Never						**Always**
1	*2*	*3*	*4*	*5*	*6*	*7*

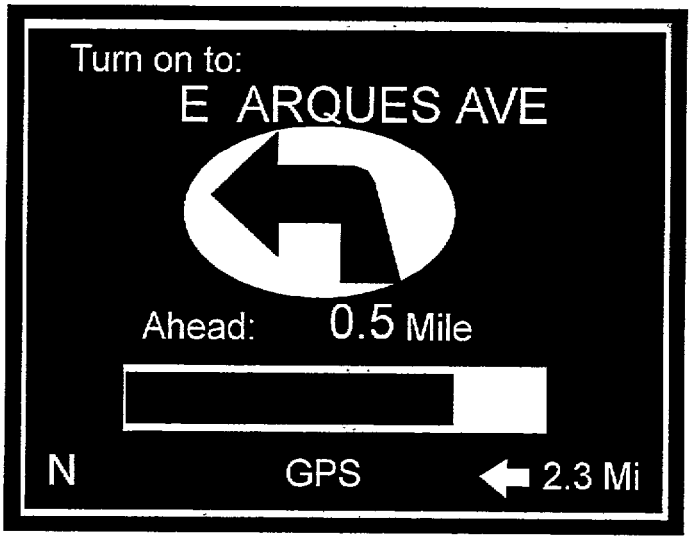
The Next Maneuver and Execute Maneuver displays contain several components, In the next few items we would like to learn what you thought of each of these components.

A10. Please rate the following characteristics of the street name component (the highlighted region in the figure below) provided by TetraStar.



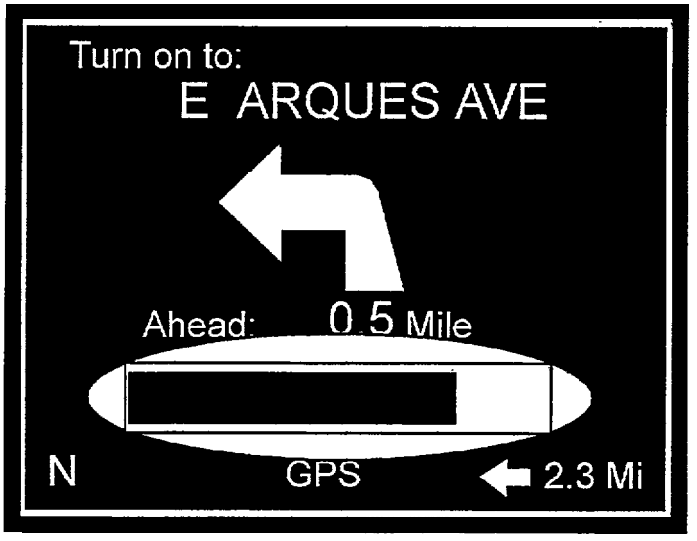
	Very difficult						**Very easy**
a. Easy or Difficult to Read	*1*	*2*	*3*	*4*	*5*	*6*	*7*
	Very distracting						**Not at all distracting**
b. Distraction While Driving	*1*	*2*	*3*	*4*	*5*	*6*	*7*
	Very inaccurate						**Very accurate**
c. Accuracy	*1*	*2*	*3*	*4*	*5*	*6*	*7*

Al 1. An example turn arrow of the Next Maneuver and Execute Maneuver displays is highlighted in the figure below. Please rate the following characteristics of this display component.



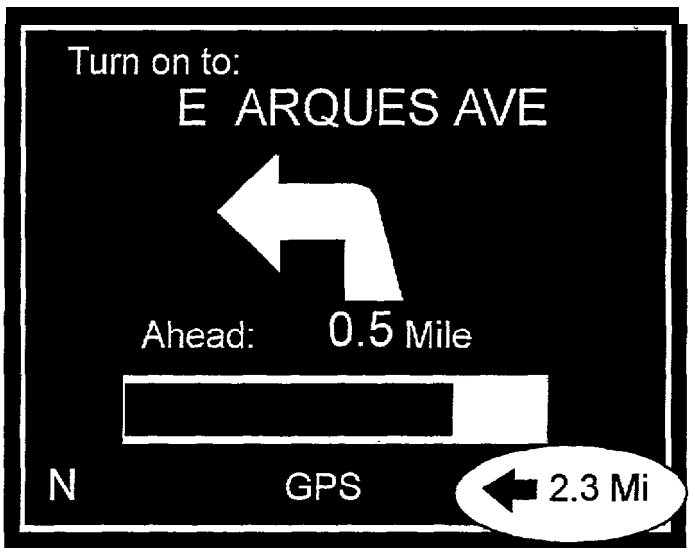
a. Easy or Difficult to Understand	**Very difficult** 1	**2**	**3**	**4**	**5**	**6**	**Very easy 7**
b. Amount of Detail Shown	**Insufficient** 1	**2**	**3**	**4**	**5**	**6**	**Sufficient 7**
c. Distraction While Driving	**Very distracting** 1	**2**	**3**	**4**	**5**	**6**	**Not at all distracting 7**
d. Accuracy of Guidance	**Very inaccurate** 1	**2**	**3**	**4**	**5**	**6**	**Very accurate 7**

A12. The countdown bar of the Execute Maneuver display is highlighted in the figure below. Please rate the following characteristics of this display component.



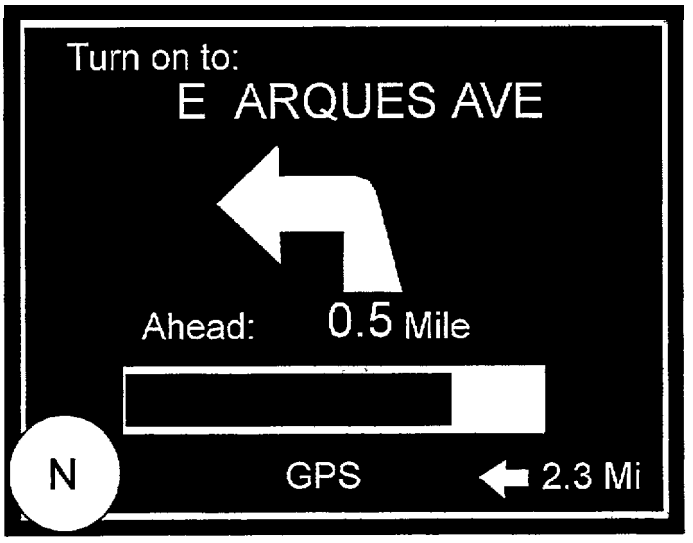
a. Easy or Difficult to Understand	**Very difficult** 1	**2**	3	**4**	**5**	**6**	**Very easy** **7**
b. Amount of Detail Shown	**Insufficient** 1	**2**	3	**4**	**5**	**6**	**Sufficient** **7**
c. Advance Warning Provided	**Not enough** 1	2	3	**4**	**5**	**6**	**Too much** **7**
d. Distraction While Driving	Very **distracting** 1	**2**	3	**4**	5	**6**	**Not at all distracting** **7**
e. Accuracy of Guidance	**Very inaccurate** 1	**2**	3	**4**	**5**	**6**	**Very accurate** **7**

A13. As shown in the highlighted figure below, the bottom right corner of the Next Maneuver and Execute Maneuver displays is a small arrow and number that indicates the actual driving distance and direction to the destination. Please rate the following characteristics of this display component.



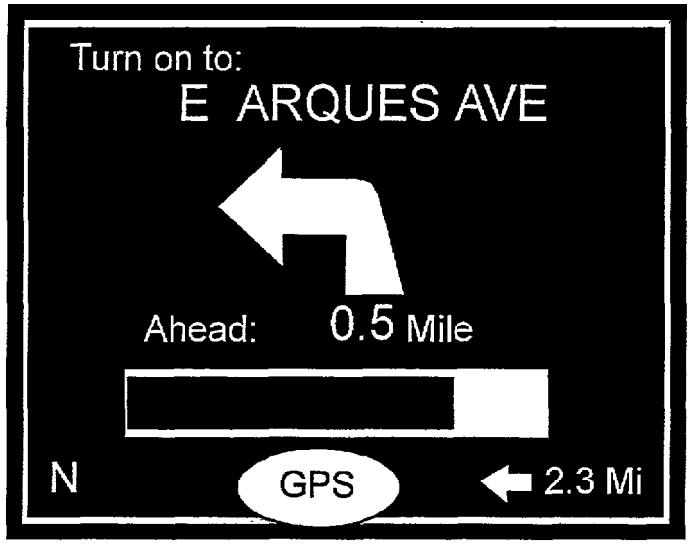
a. Easy or Difficult to Understand	**Very difficult** 1	2	3	4	5	6	**Very easy** 7
b. Amount of Detail Shown	**Insuff icient** 1	2	3	4	5	6	**Sufficient** 7
c. Usefulness in Guidance	**Not at all Useful** 1	2	3	4	5	6	**Extremely Useful** 7
d. Distraction While Driving	Very **distracting** 1	2	3	4	5	6	**Not at all distracting** 7
e. Accuracy of Guidance	Very **inaccurate** 1	2	3	4	5	6	Very **accurate** 7

A14. As shown in the highlighted part of the figure below, the Next Maneuver and Execute Maneuver displays show letters in the bottom left corner. What does this letter indicate?



- ❑ Direction that the vehicle is heading
- ☐ Direction to the destination
- ☐ Direction to next maneuver
- ☐ Direction to nearest traffic signal

A15. As shown in the highlighted part of the figure below, the Next Maneuver and Execute Maneuver displays show the letters "GPS." At any time during a trip, the color of these letters can be red, yellow, or green. What do these letters indicate?



- ❑ The color of the next traffic signal
- ❑ The amount of congestion on the roadway
- ❑ The strength of the satellite signals used for locating the vehicle
- ❑ Initials of the inventor

A16. While driving to a destination it is possible to switch the display so that you can see your vehicle's location on a map. This location was updated automatically while you drove. Considering all the trips taken with TetraStar, how often did you use this feature? Please circle the most appropriate number on the scale provided.

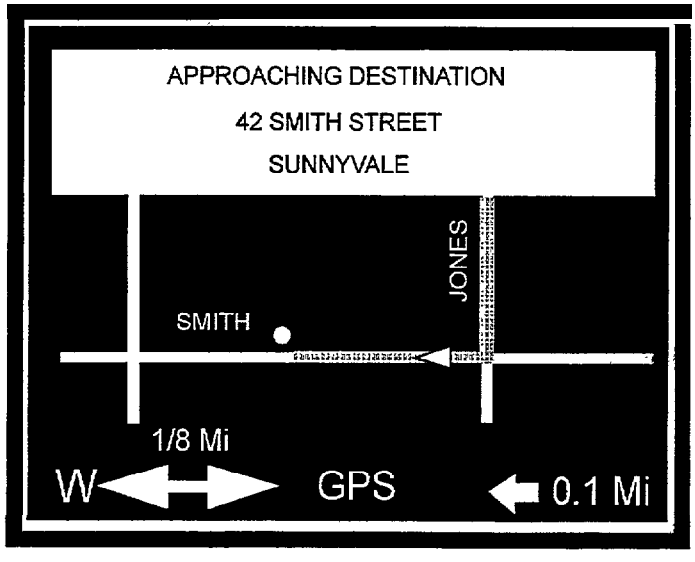
Never						Always
1	2	3	4	5	6	7

(if you selected never, then please skip to question A 18)

A17. Which presentation mode did you prefer more for getting information about the route to your destination-- a series of maneuver screens, a map showing the selected route and your vehicle's location, or did you have no preference? Please indicate your preference by placing an 'X' in the box provided.

- ❑ Maneuver Screen
- [ ] Map Display
- ❑ No Preference

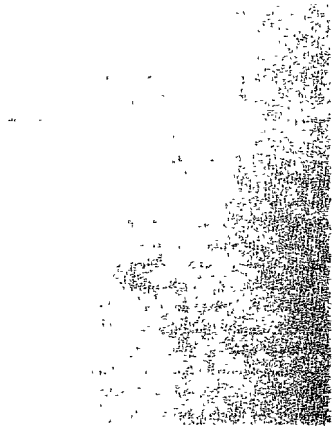
A18. When you arrive at your destination, TetraStar shows an arrival man display such as the one shown below. Please rate the following characteristics this display.



	Very difficult						Very easy
a. Easy or Difficult to Understand	1	2	3	4	5	6	**7**
	Very inaccurate						**Very accurate**
b. Accuracy of Guidance	1	2	3	4	5	6	7
	Strongly disliked						**Strongly liked**
c. Overall Impression	1	2	3	4	5	6	7

A19. Once TetraStar showed you the arrival display, how often did you have difficulty finding your final destination?

Always had difficulty						**Never had difficulty**
1	2	3	4	**5**	6	7



B. The TetraStar System

In this set of questions we would like to know what you think of the TetraStar system overall.

B1. Visual Displays and Concepts

We would like to know your overall assessment of TetraStar's **visual displays and concepts.** Please rate the listed characteristics of TetraStar by circling the most appropriate number on the scales provided.

	Very **difficult**						**Very easy**
a. Easy or Difficult to Read (Driving)	1	2	3	4	5	6	7
b. Easy or Difficult to Read (Still)	1	2	3	4	5	6	7
c. Easy or Difficult to Understand	1	2	3	4	5	6	7
	Insuff icient						**Sufficient**
d. Advance Warning Provided	1	2	3	4	5	6	7
e. Accuracy of Guidance	1	2	3	4	5	6	7
	Always						**Never**
f. Helped Me Find My Way	1	2	3	4	5	6	7
	Strongly disliked						**Strongly liked**
g. Overall Impression	1	2	3	4	5	6	7

B2. In general, were TetraStar's visual displays distracting:

	Very distracting						**Not at all distracting**
a. At night	1	2	3	4	5	6	7
b. During daylight hours	1	2	3	4	5	6	7
c. In heavy traffic	1	2	3	4	5	6	7
d. In light traffic	1	2	3	4	5	6	7
e. When traveling along freeways	1	2	3	4	5	6	7
f. Traveling along other roads	1	2	3	4	5	6	7

B3. **Voice Guidance**

For this question, we would like to know your overall assessment of the TetraStar system's **Voice Guidance** feature. Please circle the most appropriate number on the scale provided.

	Very difficult						**Very easy**
a. Easy or Difficult to Hear	1	2	3	4	5	6	7
b. Easy or Difficult to Understand	1	2	3	4	5	6	7
	Insufficient						**Sufficient**
c. Amount of information Given	1	2	3	4	5	6	7
d. Advance Warning Provided	1	2	3	4	5	6	7
	Very distracting						**Not at all distracting**
e. Distraction While Driving	1	2	3	4	5	6	7
	Strongly disliked						**Strongly liked**
f. Sound of the Voice	1	2	3	4	5	6	7
g. Overall Impression	1	2	3	4	5	6	7

B4. Considering both visual and verbal information, how often did you follow TetraStar's recommendations to turn?

Never						**Always**
1	2	3	4	5	6	7

(if always, please skip to question B6.)

B5. TetraStar Recommendations

Considering all of the times that you **did not take the recommended turn,** how often were each of the following items part of your reason not to follow the recommended turn? (Answer by circling the most appropriate number on the scale provided just below each item.)

a. I knew of a faster route:

Never						Always
1	2	3	4	5	6	7

b. I believed that the recommended turn would take me away from my destination:

Never						Always
1	2	3	4	5	6	7

c. I needed to make stops along the way to my destination:

Never						Always
1	2	3	4	5	6	7

d. I believed that the recommended turn would lead me into traffic congestion:

Never						Always
1	2	3	4	5	6	7

e. TetraStar provided the suggested turn too late:

Never						Always
I	2	3	4	5	6	7

f. The recommended turn was not clear to me:

Never						Always
1	2	3	4	5	6	7

g. Not enough room to merge:

Never						Always
1	2	3	4	5	6	7

h. Other (please write in): _____

Never						Always
1	2	3	4	5	6	7

B6. Which was your preferred way for receiving TetraStar's route guidance information?

- ❑ Voice alone
- ❑ Voice and visual together
- ❑ Visual alone
- ❑ No preference

B7. In your opinion, how did the TetraStar system change the following factors of your driving?

	Reduced						Increased
a. Travel time	1	2	3	4	5	6	7
b. Congestion Avoidance	1	2	3	4	5	6	7
c. Driving safety	1	2	3	4	5	6	7
d. Fuel consumption	1	2	3	4	5	6	7

B8. Now consider everything about the TetraStar System. Please rate the following characteristics of the TetraStar system as a whole.

	Very difficult						Very easy
a. Easy or Difficult to Learn	1	2	3	4	5	6	7
b. Easy or Difficult to Understand	1	2	3	4	5	6	7
	Insufficient						**Sufficient**
c. Amount of Information Given	1	2	3	4	5	6	7
d. Advance Warning Provided	1	2	3	4	5	6	7
	Very inaccurate						**Very accurate**
e. Accuracy of Guidance	1	2	3	4	5	6	7
	Strongly disagree						**Strongly agree**
f. Helped Me Find My Way	1	2	3	4	5	6	7
g. Reduced My Travel Time	1	2	3	4	5	6	7
h. Functioned Properly	1	2	3	4	5	6	7
	Very distracting						**Not at all distracting**
i. Distraction While Driving	1	2	3	4	5	6	7
	Strongly disliked						**Strongly liked**
j. Overall Impression	1	2	3	4	5	6	7

C. Use of the TetraStar System

In this section, we would like to know how you used TetraStar as part of your driving and trip-making.

C1. How often did you use TetraStar for the following types of trips? Circle the most appropriate number in the scales provided.

	Never						Always
a. Commuting to work	1	2	3	4	5	6	7
b. Work-related trips (non-commuting)	1	2	3	4	5	6	7
c. Recreational trips	1	2	3	4	5	6	7
d. Other personal trips	1	2	3	4	5	6	7

For the next few questions, please compare your driving <u>without</u> a TetraStar system to your driving with the TetraStar system.

c2. Please indicate the extent to which driving with TetraStar changed your *attention* to:

	Much less attention						Much more attention
a. Traffic Conditions	1	2	3	4	5	6	7
b. Traffic Signals	1	2	3	4	5	6	7
c. Road Signs (such as 55 MPH)	1	2	3	4	5	6	7
d. Street Signs (such as Main St.)	1	2	3	4	5	6	7
e. Street Addresses	1	2	3	4	5	6	7
f. Speedometer	1	2	3	4	5	6	7
g. Mirrors	1	2	3	4	5	6	7
h. Fuel Gauge	1	2	3	4	5	6	7

c3. Please indicate the extent to which driving with the TetraStar system, compared to driving without TetraStar, made you feel:

	Always less with TetraStar						Always more with TetraStar
a. Nervous	1	2	3	4	5	6	7
b. Confident	1	2	3	4	5	6	7
c. Confused	I	2	3	4	5	6	7
d. Attentive	1	2	3	4	5	6	7
e. Safe	1	2	3	4	5	6	7
f. Stressed	1	2	3	4	5	6	7
g. Relaxed	1	2	3	4	5	6	7
h. Frustrated	1	2	3	4	5	6	7

c4. Again, compared to driving without TetraStar, please indicate the extent to which you had the following experiences while driving with TetraStar:

	Always less with TetraStar						**Always more with TetraStar**
a. Crashes	1	2	3	4	5	6	7
b. Missed Stop Signs	1	2	3	4	5	6	7
c. Ran Red Light	1	2	3	4	5	6	7
d. Ran Off Road	1	2	3	4	5	6	7
e. Crossed Lane Marker	1	2	3	4	5	6	7

D. Valuation

In the following questions, we would like to learn how much you, an experienced user, value the TetraStar system.

D1. For assistance in reaching your destinations, how do you rate the following sources of route-guidance information?

	Poor						Excellent
a. Standard road map	1	**2**	**3**	**4**	**5**	**6**	**7**
b. Verbal directions from passenger	1	2	3	4	5	6	7
c. Verbal directions from other people	1	**2**	**3**	**4**	**5**	**6**	**7**
d. Written directions	1	2	3	4	5	6	7
e. TetraStar	1	**2**	**3**	**4**	**5**	**6**	**7**

D2. If you were about to drive to an unfamiliar area, which of the following sources of route-guidance information would you like to use?

	Definitely would not like						Definitely would like
a. Standard road map	1	2	3	4	5	6	7
b. Verbal directions from passenger	1	2	3	4	5	6	7
c. Verbal directions from other people	1	2	3	4	5	6	7
d. Written directions	1	**2**	**3**	**4**	**5**	**6**	**7**
e. TetraStar	1	2	3	4	5	6	7

D3. For the following items, assume that the TetraStar system was available nationwide. Given this scenario, how useful do you think the TetraStar system would be for:

	Not at all useful						Extremely useful
a. The commuting trip?	1	**2**	**3**	**4**	**5**	**6**	**7**
b. Out-of-town vacation trips?	1	**2**	**3**	**4**	**5**	**6**	**7**
c. Out-of-town business trips?	1	**2**	**3**	**4**	**5**	**6**	**7**
d. Local driving (non-work, e.g., for shopping)?	1	2	3	4	5	6	7

D4. How much would you be willing to pay for the TetraStar system as an option on a new car?

$_____

D5. How much would you be willing to pay to add the TetraStar system to your present car?

$_____

D6. How much extra *per day* would you be willing to pay for the TetraStar system as an option on a rental car?

$_____

D7. In your opinion, how important are each of the following factors to the operation of systems such as TetraStar?

	Not at all important						**Extremely important**
a. Fuel savings	1	2	3	4	5	6	7
b. Reduced air pollution	1	2	3	4	5	6	7
c. Traffic safety	1	2	3	4	5	6	7
d. Relief of highway congestion	1	2	3	4	5	6	7
e. Accurate route guidance	1	2	3	4	5	6	7
f. Traffic diverted into neighborhoods	1	2	3	4	5	6	7
g. Ease of use	1	2	3	4	5	6	7
h. Quick updates of road conditions	1	2	3	4	5	6	7

D8. We are interested in knowing how you would like to see TetraStar improved. In the space provided, please tell us two changes that you would like to see made in the system.

_____

_____

2. _____

_____

E. Comparison of TetraStar and ALI-SCOUT In-Vehicle Route Guidance Systems

As a participant in the FAST-TRAC project you have had the unique opportunity to use two distinct navigation assistance systems--TetraStar and ALI-SCOUT. In the next set of questions we are interested in your opinions about how your driving with ALI-SCOUT in the Oakland County Study Area (i.e., the beacon network) compares with all the driving you did with TetraStar.

E1. We are interested in knowing which system gave you the more positive impression or whether you had no preference. For each characteristic please indicate the preferred system or no preference by placing an X in the box provided.

	TetraStar Better	**ALI-SCOUT Better**	**No Preference**
Overall Appearance of System	❑	❑	❑
Ease of Learning the System	❑	❑	❑
Quality of Visual Displays	❑	❑	❑
Quality of Verbal Messages	❑	❑	❑
Ease of Selecting/Entering Destinations	❑	❑	❑
Ease of Finding the Start of Route	❑	❑	❑
Accuracy of Guidance	❑	❑	❑
Prevents Getting Lost	❑	❑	❑
Ease of Finding Destinations	❑	❑	❑
Avoids Traffic Congestion	❑	❑	❑
Reduces Travel Time	❑	❑	❑
Clarity of Guidance Instructions	❑	❑	❑
Size of Guidance Area	❑	❑	❑

E2. We are interested in knowing which system you thought performed better or whether you had no preference. For each route characteristic listed, please indicate the preferred system or no preference by placing an X in the box provided.

	TetraStar Better	ALI-SCOUT Better	No Preference
Recommended the Fastest Routes	❑	❑	❑
Recommended the Shortest Distance Routes	❑	❑	❑
Recommended Routes with the Least Traffic	❑	❑	❑
Recommended the Most Scenic Routes	❑	❑	❑
Recommended Routes with the Least Turns	❑	❑	❑

E3. We are interested in knowing which system you would prefer to own, lease, or rent for each of the following scenarios or whether you had no preference. For each of the items assume that the cost for the systems are equal. Please indicate the preferred system or no preference by placing an X in the box provided.

	TetraStar	ALI-SCOUT	No Preference
Putting in Your Own Car	❑	❑	❑
Getting as an Option on a Rental Car	❑	❑	❑
Getting as an Option on a New Car	❑	❑	❑

E4. Considering everything about the two systems you tested, please indicate the system you preferred overall or whether you had no preference.

TetraStar	ALI-SCOUT	No Preference
❑	❑	❑

E5. Why was the system selected in the last question preferred or why did you have no preference?

_____

_____

_____

_____

o Thank you for participating in this survey. The information that you have provided will be of great value in our efforts to measure how the technologies involved in the FAST-TRAC Project have affected the transportation system in Oakland County and how they might affect the future of transportation in Oakland County and beyond. Please use the remainder of this page for any additional comments that you would like to make about the TetraStar system or the FAST-TRAC Project.

APPENDIX D:
DRIVER LOG INSTRUCTIONS AND EXAMPLE

THE FAST-TRAC PROJECT

Instructions for Completing Driver Log Sheets

Hello, and welcome to the FAST-TRAC project. In order to evaluate fully the TetraStar system we are asking you to maintain a driving log of your travels over the next month. You should begin filling out the driver log on the day you get the TetraStar device.

You have a driver log form for each of the first twenty-eight days, including weekends, that you will be using the TetraStar device. For each day that you drive the TetraStar-equipped car, please record information about every trip that you take and indicate all unusual driving experiences and problems you have with the TetraStar system.

Oniy you, the designated TetraStar user, should fill out the driver log for the TetraStar-equipped car. For the days that the car is not driven by you, please write "NO TRIPS TAKEN" on the driver log sheet for that day and return it to us with the rest of the completed forms. *Please remember to use a different driver* log *sheet for each day.* This will help us keep track of how your car is being used and will assure us that no forms have been misplaced. Note that we also have included five extra sheets in case you need them.

Trips Taken

For our purposes, a trip is anytime you start the car, drive somewhere, and then turn the car off. This means that, for example, if you were to go from your house to a shopping center, then to a friend's house, and then back home, this would be three trips. The first trip was from your house to the store, the second was from the store to your friend's house, and the third was from your friend' s house back home.

At the end of each trip you take as the driver of the TetraStar-equipped car, please record the following information directly on the driving log.

Origin: Record the type of place and city where the trip began. For example, 7-Eleven in Troy. If the trip begins in a township, then record the township name instead of a city. Also, if the trip begins out of Michigan, please indicate the state.

Destination: Record the type of place and city where the trip ended following the instructions for recording the origin.

Trip Purpose: Record the purpose of the trip in the space provided. Example purposes are: home, work, personal business, medical, social/recreational, eat meal, shopping, school, church, or to serve a passenger.

Length of trip in miles: Record your estimate of the trip length in miles and tenths of miles. For example, a trip length of one and one-half miles would be recorded as "1.5" miles.

Time of day that the trip took place: Record the hour and minutes of the day in which the trip began and indicate whether it was AM or PM. For example, a trip that started at 1:30 in the afternoon would be recorded as "1:30 pm." It is important that you remember to indicate AM or PM.

Was TetraStar used during the trip? Indicate whether or not you used TetraStar for the trip by circling "Y" for yes or "N" for no.

If you take more than 10 trips in a single day, then please continue your record of the trips on the back of the driving log. Remember that trips taken by you in some other vehicle should *not* be recorded on the driver log.

Finally, many of the trip origins will be the same as the preceding trip's destination. In these cases you may write "SAME" in the origin box to indicate that the origin of the trip is the same as the destination from the previous trip.

Unusual Driving Experiences, Problems with TetraStar, or Other Comments:

In this section we want you to record any driving-related experiences that happen to you that were out of the ordinary, any problems that you had with the TetraStar system (e.g., entering information into TetraStar, understanding the TetraStar display or voice commands, or problems with getting to a destination), or any other comments that you might have. While we want you to record any unusual driving experience, we are particularly interested in any collisions (e.g., crashes, fender-benders, bumps) or near-collisions you may have experienced, unsafe driving (e.g., running off the road, failing to stop at stop sign), and any tickets or warnings from law enforcement that you may have received. It is important that you include as much detail about the incident as you can and that you record the number of the trip during which the incident occurred. The trip number can be found to the left of each origin box on the driver log form. Use the back of the form if you need more space. If you are unsure whether a certain incident should be recorded, go ahead and record that incident. While we know that much of this information is sensitive, these data are extremely important in allowing us to assess the TetraStar system. The information you provide us will be kept in the strictest confidence and will not impact your driving record.

Sending the fogs back to us

At the end of each week, please remove the completed driver logs, place them in one of the provided envelopes, and mail. It is important that you check and make sure that you have completed a driver log for each day. If the envelopes are misplaced the driver logs should be mailed to: [address given]

Final Information

If you have any questions about the driver logs, contact the FAST-TRAC coordinator at 313/763-2466 (phone), 313/936-1076 (fax) , or FASTTRAC@umich.edu (Internet). Thank you for participating in the FAST-TRAC project and remember to buckle up and drive safely.

DRIVER LOG SHEET: CONFIDENTIAL

(Note: Complete only one driver log sheet for each day)

Name: _____ **Date:** _____

Log-number: _____ **Code:** _____

Trips Taken

Trip	Origin (e.g., Home, Pontiac)	Destination (e.g., Bank, Troy)	Trip Purpose	Length of trip in miles	Time of day for trip	Was *Tetra-Star* used?
1						Y N
2						Y N
3						Y N
4						Y N
5						Y N
6						Y N
7						Y N
8						Y N
9						Y N
10						Y N

Note: If necessary, continue your trip records on the back.

Please note any unusual driving experiences, problems using TetraStar, or any other Comments. If the comment refers to a specific trip, please indicate the corresponding trip number:

APPENDIX E:
VEHICLE CHECKOUT FORM

THE UNIVERSITY OF MICHIGAN
TRANSPORTATION RESEARCH INSTITUTE
2901 BAXTER RD.
ANN ARBOR, MI 48109-2150

VEHICLE CONDITION REPORT

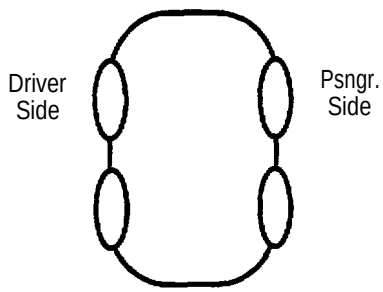
VIN	License plate #	Miles In
UMTRI ID	1995 Mercury Sable - white, 4 door	Miles Out
		Miles Used

circle area of damage and/or describe below.

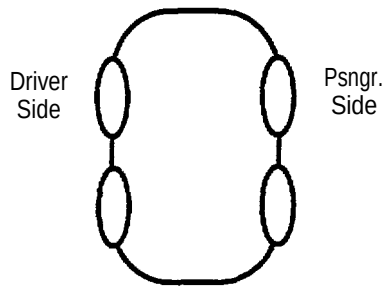
OUTGOING INSPECTION **INCOMING INSPECTION**

nature date signature date

Front



Front



Description of interior (if any) damage and other comments:

Check glove box for:	Check interior for:	Check trunk for:
Owners manual	TetraStar display unit	spare tire
Warranty card	TetraStar manual	jack
Roadside assistance card	windshield scraper/snow brush	
Registration		
Proof of insurance		
Certificate		
Accident report package		

port any missing items before leaving with your vehicle.

APPENDIX F:
SURVEY UNIVARIATES

A. TetraStar Operation and Displays

As a participant in the FAST-TRAC Project, you have been driving a vehicle equipped with an electronic route-guidance system called TetraStar. In this section, we would like to learn what you think about the different parts of the system.

A1. Since you have had a TetraStar equipped vehicle, how often have you used TetraStar for trips in which you drove this vehicle? Please circle the most appropriate number on the scale provided.

Never						**Always**
1	2	3	4	5	6	7

If you did not answer always, we would like to learn why you sometimes did not use the system. Please check all that apply.

- ❑ Many trips are very short.
- ❑ Too much trouble to program the destinations.
- ❑ I did not think TetraStar provided the fastest route.
- ❑ I did not think TetraStar provided accurate guidance.
- ❑ I knew the way.
- ❑ Other, please specify:_____

(If you never used TetraStar during this evaluation, please skip to question D1).

	Male			**Female**		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	10.0 (1)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)	14.3 (1)
5	0.0 (0)	0.0 (0)	0.0 (0)	30.0 (3)	10.0 (1)	28.6 (2)
6	80.0 (8)	71.4 (5)	75.0 (6)	30.0 (3)	60.0 (6)	42.9 (3)
7	10.0 (1)	28.6 (2)	25.0 (2)	20.0 (2)	30.0 (3)	14.3 (1)

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
Many trips are very short	55.6 (5)	62.5 (5)	75.0 (6)	70.0 (7)	60.0 (6)	28.6 (2)
Too much trouble to program the destinations	22.2 (2)	0.0 (0)	0.0 (0)	20.0 (2)	0.0 (0)	14.3 (1)
I did not think Tetrastar provided the fastest route	22.2 (2)	12.5 (1)	0.0 (0)	10.0 (1)	0.0 (0)	14.3 (1)
I did not think Tetrastar provided accurate guidance	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)	0.0 (0)
I knew the way	77.8 (7)	37.5 (3)	12.5 (1)	50.0 (5)	0.0 (0)	14.3 (1)
Other	11.1 (1)	25.0 (2)	25.0 (2)	40.0 (4)	20.0 (2)	42.9 (3)

Question A1. If you did not answer always, we would like to learn why you sometimes did not use the system. OTHER category responses (verbatim).

Male
16-29

- No comments from this age group

30-64

- Too lazy
- I didn't use when going 1 or 2 miles to lunch - always used for longer trips

65-80

- It didn't work once
- Could not find near location on computer

Female
16-29

- Wanted to drive own car at LEAST one day a week.
- Not enough time to program can't do it while driving.
- Did not know address
- Couldn't find my category under points of interest - ex., Arbor Drugs - what would that be under

30-64

- Forgot for 2 short trips
- Went out of area
- Sometimes too rushed

65-80

- Did not have the address available to program when away from home
- At times it didn't work
- While at Boyne City Farm, Tetrastar would not pinpoint out farm on Wildwood Harbor Rd – a country road

A2. The TetraStar system offers several options for telling TetraStar where you want to go. These options are:

Street Address--Selecting a destination by entering the city and street address of where you want to go.

Intersections--Selecting a destination by entering the city and name of two streets that cross.

Points of Interest--Selecting a destination from a list of points of interest that are sorted by name, distance, or city.

Freeway Entrance/Exit Ramps--Selecting a destination by entering a freeway and street for either entering or exiting the freeway.

Guidance History--Selecting a destination that you have been to from a list of recent destinations.

We are interested in knowing which of these options you used most often for entering new destinations. Please rank them from one (most frequent) to five (least frequent) according to how often you used them.

Street Addresses _____
Intersections _____
Points of Interest _____
Freeway Entrance/Exit Ramps _____
Guidance History _____

Street Addresses	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	30.0 (3)	12.5 (1)	87.5 (7)	33.3 (3)	33.3 (3)	33.3 (3)
2	50.0 (5)	62.5 (5)	0.0 (0)	33.3 (3)	44.4 (4)	50.0 (3)
3	20.0 (2)	12.5 (1)	0.0 (0)	22.2 (2)	0.0 (0)	16.7 (1)
4	0.0 (0)	0.0 (0)	12.5 (1)	11.1 (1)	11.1 (1)	0.0 (0)
5	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	11.1 (1)	0.0 (0)

Inter-sections	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	12.5 (1)	0.0 (0)	11.1 (1)	0.0 (0)	16.7 (1)
2	10.0 (1)	25.0 (2)	37.5 (3)	44.4 (4)	22.2 (2)	33.3 (3)
3	50.0 (5)	37.5 (3)	37.5 (3)	33.3 (3)	55.6 (5)	33.3 (2)
4	40.0 (4)	25.0 (2)	12.5 (1)	11.1 (1)	11.1 (1)	16.7 (1)
5	0.0 (0)	0.0 (0)	12.5 (1)	0.0 (0)	11.1 (1)	0.0 (0)

Points of Interest	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)	0.0 (0)
2	30.0 (3)	0.0 (0)	20.0 (2)	10.0 (1)	0.0 (0)	0.0 (0)
3	30.0 (3)	25.0 (2)	40.0 (2)	30.0 (3)	12.5 (1)	33.3 (3)
4	40.0 (4)	62.5 (5)	40.0 (2)	50.0 (5)	62.5 (5)	66.7 (4)
5	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	12.5 (1)	0.0 (0)

Freeway Ramps	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)	16.7 (1)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	12.5 (1)	20.0 (1)	0.0 (0)	14.3 (1)	0.0 (0)
4	10.0 (1)	12.5 (1)	20.0 (1)	11.1 (1)	28.6 (2)	0.0 (0)
5	90.0 (9)	62.5 (5)	60.0 (3)	88.9 (8)	57.1 (4)	83.3 (5)

Guidance History	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	70.0 (7)	62.5 (5)	12.5 (1)	55.6 (5)	44.4 (4)	33.3 (2)
2	10.0 (1)	0.0 (0)	50.0 (4)	11.1 (1)	33.3 (3)	16.7 (1)
3	0.0 (0)	12.5 (1)	25.0 (2)	11.1 (1)	0.0 (0)	16.7 (1)
4	10.0 (1)	0.0 (0)	0.0 (0)	11.1 (1)	0.0 (0)	16.7 (1)
5	10.0 (1)	25.0 (2)	12.5 (1)	11.1 (1)	22.2 (2)	16.7 (1)

A3. Entering and Selecting Destinations

We also are interested in knowing how easy or difficult you found each method of selecting destinations. Please rate each of the five methods by circling the most appropriate number on the scales provided. (*If you did not use a particular method, then place an X in the box.)*

	Did not use	**Very difficult to use**						**Very easy to use**
a. Street Address	❑	1	2	3	4	5	6	7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
0	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)	16.7 (1)
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)	0.0 (0)
4	10.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
5	0.0 (0)	0.0 (0)	37.5 (3)	0.0 (0)	0.0 (0)	16.7 (1)
6	30.0 (3)	50.0 (4)	50.0 (4)	30.0 (3)	20.0 (2)	0.0 (0)
7	60.0 (6)	50.0 (4)	12.5 (1)	50.0 (4)	80.0 (8)	66.7 (6)

	Did not use	Very difficult to use					Very easy to use
b. Intersections	❑	1	2	3	4	5	6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
0	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)	0.0 (0)
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	16.7 (1)
4	10.0 (1)	12.5 (1)	25.0 (2)	10.0 (1)	0.0 (0)	0.0 (0)
5	10.0 (1)	12.5 (1)	37.5 (3)	10.0 (1)	10.0 (1)	0.0 (0)
6	30.0 (3)	25.0 (2)	37.5 (3)	10.0 (1)	20.0 (2)	33.3 (2)
7	50.0 (5)	50.0 (4)	0.0 (0)	60.0 (6)	70.0 (7)	50.0 (3)

	Did not use	Very difficult to use					Very easy to use
c. Points of Interest	❑	1	2	3	4	5	6	7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
0	0.0 (0)	12.5 (1)	42.9 (3)	0.0 (0)	40.0 (4)	33.3 (2)
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	16.7 (1)
4	10.0 (1)	12.5 (1)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)
5	30.0 (3)	25.0 (2)	28.6 (2)	20.0 (2)	20.0 (2)	33.3 (2)
6	10.0 (1)	25.0 (2)	14.3 (1)	40.0 (4)	0.0 (0)	0.0 (0)
7	50.0 (5)	25.0 (2)	14.3 (1)	40.0 (4)	30.0 (3)	16.7 (1)

	Did not use	Very difficult to use					Very easy to use
d. Freeway Entry/Exit	❑	1	2	3	4	5	6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
0	60.0 (6)	57.1 (4)	71.4 (5)	70.0 (7)	50.0 (5)	50.0 (3)
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	14.3 (1)	14.3 (1)	0.0 (0)	0.0 (0)	0.0 (0)
4	10.0 (1)	0.0 (0)	14.3 (1)	0.0 (0)	10.0 (1)	16.7 (1)
5	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)
6	10.0 (1)	14.3 (1)	0.0 (0)	30.0 (3)	0.0 (0)	16.7 (1)
7	20.0 (2)	14.3 (1)	0.0 (0)	0.0 (0)	30.0 (3)	16.7 (1)

	Did not use	Very difficult to use					Very easy to use
e. Guidance History	❑	1	2	3	4	5	6	7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
0	10.0 (1)	0.0 (0)	12.5 (1)	20.0 (2)	10.0 (1)	16.7 (1)
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	16.7 (1)
4	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
5	0.0 (0)	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)
6	10.0 (1)	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)
7	80.0 (8)	100.0 (8)	62.5 (5)	80.0 (8)	90.0 (6)	66.7 (4)

A4. In order to select destinations using TetraStar, you must use the buttons on the front of the unit to scroll through options, select options, and change screens. Please rate the following characteristics of the TetraStar **Destination Selection System** by circling the most appropriate number on the scales provided.

	Very Difficult						**Very easy**
a. Easy or Difficult to Learn	1	2	3	4	5	6	7

	Male			**Female**		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	16.7 (1)
3	0.0 (0)	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)
4	0.0 (0)	0.0 (0)	25.0 (2)	0.0 (0)	0.0 (0)	0.0 (0)
5	20.0 (2)	0.0 (0)	25.0 (2)	0.0 (0)	0.0 (0)	0.0 (0)
6	0.0 (0)	37.5 (3)	37.5 (3)	20.0 (2)	30.0 (3)	33.3 (2)
7	80.0 (8)	62.5 (5)	0.0 (0)	80.0 (8)	70.0 (7)	50.0 (3)

	Very Difficult						Very easy
b. Easy or Difficult to Use	1	2	3	4	5	6	7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	16.7 (1)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
5	11.1 (1)	25.0 (2)	57.1 (4)	0.0 (0)	10.0 (1)	0.0 (0)
6	11.1 (1)	37.5 (3)	14.3 (1)	10.0 (1)	10.0 (1)	16.7 (1)
7	77.8 (7)	37.5 (3)	28.6 (2)	90.0 (9)	80.0 (8)	66.7 (6)

	Never						Always
c. Functioned Properly	1	2	3	4	5	6	7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	16.7 (1)
4	0.0 (0)	0.0 (0)	12.5 (1)	0.0 (0)	10.0 (1)	16.7 (1)
5	33.3 (3)	25.0 (2)	25.0 (2)	10.0 (1)	40.0 (4)	16.7 (1)
6	33.3 (3)	62.5 (6)	25.0 (2)	30.0 (3)	30.0 (3)	33.3 (2)
7	33.3 (3)	12.5 (1)	25.0 (2)	60.0 (6)	20.0 (2)	16.7 (1)

	Strongly disliked						Strongly liked
d. Overall Impression	1	2	3	4	5	6	7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	16.7 (1)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	0.0 (0)	0.0 (0)	25.0 (2)	0.0 (0)	0.0 (0)	0.0 (0)
5	11.1 (1)	25.0 (2)	25.0 (2)	0.0 (0)	0.0 (0)	0.0 (0)
6	55.6 (5)	37.5 (3)	25.0 (2)	10.0 (1)	50.0 (5)	16.7 (1)
7	33.3 (3)	37.5 (3)	25.0 (2)	90.0 (9)	40.0 (4)	66.7 (4)

A5. Calculating a Route

Once a destination has been selected, TetraStar gives you three options for your route. These options are:

Shortest Time Route--the route that will get you to your destination in the least amount of time using all possible roads.

Most Use of Freeways--the route that uses freeways as much as possible.

Least Use of Freeways--the route that avoids freeways as much as possible.

We are interested in knowing which of these options you used most often for calculating a route. Please rank them from one (most frequent) to three (least frequent) according to how often you used them.

Shortest Time Route _____
Most Use of Freeways _____
Least Use of Freeways _____

Shortest Route	**Male**			**Female**		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	100.0 (10)	87.5 (7)	85.7 (6)	100.0 (10)	87.5 (7)	83.3 (5)
2	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	12.5 (1)	16.7 (1)
3	0.0 (0)	0.0 (0)	14.3 (1)	0.0 (0)	0.0 (0)	0.0 (0)

Most Use of Freeways	**Male**			**Female**		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	25.0 (2)	25.0 (1)
2	70.0 (7)	75.0 (6)	71.4 (5)	60.0 (6)	62.5 (5)	25.0 (1)
3	30.0 (3)	12.5 (1)	28.6 (2)	40.0 (4)	12.5 (1)	50.0 (2)

Least Use of Freeways	**Male**			**Female**		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	14.3 (1)	0.0 (0)	0.0 (0)	0.0 (0)
2	30.0 (3)	14.3 (1)	28.6 (2)	40.0 (4)	28.6 (2)	25.0 (1)
3	70.0 (7)	85.7 (6)	57.1 (4)	60.0 (6)	71.4 (5)	75.0 (3)

A6. This is an example of the TetraStar system' s **Proceed to the Route** display, which is shown at the beginning of a trip. Please rate the following characteristics of this display by circling the most appropriate number on the scales provided.

	Very Difficult						**Very easy**
a. Easy or Difficult to Learn	1	2	3	4	5	6	7

	Male			**Female**		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	16.7 (1)
4	10.0 (1)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
5	20.0 (2)	12.5 (1)	25.0 (2)	33.3 (3)	10.0 (1)	16.7 (1)
6	30.0 (3)	12.5 (1)	75.0 (6)	33.3 (3)	20.0 (2)	16.7 (1)
7	40.0 (4)	62.5 (5)	0.0 (0)	33.3 (3)	60.0 (6)	50.0 (3)

Very distracting **Not at all distracting**

b. Distraction While Driving 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	16.7 (1)
2	10.0 (1)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	20.0 (2)	12.5 (1)	12.5 (1)	11.1 (1)	0.0 (0)	16.7 (1)
4	20.0 (2)	12.5 (1)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)
5	10.0 (1)	25.0 (2)	37.5 (3)	0.0 (0)	20.0 (2)	16.7 (1)
6	20.0 (2)	12.5 (1)	50.0 (4)	44.4 (4)	20.0 (2)	0.0 (0)
7	20.0 (2)	25.0 (2)	0.0 (0)	44.4 (4)	50.0 (5)	50.0 (3)

Very inaccurate **Very accurate**

c. Accuracy of Guidance 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	11.1 (1)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	16.7 (1)
4	10.0 (1)	14.3 (1)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)
5	20.0 (2)	14.3 (1)	37.5 (3)	22.2 (2)	20.0 (2)	16.7 (1)
6	60.0 (6)	28.6 (2)	25.0 (2)	33.3 (3)	30.0 (3)	0.0 (0)
7	10.0 (1)	42.9 (3)	37.5 (3)	33.3 (3)	40.0 (4)	66.7 (4)

Never **Always**

d. Functioned Properly 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	16.7 (1)
2	0.0 (0)	0.0 (0)	0.0 (0)	11.1 (1)	10.0 (1)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	16.7 (1)
4	20.0 (2)	12.5 (1)	25.0 (2)	0.0 (0)	10.0 (1)	16.7 (1)
5	40.0 (4)	12.5 (1)	25.0 (2)	22.2 (2)	40.0 (4)	0.0 (0)
6	40.0 (4)	62.5 (5)	37.5 (3)	33.3 (3)	30.0 (3)	50.0 (3)
7	0.0 (0)	12.5 (1)	12.5 (1)	33.3 (3)	10.0 (1)	16.7 (1)

Strongly disliked **Strongly liked**

e. Overall Impression 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	16.7 (1)
4	20.0 (2)	0.0 (0)	0.0 (0)	22.2 (2)	10.0 (1)	0.0 (0)
5	20.0 (2)	25.0 (2)	37.5 (3)	0.0 (0)	0.0 (0)	0.0 (0)
6	40.0 (4)	25.0 (2)	37.5 (3)	33.3 (3)	50.0 (5)	16.7 (1)
7	20.0 (2)	50.0 (4)	25.0 (2)	44.4 (4)	40.0 (4)	66.7 (4)

A7. The following is an example of the TetraStar system' s **Next Maneuver** display, which shows the type of maneuver, the street where the maneuver will occur, the distance to the maneuver, and other information. Please rate the following characteristics of this display by circling the most appropriate number on the scales provided.

	Very Difficult						**Very easy**
a. Easy or Difficult to Understand	1	2	3	4	5	6	7

	Male			**Female**		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
5	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	16.7 (1)
6	30.0 (3)	25.0 (2)	37.5 (3)	0.0 (0)	10.0 (1)	0.0 (0)
7	70.0 (7)	75.0 (6)	62.5 (5)	100.0 (9)	90.0 (9)	83.3 (5)

	Insufficient						**Sufficient**
b. Amount of Detail Shown	1	2	3	4	5	6	7

	Male			**Female**		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	10.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)
5	10.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	16.7 (1)
6	40.0 (4)	25.0 (2)	37.5 (3)	11.1 (1)	20.0 (2)	0.0 (0)
7	40.0 (4)	75.0 (6)	62.5 (5)	88.9 (8)	70.0 (7)	83.3 (5)

	Not enough						Too much
c. Advance warning provided	1	2	3	4	5	6	7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	12.5 (1)	0.0 (0)	10.0 (1)	0.0 (0)
4	80.0 (8)	37.5 (3)	12.5 (1)	77.8 (7)	30.0 (3)	16.7 (1)
5	10.0 (1)	12.5 (1)	37.5 (3)	11.1 (1)	50.0 (5)	33.3 (2)
6	10.0 (1)	37.5 (3)	25.0 (2)	11.1 (1)	10.0 (1)	50.0 (3)
7	0.0 (0)	12.5 (1)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)

	Very distracting						Not at all distracting
d. Distraction while driving	1	2	3	4	5	6	7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	10.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	10.0 (1)	0.0 (0)	12.5 (1)	0.0 (0)	10.0 (1)	20.0 (2)
5	30.0 (3)	25.0 (2)	25.0 (2)	0.0 (0)	30.0 (3)	0.0 (0)
6	30.0 (3)	25.0 (2)	37.5 (3)	55.6 (5)	10.0 (1)	0.0 (0)
7	20.0 (2)	50.0 (4)	25.0 (2)	44.4 (4)	50.0 (5)	80.0 (4)

	Very inaccurate						Very accurate
e. Accuracy of Guidance	1	2	3	4	5	6	7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	11.1 (1)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	10.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)
5	30.0 (3)	0.0 (0)	25.0 (2)	22.2 (2)	20.0 (2)	16.7 (1)
6	40.0 (4)	37.5 (3)	62.5 (5)	44.4 (4)	20.0 (2)	16.7 (1)
7	20.0 (2)	62.5 (5)	12.5 (1)	22.2 (2)	50.0 (5)	66.7 (4)

	Strongly disliked						Strongly liked
f. Overall Impression	1	2	3	4	5	6	7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	10.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	16.7 (1)
5	20.0 (2)	0.0 (0)	12.5 (1)	11.1 (1)	10.0 (1)	0.0 (0)
6	50.0 (5)	37.5 (3)	62.5 (5)	33.3 (3)	30.0 (3)	16.7 (1)
7	20.0 (2)	62.5 (5)	25.0 (2)	55.6 (5)	60.0 (6)	66.7 (4)

A8. The following is an example of the TetraStar system' s **Execute Maneuver** display, which is shown as you approach the location for a recommended maneuver. Please rate the following characteristics of the TetraStar system' s **Execute Maneuver** display.

	Very Difficult						**Very easy**
a. Easy or Difficult to Understand	1	2	3	4	5	6	7

	Male			**Female**		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
5	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
6	50.0 (5)	12.5 (1)	42.9 (3)	0.0 (0)	10.0 (1)	16.7 (1)
7	50.0 (5)	87.5 (7)	57.1 (4)	100.0 (10)	90.0 (9)	83.3 (5)

Insufficient **Sufficient**

b. Amount of Detail Shown 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	10.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)
5	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
6	50.0 (5)	12.5 (1)	42.9 (3)	0.0 (0)	30.0 (3)	33.3 (2)
7	40.0 (4)	87.5 (7)	57.1 (4)	100.0 (10)	60.0 (6)	66.7 (4)

Not enough **Too much**

c. Advance warning provided 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	16.7 (1)
3	10.0 (1)	0.0 (0)	14.3 (1)	0.0 (0)	0.0 (0)	0.0 (0)
4	60.0 (6)	50.0 (4)	14.3 (1)	80.0 (8)	40.0 (4)	16.7 (1)
5	20.0 (2)	25.0 (2)	28.6 (2)	0.0 (0)	40.0 (4)	33.3 (2)
6	10.0 (1)	12.5 (1)	42.9 (3)	20.0 (0)	20.0 (2)	33.3 (2)
7	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)

	Very distracting						Not at all distracting
d. Distraction while driving	1	2	3	4	5	6	7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	14.3 (1)	0.0 (0)	0.0 (0)	0.0 (0)
3	10.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	30.0 (3)	12.5 (1)	14.3 (1)	0.0 (0)	0.0 (0)	16.7 (1)
5	20.0 (2)	12.5 (1)	14.3 (1)	10.0 (1)	20.0 (2)	0.0 (0)
6	20.0 (2)	12.5 (1)	28.6 (2)	30.0 (3)	20.0 (2)	33.3 (2)
7	20.0 (2)	62.5 (5)	28.6 (2)	60.0 (6)	60.0 (6)	50.0 (3)

	Very inaccurate						Very accurate
e. Accuracy of Guidance	1	2	3	4	5	6	7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	20.0 (2)	0.0 (0)	14.3 (1)	0.0 (0)	20.0 (2)	0.0 (0)
5	10.0 (1)	12.5 (1)	14.3 (1)	10.0 (1)	0.0 (0)	0.0 (0)
6	50.0 (5)	12.5 (1)	57.1 (4)	50.0 (5)	30.0 (3)	33.3 (2)
7	20.0 (2)	75.0 (6)	14.3 (1)	30.0 (3)	50.0 (5)	66.7 (4)

	Strongly disliked						**Strongly liked**
f. Overall Impression	1	2	3	4	5	6	7

	Male			**Female**		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	20.0 (2)	0.0 (0)	14.3 (1)	0.0 (0)	0.0 (0)	16.7 (1)
5	20.0 (2)	0.0 (0)	14.3 (1)	10.0 (1)	10.0 (1)	0.0 (0)
6	40.0 (4)	37.5 (3)	42.9 (3)	40.0 (4)	40.0 (4)	16.7 (1)
7	20.0 (2)	62.5 (5)	28.6 (2)	50.0 (5)	50.0 (5)	66.7 (4)

A9. When TetraStar is showing a Next **Maneuver** display it is possible to take a look at the trip TetraStar has calculated by scrolling through all the required maneuvers to get to a destination. Considering all the trips taken with TetraStar, how often did you use this feature? Please circle the most appropriate number on the scale provided.

Never **Always**
1 2 3 4 5 6 7

	Male			**Female**		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	10.0 (1)	14.3 (1)	42.9 (3)	30.0 (3)	33.3 (3)	16.7 (1)
2	20.0 (2)	14.3 (1)	0.0 (0)	0.0 (0)	11.1 (1)	33.3 (2)
3	0.0 (0)	42.9 (3)	0.0 (0)	20.0 (2)	0.0 (0)	0.0 (0)
4	20.0 (2)	0.0 (0)	14.3 (1)	20.0 (2)	11.1 (1)	0.0 (0)
5	40.0 (4)	28.6 (2)	42.9 (3)	20.0 (2)	22.2 (2)	33.3 (2)
6	10.0 (1)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)	16.7 (1)
7	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	22.2 (2)	0.0 (0)

The Next maneuver and Execute Maneuver displays contain several components, in the next few items we would like to learn what you thought of each of these components.

A10. Please rate the following characteristics of the street name component (the highlighted region in the figure below) provided by TetraStar.

	Very Difficult						Very easy
a. Easy or Difficult to Read	1	2	3	4	5	6	7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
5	20.0 (2)	0.0 (0)	25.0 (2)	0.0 (0)	0.0 (0)	16.7 (1)
6	10.0 (1)	25.0 (2)	50.0 (4)	20.0 (2)	20.0 (2)	0.0 (0)
7	70.0 (7)	75.0 (6)	25.0 (2)	80.0 (8)	80.0 (8)	83.3 (5)

	Very distracting						Not at all distracting
b. Distraction While Driving	1	2	3	4	5	6	7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	20.0 (2)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	10.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	16.7 (1)
5	0.0 (0)	0.0 (0)	50.0 (5)	0.0 (0)	20.0 (2)	0.0 (0)
6	30.0 (3)	25.0 (2)	37.5 (3)	10.0 (1)	10.0 (1)	16.7 (1)
7	40.0 (4)	75.0 (6)	12.5 (1)	90.0 (9)	70.0 (7)	66.7 (4)

	Very inaccurate						Very accurate
c. Accuracy	1	2	3	4	5	6	7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	20.0 (2)	0.0 (0)
5	30.0 (3)	0.0 (0)	25.0 (2)	30.0 (3)	0.0 (0)	0.0 (0)
6	30.0 (3)	25.0 (2)	62.5 (5)	10.0 (1)	20.0 (2)	33.3 (2)
7	40.0 (4)	75.0 (6)	12.5 (1)	50.0 (5)	60.0 (6)	66.7 (4)

A11. An example turn arrow of the Next Maneuver and Execute Maneuver displays is highlighted in the figure below. Please rate the following characteristics of this display component.

	Very Difficult						Very easy
a. Easy or Difficult to Understand	1	2	3	4	5	6	7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
5	10.0 (1)	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)
6	0.0 (0)	25.0 (2)	37.5 (3)	0.0 (0)	20.0 (2)	0.0 (0)
7	90.0 (9)	75.0 (6)	50.0 (4)	100.0 (10)	80.0 (8)	100.0 (5)

Insufficient **Sufficient**

b. Amount of Detail Shown 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	10.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	10.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
5	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
6	30.0 (3)	12.5 (1)	62.5 (5)	0.0 (0)	40.0 (4)	0.0 (0)
7	50.0 (5)	87.5 (7)	37.5 (3)	100.0 (10)	60.0 (6)	100.0 (5)

Very distracting **Not at all distracting**

c. Distraction While Driving 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	10.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	20.0 (2)	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	16.7 (1)
5	0.0 (0)	0.0 (0)	62.5 (5)	0.0 (0)	10.0 (1)	0.0 (0)
6	40.0 (4)	37.5 (3)	12.5 (1)	30.0 (3)	10.0 (1)	16.7 (1)
7	30.0 (3)	62.5 (5)	25.0 (2)	70.0 (7)	70.0 (7)	66.7 (4)

	Very inaccurate						Very accurate
d. Accuracy of Guidance	1	2	3	4	5	6	7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	10.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	20.0 (2)	0.0 (0)
5	10.0 (1)	0.0 (0)	25.0 (2)	0.0 (0)	10.0 (1)	0.0 (0)
6	70.0 (7)	37.5 (3)	62.5 (5)	20.0 (2)	10.0 (1)	33.3 (2)
7	20.0 (2)	62.5 (5)	12.5 (1)	70.0 (7)	60.0 (6)	66.7 (4)

A12. The countdown bar of the Execute Maneuver display is highlighted in the figure below. Please rate the following characteristics of this display component.

	Very Difficult						Very easy
a. Easy or Difficult to Understand	1	2	3	4	5	6	7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
5	30.0 (3)	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)
6	20.0 (2)	0.0 (0)	25.0 (2)	10.0 (1)	20.0 (2)	16.7 (1)
7	50.0 (5)	100.0 (8)	62.5 (5)	90.0 (9)	80.0 (8)	83.3 (5)

Insufficient **Sufficient**

b. Amount of Detail Shown 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	10.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	10.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
5	10.0 (1)	0.0 (0)	12.5 (1)	0.0 (0)	10.0 (1)	0.0 (0)
6	30.0 (3)	0.0 (0)	25.0 (2)	10.0 (1)	20.0 (2)	16.7 (1)
7	40.0 (4)	100.0 (8)	62.5 (5)	90.0 (9)	70.0 (7)	83.3 (5)

Not enough **Too much**

c. Advance Warning Period 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	50.0 (5)	75.0 (6)	25.0 (2)	80.0 (8)	30.0 (3)	33.3 (2)
5	30.0 (3)	12.5 (1)	25.0 (2)	0.0 (0)	50.0 (5)	16.7 (1)
6	20.0 (2)	0.0 (0)	37.5 (3)	10.0 (1)	20.0 (2)	50.0 (3)
7	0.0 (0)	12.5 (1)	12.5 (1)	10.0 (1)	0.0 (0)	0.0 (0)

Very distracting **Not at all distracting**

d. Distraction While Driving 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	10.0 (1)	0.0 (0)	25.0 (2)	0.0 (0)	0.0 (0)	0.0 (0)
4	20.0 (2)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	16.7 (1)
5	10.0 (1)	12.5 (1)	37.5 (3)	0.0 (0)	0.0 (0)	0.0 (0)
6	30.0 (3)	37.5 (3)	12.5 (1)	40.0 (4)	20.0 (2)	16.7 (1)
7	30.0 (3)	50.0 (4)	25.0 (2)	60.0 (6)	80.0 (8)	66.7 (4)

Very inaccurate **Very accurate**

e. Accuracy of Guidance 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)
4	10.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)
5	20.0 (2)	0.0 (0)	12.5 (1)	0.0 (0)	10.0 (1)	0.0 (0)
6	40.0 (4)	25.0 (2)	37.5 (3)	50.0 (5)	10.0 (1)	33.3 (2)
7	30.0 (3)	75.0 (6)	50.0 (4)	40.0 (4)	60.0 (6)	66.7 (4)

A13. As shown in the highlighted figure below, the bottom right corner of the Next Maneuver and Execute Maneuver displays is a small arrow and number that indicates the actual driving distance and direction to the destination. Please rate the following characteristics of this display component.

	Very Difficult						**Very easy**
a. Easy or Difficult to Understand	1	2	3	4	5	6	7

	Male			**Female**		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	10.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
5	10.0 (1)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)	16.7 (1)
6	20.0 (2)	0.0 (0)	37.5 (3)	0.0 (0)	0.0 (0)	0.0 (0)
7	60.0 (6)	87.5 (7)	62.5 (5)	100.0 (10)	100.0 (10)	83.3 (5)

	Insufficient						**Sufficient**
b. Amount of Detail Shown	1	2	3	4	5	6	7

	Male			**Female**		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	10.0 (1)	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)
4	10.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
5	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	16.7 (1)
6	30.0 (3)	0.0 (0)	25.0 (2)	0.0 (0)	10.0 (1)	0.0 (0)
7	50.0 (5)	100.0 (8)	62.5 (5)	100.0 (10)	90.0 (9)	83.3 (5)

	Not at all useful						Extremely useful
c. Usefulness in Guidance	1	2	3	4	5	6	7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	10.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	30.0 (3)	0.0 (0)	0.0 (0)	10.0 (1)	10.0 (1)	16.7 (1)
5	0.0 (0)	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	33.3 (2)
6	20.0 (2)	12.5 (1)	75.0 (6)	20.0 (2)	10.0 (1)	0.0 (0)
7	40.0 (4)	87.5 (7)	12.5 (1)	70.0 (7)	80.0 (8)	50.0 (3)

	Very distracting						Not at all distracting
d. Distraction While Driving	1	2	3	4	5	6	7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)
3	11.1 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	0.0 (0)	0.0 (0)	12.5 (1)	11.1 (1)	0.0 (0)	33.3 (2)
5	22.2 (2)	14.3 (1)	25.0 (2)	0.0 (0)	20.0 (2)	0.0 (0)
6	33.3 (3)	14.3 (1)	25.0 (2)	22.2 (2)	0.0 (0)	16.7 (1)
7	33.3 (3)	71.4 (5)	25.0 (2)	66.7 (4)	80.0 (8)	50.0 (3)

	Very inaccurate						Very accurate
e. Accuracy of Guidance	1	2	3	4	5	6	7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)	0.0 (0)
4	10.0 (1)	0.0 (0)	12.5 (1)	0.0 (0)	10.0 (1)	0.0 (0)
5	10.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	16.7 (1)
6	30.0 (3)	25.0 (2)	50.0 (4)	30.0 (3)	30.0 (3)	33.3 (2)
7	50.0 (5)	75.0 (6)	37.5 (3)	50.0 (5)	60.0 (6)	50.0 (3)

A14. As shown in the highlighted part of the figure below, the Next Maneuver and Execute Maneuver displays show letters in the bottom left corner. What does this letter indicate?

- ❑ Direction that the vehicle is heading
- ❑ Direction to the destination
- ❑ Direction to next maneuver
- ❑ Direction to nearest traffic signal

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
Direction that the vehicle is heading	100.0 (9)	42.9 (3)	71.4 (5)	90.0 (9)	80.0 (8)	60.0 (3)
Direction to the destination	0.0 (0)	57.1 (4)	14.3 (1)	0.0 (0)	20.0 (2)	40.0 (2)
Direction to next maneuver	0.0 (0)	0.0 (0)	14.3 (1)	10.0 (1)	0.0 (0)	0.0 (0)
Direction to nearest traffic signal	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)

A15. As shown in the highlighted part of the figure below, the Next Maneuver and Execute Maneuver displays show the letters “GPS.” At any time during a trip, the color of these letters can be red, **yellow, or green.** What do these letters indicate?

- ❑ The color of the next traffic signal
- ❑ The amount of congestion on the roadway
- ❑ The strength of the satellite signals used for locating the vehicle
- ❑ Initials of the inventor

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
The color of the next traffic signal	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
The amount of congestion on the roadway	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	20.0 (2)
The strength of the satellite signals used for locating the vehicle	100.0 (10)	100.0 (7)	100.0 (7)	87.5 (7)	100.0 (9)	80.0 (4)
Initials of the inventor	0.0 (0)	0.0 (0)	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)

A16. While driving to a destination it is possible to switch the display so that you can see your vehicle's location on a map. This location was updated automatically while you drove. Considering all the trips taken with TetraStar, how often did you use this feature? Please circle the most appropriate number on the scale provided.

Never **Always**

1 2 3 4 5 6 7

(If you selected never, then please skip to question A18)

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	14.3 (1)	20.0 (2)	22.2 (2)	33.3 (3)
2	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	22.2 (2)	0.0 (0)
3	0.0 (0)	25.0 (2)	28.6 (2)	20.0 (2)	0.0 (0)	0.0 (0)
4	20.0 (2)	0.0 (0)	14.3 (1)	20.0 (2)	11.1 (1)	0.0 (0)
5	10.0 (1)	12.5 (1)	0.0 (0)	10.0 (1)	11.1 (1)	16.7 (1)
6	30.0 (3)	37.5 (3)	42.9 (3)	10.0 (1)	22.2 (2)	33.3 (2)
7	40.0 (4)	12.5 (1)	0.0 (0)	20.0 (2)	11.1 (1)	16.7 (1)

A17. Which presentation mode did you prefer more for getting information about the route to your destination-- a series of maneuver screens, a map showing the selected route and your vehicle' s location, or did you have no preference? Please indicate your preference by placing an ' X' in the box provided.

- ❑ Maneuver Screen
- ❑ Map Display
- ❑ No Preference

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
Maneuver Screen	22.2 (2)	28.6 (2)	42.9 (3)	37.5 (3)	42.9 (3)	25.0 (2)
Map Display	66.7 (6)	57.1 (4)	42.9 (3)	37.5 (3)	42.9 (3)	75.0 (6)
No Preference	11.1 (1)	14.3 (1)	14.3 (1)	25.0 (2)	14.3 (1)	0.0 (0)

A18. When you arrive at your destination, TetraStar shows an arrival map display such as the one shown below. Please rate the following characteristics this display.

	Very Difficult						Very easy
a. Easy or Difficult to Understand	1	2	3	4	5	6	7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
5	10.0 (1)	0.0 (0)	12.5 (1)	10.0 (1)	10.0 (1)	0.0 (0)
6	40.0 (4)	0.0 (0)	50.0 (4)	0.0 (0)	0.0 (0)	16.7 (1)
7	50.0 (5)	100.0 (8)	37.5 (3)	90.0 (9)	90.0 (9)	83.3 (5)

	Very inaccurate						Very accurate
b. Accuracy of Guidance	1	2	3	4	5	6	7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	10.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)
5	10.0 (1)	12.5 (1)	0.0 (0)	20.0 (2)	10.0 (1)	16.7 (1)
6	40.0 (4)	25.0 (2)	75.0 (6)	20.0 (2)	20.0 (2)	16.7 (1)
7	40.0 (4)	62.5 (5)	25.0 (2)	50.0 (5)	70.0 (7)	66.7 (4)

	Strongly disliked						Strongly liked
c. Overall Impression	1	2	3	4	5	6	7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	10.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
5	20.0 (2)	12.5 (1)	0.0 (0)	10.0 (1)	0.0 (0)	0.0 (0)
6	40.0 (4)	25.0 (2)	62.5 (5)	20.0 (2)	30.0 (3)	33.3 (2)
7	30.0 (3)	62.5 (5)	37.5 (3)	70.0 (7)	70.0 (7)	66.7 (4)

A19. Once TetraStar showed you the arrival display, how often did you have difficulty finding your final destination?

	Always had difficulty						Never had difficulty
	1	2	3	4	5	6	7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	10.0 (1)	0.0 (0)	0.0 (0)	11.1 (1)	0.0 (0)	0.0 (0)
4	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
5	10.0 (1)	12.5 (1)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)
6	50.0 (5)	37.5 (3)	12.5 (1)	44.4 (4)	30.0 (3)	16.7 (1)
7	30.0 (3)	50.0 (4)	87.5 (7)	44.4 (4)	60.0 (6)	83.3 (5)

B. The TetraStar System

In this set of questions we would like to know what you think of the TetraStar system overall.

B1. Visual Displays and Concepts

We would like to know your overall assessment of TetraStar' s **visual displays and concepts.** Please rate the listed characteristics of TetraStar by circling the most appropriate number on the scales provided.

	Very Difficult						**Very easy**
a. Easy or Difficult to Read (driving)	1	2	3	4	5	6	7

	Male			**Female**		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	12.5 (1)	10.0 (1)	0.0 (0)	0.0 (0)
3	10.0 (1)	12.5 (1)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)
4	10.0 (1)	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	20.0 (2)
5	20.0 (2)	0.0 (0)	12.5 (1)	10.0 (1)	10.0 (1)	0.0 (0)
6	20.0 (2)	25.0 (2)	25.0 (2)	40.0 (4)	20.0 (2)	40.0 (2)
7	40.0 (4)	62.5 (5)	12.5 (1)	40.0 (4)	70.0 (7)	40.0 (2)

	Very Difficult						Very easy
b. Easy or Difficult to Read (still)	1	2	3	4	5	6	7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
5	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)	0.0 (0)
6	30.0 (3)	12.5 (1)	12.5 (1)	0.0 (0)	0.0 (0)	16.7 (1)
7	70.0 (7)	87.5 (7)	75.0 (6)	90.0 (9)	100.0 (10)	83.3 (5)

	Very Difficult						Very easy
c. Easy or Difficult to Understand	1	2	3	4	5	6	7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
5	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)	20.0 (2)
6	50.0 (5)	0.0 (0)	62.5 (5)	10.0 (1)	20.0 (2)	0.0 (0)
7	50.0 (5)	100.0 (8)	37.5 (3)	80.0 (8)	80.0 (8)	80.0 (4)

Insufficient **Sufficient**

d. Advance warning provided 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	10.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)
5	30.0 (3)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	16.7 (1)
6	40.0 (4)	25.0 (2)	62.5 (5)	40.0 (4)	40.0 (4)	16.7 (1)
7	20.0 (2)	62.5 (5)	37.5 (3)	60.0 (6)	50.0 (5)	66.7 (4)

Very inaccurate **Very accurate**

e. Accuracy of Guidance 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	0.0 (0)	0.0 (0)	12.5 (1)	0.0 (0)	10.0 (1)	0.0 (0)
5	20.0 (2)	0.0 (0)	12.5 (1)	20.0 (2)	20.0 (2)	0.0 (0)
6	60.0 (6)	50.0 (4)	25.0 (2)	60.0 (6)	20.0 (2)	33.3 (2)
7	20.0 (2)	50.0 (4)	50.0 (4)	10.0 (1)	50.0 (5)	66.7 (4)

Always **Never**

f. Helped me find my way 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	50.0 (4)	12.5 (1)	30.0 (3)	20.0 (2)	50.0 (5)
2	40.0 (4)	37.5 (3)	25.0 (2)	30.0 (3)	30.0 (3)	0.0 (0)
3	30.0 (3)	0.0 (0)	0.0 (0)	20.0 (2)	0.0 (0)	0.0 (0)
4	10.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)
5	10.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	16.7 (1)
6	0.0 (0)	0.0 (0)	50.0 (4)	10.0 (1)	30.0 (3)	16.7 (1)
7	10.0 (1)	12.5 (1)	12.5 (1)	10.0 (1)	0.0 (0)	16.7 (1)

Strongly disliked **Strongly liked**

g. Overall Impression 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	16.7 (1)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)	0.0 (0)
5	0.0 (0)	0.0 (0)	25.0 (2)	0.0 (0)	0.0 (0)	0.0 (0)
6	60.0 (6)	37.5 (3)	37.5 (3)	40.0 (4)	40.0 (4)	16.7 (1)
7	40.0 (4)	62.5 (5)	37.5 (3)	60.0 (6)	60.0 (6)	66.7 (4)

B2. In general, were TetraStar' s visual displays distracting:

	Very distracting						**Not at all distracting**
a. At night	1	2	3	4	5	6	7

	Male			**Female**		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	10.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	20.0 (2)	25.0 (2)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
5	0.0 (0)	12.5 (1)	37.5 (3)	0.0 (0)	10.0 (1)	20.0 (2)
6	40.0 (4)	12.5 (1)	12.5 (1)	20.0 (2)	10.0 (1)	0.0 (0)
7	30.0 (3)	50.0 (4)	37.5 (3)	80.0 (8)	80.0 (8)	80.0 (4)

	Very distracting						**Not at all distracting**
b. During Daylight Hours	1	2	3	4	5	6	7

	Male			**Female**		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)
3	10.0 (1)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)	16.7 (1)
4	30.0 (3)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	16.7 (1)
5	10.0 (1)	0.0 (0)	50.0 (5)	0.0 (0)	0.0 (0)	0.0 (0)
6	30.0 (3)	12.5 (1)	37.5 (3)	10.0 (1)	40.0 (4)	0.0 (0)
7	20.0 (2)	75.0 (6)	0.0 (0)	90.0 (9)	60.0 (6)	66.7 (4)

	Very distracting						Not at all distracting
c. In heavy traffic	1	2	3	4	5	6	7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	10.0 (1)	12.5 (1)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)
3	20.0 (2)	0.0 (0)	25.0 (2)	0.0 (0)	0.0 (0)	16.7 (1)
4	10.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)
5	0.0 (0)	0.0 (0)	12.5 (1)	20.0 (2)	10.0 (1)	16.7 (1)
6	20.0 (2)	25.0 (2)	37.5 (3)	0.0 (0)	10.0 (1)	16.7 (1)
7	40.0 (4)	62.5 (5)	12.5 (1)	80.0 (8)	70.0 (7)	50.0 (3)

	Very distracting						Not at all distracting
d. In light traffic	1	2	3	4	5	6	7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	20.0 (2)	0.0 (0)	25.0 (2)	0.0 (0)	0.0 (0)	16.7 (1)
5	20.0 (2)	0.0 (0)	25.0 (2)	0.0 (0)	0.0 (0)	16.7 (1)
6	20.0 (2)	25.0 (2)	12.5 (1)	10.0 (1)	30.0 (3)	16.7 (1)
7	40.0 (4)	62.5 (5)	37.5 (3)	90.0 (9)	70.0 (7)	50.0 (3)

Very distracting **Not at all distracting**

e. When Traveling Along Freeways 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)	16.7 (1)
4	0.0 (0)	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	16.7 (1)
5	30.0 (3)	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)
6	30.0 (3)	0.0 (0)	25.0 (2)	30.0 (3)	30.0 (3)	0.0 (0)
7	40.0 (4)	87.5 (7)	50.0 (4)	70.0 (7)	70.0 (7)	66.7 (4)

Very distracting **Not at all distracting**

f. Traveling Along Other Roads 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	10.0 (1)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	10.0 (1)	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	33.3 (2)
5	20.0 (2)	12.5 (1)	37.5 (3)	10.0 (1)	0.0 (0)	0.0 (0)
6	30.0 (3)	12.5 (1)	12.5 (1)	10.0 (1)	30.0 (3)	0.0 (0)
7	30.0 (3)	62.5 (5)	37.5 (3)	80.0 (8)	70.0 (7)	66.7 (4)

B3. Voice Guidance

For this question, we would like to know your overall assessment of the TetraStar system' s **Voice Guidance** feature. Please circle the most appropriate number on the scale provided.

	Very Difficult						**Very easy**
a. Easy or Difficult to Hear	1	2	3	4	5	6	7

	Male			**Female**		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
5	30.0 (3)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
6	30.0 (3)	0.0 (0)	37.5 (3)	30.0 (3)	30.0 (3)	0.0 (0)
7	40.0 (4)	75.0 (6)	62.5 (5)	70.0 (7)	70.0 (7)	100.0 (6)

	Very Difficult						Very easy
b. Easy or Difficult to Understand	1	2	3	4	5	6	7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	10.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
5	30.0 (3)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
6	20.0 (2)	25.0 (2)	12.5 (1)	20.0 (2)	10.0 (1)	0.0 (0)
7	40.0 (4)	62.5 (5)	87.5 (7)	80.0 (8)	90.0 (9)	100.0 (6)

	Insufficient						Sufficient
c. Amount of information given	1	2	3	4	5	6	7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	10.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
5	30.0 (3)	12.5 (1)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)
6	10.0 (1)	37.5 (3)	50.0 (4)	10.0 (1)	10.0 (1)	0.0 (0)
7	50.0 (5)	50.0 (4)	50.0 (4)	90.0 (9)	80.0 (8)	100.0 (6)

Insufficient **Sufficient**

d. Advance Warning Provided 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	16.7 (1)
4	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
5	60.0 (6)	12.5 (1)	0.0 (0)	0.0 (0)	20.0 (2)	0.0 (0)
6	20.0 (2)	37.5 (3)	25.0 (2)	20.0 (2)	10.0 (1)	0.0 (0)
7	20.0 (2)	50.0 (4)	62.5 (5)	80.0 (8)	70.0 (7)	83.3 (5)

Very distracting **Not at all distracting**

e. Distraction while driving 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	10.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	20.0 (2)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)	0.0 (0)
4	20.0 (2)	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)
5	10.0 (1)	12.5 (1)	12.5 (1)	10.0 (1)	20.0 (2)	0.0 (0)
6	20.0 (2)	25.0 (2)	25.0 (2)	10.0 (1)	10.0 (1)	0.0 (0)
7	20.0 (2)	62.5 (5)	62.5 (5)	70.0 (7)	60.0 (6)	100.0 (5)

	Strongly disliked						Strongly liked
f. Sound of the Voice	1	2	3	4	5	6	7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	10.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	30.0 (3)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)
4	20.0 (2)	12.5 (1)	0.0 (0)	10.0 (1)	10.0 (1)	0.0 (0)
5	20.0 (2)	25.0 (2)	12.5 (1)	20.0 (2)	20.0 (2)	0.0 (0)
6	10.0 (1)	37.5 (3)	62.5 (5)	30.0 (3)	30.0 (3)	16.7 (1)
7	10.0 (1)	12.5 (1)	25.0 (2)	40.0 (4)	30.0 (3)	83.3 (5)

	Strongly disliked						Strongly liked
g. Overall Impression	1	2	3	4	5	6	7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	20.0 (2)	12.5 (1)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)
5	40.0 (4)	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)
6	40.0 (4)	62.5 (5)	37.5 (3)	40.0 (4)	40.0 (4)	0.0 (0)
7	0.0 (0)	25.0 (2)	50.0 (4)	60.0 (6)	50.0 (5)	100.0 (5)

B4. Considering both visual and verbal information, how often did you follow TetraStar' s recommendations to turn?

Never **Always**
1 2 3 4 5 6 7

*(If always, please skip to question **B6**.)*

	Male			**Female**		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	20.0 (2)	0.0 (0)	37.5 (3)	0.0 (0)	20.0 (2)	0.0 (0)
5	70.0 (7)	75.0 (6)	25.0 (2)	20.0 (2)	50.0 (5)	80.0 (4)
6	10.0 (1)	25.0 (2)	25.0 (2)	70.0 (7)	30.0 (3)	20.0 (1)
7	0.0 (0)	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)

B5. TetraStar Recommendations

Considering all of the times that **you did not take the recommended turn,** how often were each of the following items part of your reason not to follow the recommended turn? (Answer by circling the most appropriate number on the scale provided just below each item.)

a. I knew of a faster route:

Never **Always**

1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	20.0 (2)	0.0 (0)	20.0 (2)
3	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)	0.0 (0)
4	20.0 (2)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)	20.0 (2)
5	30.0 (3)	12.5 (1)	50.0 (4)	10.0 (1)	30.0 (3)	20.0 (1)
6	30.0 (3)	37.5 (3)	16.7 (1)	50.0 (5)	20.0 (2)	40.0 (2)
7	20.0 (2)	37.5 (3)	33.3 (2)	10.0 (1)	40.0 (4)	0.0 (0)

b. I believed that the recommended turn would take me away from my destination:

Never **Always**

1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	30.0 (3)	12.5 (1)	0.0 (0)	40.0 (4)	30.0 (3)	40.0 (2)
2	50.0 (5)	25.0 (2)	33.3 (2)	30.0 (3)	10.0 (1)	20.0 (1)
3	10.0 (1)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	10.0 (1)	12.5 (1)	33.3 (2)	10.0 (1)	10.0 (1)	0.0 (0)
5	0.0 (0)	0.0 (0)	16.7 (1)	0.0 (0)	10.0 (1)	0.0 (0)
6	0.0 (0)	12.5 (1)	16.7 (1)	20.0 (2)	20.0 (2)	20.0 (1)
7	0.0 (0)	25.0 (2)	0.0 (0)	0.0 (0)	20.0 (2)	20.0 (1)

c. I needed to make stops along the way to my destination:

Never **Always**

1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	10.0 (1)	25.0 (2)	16.7 (1)	20.0 (2)	20.0 (2)	20.0 (1)
2	20.0 (2)	37.5 (3)	0.0 (0)	30.0 (3)	20.0 (2)	20.0 (1)
3	20.0 (2)	12.5 (1)	16.7 (1)	0.0 (0)	0.0 (0)	0.0 (0)
4	30.0 (3)	12.5 (1)	16.7 (1)	20.0 (2)	20.0 (1)	0.0 (0)
5	10.0 (1)	12.5 (1)	33.3 (2)	10.0 (1)	20.0 (2)	20.0 (1)
6	0.0 (0)	0.0 (0)	16.7 (1)	20.0 (2)	20.0 (2)	40.0 (2)
7	10.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)

d. I believed that the recommended turn would lead me into traffic congestion:

Never **Always**
1 2 3 4 5 6 7

	Male			**Female**		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	10.0 (1)	25.0 (2)	16.7 (1)	30.0 (3)	30.0 (3)	60.0 (3)
2	20.0 (2)	12.5 (1)	33.3 (2)	10.0 (1)	10.0 (1)	20.0 (1)
3	10.0 (1)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)	20.0 (1)
4	0.0 (0)	0.0 (0)	33.3 (2)	0.0 (0)	10.0 (1)	0.0 (0)
5	30.0 (3)	12.5 (1)	16.7 (1)	20.0 (2)	10.0 (1)	0.0 (0)
6	20.0 (2)	37.5 (3)	0.0 (0)	30.0 (3)	20.0 (2)	0.0 (0)
7	10.0 (1)	12.5 (1)	0.0 (0)	0.0 (0)	20.0 (2)	0.0 (0)

e. TetraStar provided the suggested turn too late:

Never **Always**
1 2 3 4 5 6 7

	Male			**Female**		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	20.0 (2)	50.0 (4)	50.0 (3)	90.0 (9)	50.0 (5)	80.0 (4)
2	40.0 (4)	25.0 (2)	50.0 (3)	10.0 (1)	30.0 (3)	20.0 (1)
3	10.0 (1)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	20.0 (2)	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)
5	10.0 (1)	12.5 (1)	0.0 (0)	0.0 (0)	10.0 (0)	0.0 (0)
6	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
7	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)

f. The recommended turn was not clear to me:

Never **Always**
1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	40.0 (4)	75.0 (6)	50.0 (3)	70.0 (7)	70.0 (7)	60.0 (3)
2	50.0 (5)	25.0 (2)	16.7 (1)	10.0 (1)	0.0 (0)	20.0 (1)
3	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	10.0 (1)	20.0 (1)
4	10.0 (1)	0.0 (0)	16.7 (1)	10.0 (1)	10.0 (1)	0.0 (0)
5	0.0 (0)	0.0 (0)	16.7 (1)	0.0 (0)	10.0 (1)	0.0 (0)
6	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
7	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)

g. Not enough room to merge:

Never **Always**
1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	80.0 (8)	62.5 (5)	33.3 (2)	70.0 (7)	40.0 (4)	80.0 (4)
2	10.0 (1)	12.5 (1)	50.0 (3)	20.0 (2)	10.0 (1)	20.0 (1)
3	0.0 (0)	12.5 (1)	0.0 (0)	10.0 (1)	10.0 (1)	0.0 (0)
4	10.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	20.0 (2)	0.0 (0)
5	0.0 (0)	12.5 (1)	16.7 (1)	0.0 (0)	20.0 (2)	0.0 (0)
6	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
7	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)

h. Other (please write in):_____

Never **Always**

1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	50.0 (2)	0.0 (0)	0.0 (0)	0.0 (0)	25.0 (1)	0.0 (0)
2	0.0 (0)	25.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	50.0 (5)
3	25.0 (1)	0.0 (0)	66.7 (2)	0.0 (0)	0.0 (0)	0.0 (0)
4	0.0 (0)	0.0 (0)	0.0 (0)	33.3 (1)	0.0 (0)	0.0 (0)
5	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
6	0.0 (0)	50.0 (2)	0.0 (0)	33.3 (1)	0.0 (0)	50.0 (5)
7	25.0 (1)	25.0 (1)	33.3 (1)	33.3 (1)	75.0 (3)	0.0 (0)

Question B5h. If you did not take the recommended turn, how often were each of the following items part of your reason not to follow the recommended turn? OTHER category responses.

Male
16-29

- errors (system)

30-64

- Able to make recommended turn sooner (it went too far on Woodward ignored a U-turn area south at [unreadable].
- I knew a way with less traffic or shorter
- Overlooks traffic
- Satellite interference (2 occasions) weather?
- Shorter route
- Only time it told me incorrectly was to turn right & then U turn at a location that program must not have known you could turn directly left (University & Squirrel)
- In Michigan U-turns intersection. Tetrastar tells you to turn left at intersections where it is illegal. As soon as you turn [diagram drawn] the system recalculates the route and it is fine

65-80

- Took subdivision route instead of main road but Tetrastar was able to pick up my route & redirected me to my destination

- Testing system to see what would happen

Female
16-29

- Weather conditions
- told me to take a road that did not exist w/in the area
- I could not program exact point and Tetrastar would direct me to the intersection that I programmed. For Oakland University Tetra-star directed me to make a turn around when I could simply go straight into the campus.
- Directions given me made no sense

30-64

- Told me to make U turn when it was impossible
- Unit calculated routes from Farmington Hills when my actual location was Troy so all route information was not possible for me to follow. This has gone on for 4 days now. Does not appear unit is receiving a GPS signal.
- I preferred diff. route

65-80

- GPS inoperative (lost)
- I was driving my familiar, shorter route - so did not need to take the recommended turn.

B6. Which was your preferred way for receiving TetraStar' s route guidance information?

☐ Voice alone ☐ Voice and visual together

☐ Visual alone ☐ No preference

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
Voice Alone	0.0 (0)	0.0 (0)	0.0 (0)	20.0 (2)	0.0 (0)	0.0 (0)
Visual Alone	10.0 (1)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)	0.0 (0)
Voice and visual together	80.0 (8)	100.0 (8)	100.0 (8)	70.0 (7)	100.0 (10)	100.0 (6)
No preference	10.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)

B7. In your opinion, how did the TetraStar system change the following factors of your driving?

a. Travel Time

Reduced 1 2 3 4 5 6 7 **Increased**

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	12.5 (1)	0.0 (0)	10.0 (1)	20.0 (2)	16.7 (1)
2	20.0 (2)	0.0 (0)	0.0 (0)	40.0 (4)	20.0 (2)	16.7 (1)
3	40.0 (4)	12.5 (1)	25.0 (1)	10.0 (1)	0.0 (0)	33.3 (2)
4	40.0 (4)	50.0 (4)	37.5 (3)	40.0 (4)	60.0 (6)	33.3 (2)
5	0.0 (0)	12.5 (1)	25.0 (2)	0.0 (0)	0.0 (0)	0.0 (0)
6	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
7	0.0 (0)	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)

b. Congestion Avoidance

Reduced 1 2 3 4 5 6 7 **Increased**

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	33.3 (2)
2	10.0 (1)	12.5 (1)	28.6 (2)	0.0 (0)	10.0 (1)	0.0 (0)
3	10.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	50.0 (5)	75.0 (6)	42.9 (3)	70.0 (7)	60.0 (6)	50.0 (3)
5	10.0 (1)	12.5 (1)	28.6 (2)	20.0 (2)	0.0 (0)	16.7 (1)
6	10.0 (1)	0.0 (0)	0.0 (0)	10.0 (1)	10.0 (1)	0.0 (0)
7	10.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)

Reduced **Increased**

c. Driving Safety 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	10.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	16.7 (1)
2	20.0 (2)	25.0 (2)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	20.0 (2)	0.0 (0)	14.3 (1)	20.0 (2)	20.0 (2)	0.0 (0)
4	50.0 (5)	50.0 (4)	42.9 (3)	60.0 (6)	40.0 (4)	66.7 (4)
5	0.0 (0)	25.0 (2)	42.9 (3)	20.0 (2)	20.0 (2)	0.0 (0)
6	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	16.7 (1)
7	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)

Reduced **Increased**

d. Fuel Consumption 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	25.0 (2)	0.0 (0)	0.0 (0)	10.0 (1)	16.7 (1)
2	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	10.0 (1)	0.0 (0)
3	30.0 (3)	0.0 (0)	0.0 (0)	10.0 (1)	10.0 (1)	16.7 (1)
4	70.0 (7)	62.5 (5)	57.1 (4)	60.0 (6)	50.0 (5)	66.7 (4)
5	0.0 (0)	12.5 (1)	14.3 (1)	10.0 (1)	10.0 (1)	0.0 (0)
6	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	10.0 (1)	0.0 (0)
7	0.0 (0)	0.0 (0)	28.6 (2)	0.0 (0)	0.0 (0)	0.0 (0)

B8. Now consider everything about the TetraStar System. Please rate the following characteristics of the TetraStar system as a whole.

	Very Difficult						**Very easy**
a. Easy or Difficult to Learn	1	2	3	4	5	6	7

	Male			**Female**		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	16.7 (1)
4	0.0 (0)	0.0 (0)	37.5 (3)	0.0 (0)	0.0 (0)	0.0 (0)
5	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	16.7 (1)
6	40.0 (4)	25.0 (2)	37.5 (3)	10.0 (1)	10.0 (1)	50.0 (3)
7	60.0 (6)	75.0 (6)	25.0 (2)	90.0 (9)	90.0 (9)	16.7 (1)

	Very Difficult						**Very easy**
b. Easy or Difficult to Understand	1	2	3	4	5	6	7

	Male			**Female**		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	16.7 (1)
4	0.0 (0)	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)
5	0.0 (0)	0.0 (0)	25.0 (2)	0.0 (0)	0.0 (0)	16.7 (1)
6	40.0 (4)	12.5 (1)	50.0 (4)	10.0 (1)	10.0 (1)	50.0 (3)
7	60.0 (6)	87.5 (7)	12.5 (1)	90.0 (9)	90.0 (9)	16.7 (1)

Insufficient **Sufficient**

c. Amount of Information Given 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)
3	10.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
5	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)	0.0 (0)
6	40.0 (4)	37.5 (3)	75.0 (6)	10.0 (1)	30.0 (3)	16.7 (1)
7	50.0 (5)	62.5 (5)	12.5 (1)	100.0 (10)	70.0 (7)	83.3 (5)

Insufficient **Sufficient**

d. Advance Warning Provided 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	10.0 (1)	0.0 (0)	12.5 (1)	0.0 (0)	20.0 (2)	16.7 (1)
5	30.0 (3)	12.5 (1)	0.0 (0)	10.0 (1)	10.0 (1)	0.0 (0)
6	40.0 (4)	37.5 (3)	50.0 (4)	20.0 (2)	0.0 (0)	16.7 (1)
7	20.0 (2)	50.0 (4)	37.5 (3)	70.0 (7)	70.0 (7)	66.7 (4)

	Very inaccurate						Very accurate
e. Accuracy of Guidance	1	2	3	4	5	6	7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	16.7 (1)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	10.0 (1)	0.0 (0)	12.5 (1)	10.0 (1)	0.0 (0)	0.0 (0)
5	10.0 (1)	0.0 (0)	12.5 (1)	20.0 (2)	50.0 (5)	0.0 (0)
6	60.0 (6)	50.0 (4)	50.0 (4)	50.0 (5)	10.0 (1)	50.0 (3)
7	20.0 (2)	50.0 (4)	25.0 (2)	10.0 (1)	40.0 (4)	33.3 (2)

	Strongly disagree						Strongly agree
f. Helped Me Find My Way	1	2	3	4	5	6	7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	16.7 (1)
3	10.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	10.0 (1)	12.5 (1)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)
5	10.0 (1)	0.0 (0)	37.5 (3)	0.0 (0)	10.0 (1)	16.7 (1)
6	40.0 (4)	37.5 (3)	12.5 (1)	40.0 (4)	30.0 (3)	33.3 (2)
7	30.0 (3)	50.0 (4)	37.5 (3)	50.0 (5)	60.0 (6)	33.3 (2)

Strongly disagree **Strongly agree**

g. Reduced my Travel Time 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	12.5 (1)	0.0 (0)	10.0 (1)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	16.7 (1)
3	10.0 (1)	0.0 (0)	0.0 (0)	10.0 (1)	10.0 (1)	0.0 (0)
4	40.0 (4)	50.0 (4)	37.5 (3)	10.0 (1)	30.0 (3)	33.3 (2)
5	30.0 (3)	25.0 (2)	37.5 (3)	30.0 (3)	30.0 (3)	16.7 (1)
6	20.0 (2)	0.0 (0)	0.0 (0)	40.0 (4)	20.0 (2)	33.3 (2)
7	0.0 (0)	12.5 (1)	12.5 (1)	10.0 (1)	10.0 (1)	0.0 (0)

Strongly disagree **Strongly agree**

h. Functioned Properly 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	11.1 (1)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	16.7 (1)
3	0.0 (0)	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)
4	20.0 (2)	0.0 (0)	12.5 (1)	0.0 (0)	11.1 (1)	16.7 (1)
5	40.0 (4)	25.0 (2)	37.5 (3)	20.0 (2)	66.7 (6)	33.3 (2)
6	30.0 (3)	25.0 (2)	25.0 (2)	60.0 (6)	11.1 (1)	16.7 (1)
7	10.0 (1)	50.0 (4)	12.5 (1)	10.0 (1)	0.0 (0)	16.7 (1)

	Very distracting						Not at all distracting
i. Distraction while driving	1	2	3	4	5	6	7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	20.0 (2)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)	16.7 (1)
4	0.0 (0)	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	16.7 (1)
5	30.0 (3)	0.0 (0)	50.0 (4)	10.0 (1)	20.0 (2)	0.0 (0)
6	30.0 (3)	37.5 (3)	12.5 (1)	40.0 (4)	20.0 (2)	33.3 (2)
7	20.0 (2)	50.0 (4)	25.0 (2)	50.0 (5)	60.0 (6)	33.3 (2)

	Strongly disliked						Strongly liked
j. Overall Impression	1	2	3	4	5	6	7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	16.7 (1)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)	0.0 (0)
5	0.0 (0)	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)
6	60.0 (6)	25.0 (2)	37.5 (3)	20.0 (2)	50.0 (5)	33.3 (2)
7	40.0 (4)	75.0 (6)	50.0 (4)	70.0 (7)	50.0 (5)	50.0 (3)

C. Use of the TetraStar System

In this section, we would like to know how you used TetraStar as part of your driving and trip-making.

C1. How often did you use TetraStar for the following types of trips? Circle the most appropriate number in the scales provided.

	Never						**Always**
a. Commuting to Work	1	2	3	4	5	6	7

	Male			**Female**		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	57.1 (4)	10.0 (1)	0.0 (0)	50.0 (5)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)	0.0 (0)
4	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
5	20.0 (2)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
6	10.0 (1)	25.0 (2)	14.3 (1)	10.0 (1)	0.0 (0)	0.0 (0)
7	70.0 (7)	75.0 (6)	28.6 (2)	70.0 (7)	100.0 (10)	50.0 (2)

Never **Always**

b. Work-Related Trips (Noncommuting) 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	12.5 (1)	66.7 (4)	40.0 (4)	20.0 (2)	50.0 (2)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	10.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
5	20.0 (2)	0.0 (0)	33.3 (2)	0.0 (0)	0.0 (0)	0.0 (0)
6	10.0 (1)	50.0 (4)	0.0 (0)	40.0 (4)	0.0 (0)	0.0 (0)
7	60.0 (6)	37.5 (3)	0.0 (0)	20.0 (2)	80.0 (8)	50.0 (2)

Never **Always**

c. Recreational Trips 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	10.0 (1)	12.5 (1)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)
2	0.0 (0)	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	12.5 (1)	10.0 (1)	0.0 (0)	0.0 (0)
4	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
5	20.0 (2)	0.0 (0)	12.5 (1)	20.0 (2)	10.0 (1)	0.0 (0)
6	10.0 (1)	25.0 (2)	12.5 (1)	40.0 (4)	20.0 (2)	16.7 (1)
7	60.0 (6)	62.5 (5)	50.0 (4)	30.0 (3)	60.0 (6)	83.3 (5)

	Never						Always
d. Other Personal Trips	1	2	3	4	5	6	7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)	0.0 (0)
4	10.0 (1)	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)
5	40.0 (4)	12.5 (1)	12.5 (1)	10.0 (1)	30.0 (3)	0.0 (0)
6	40.0 (4)	37.5 (3)	37.5 (3)	40.0 (4)	20.0 (2)	33.3 (2)
7	10.0 (1)	50.0 (4)	37.5 (3)	30.0 (3)	50.0 (5)	66.7 (4)

For the next few questions, please compare your driving without a TetraStar system to your driving with the TetraStar system.

C2. Please indicate the extent to which driving with TetraStar changed your *attention* to:

	Much less attention						**Much more attention**
a. Traffic Conditions	1	2	3	4	5	6	7

	Male			**Female**		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	10.0 (1)	12.5 (1)	12.5 (1)	0.0 (0)	0.0 (0)	16.7 (1)
4	60.0 (6)	62.5 (5)	50.0 (4)	60.0 (6)	66.7 (6)	66.7 (4)
5	10.0 (1)	25.0 (2)	25.0 (2)	30.0 (3)	11.1 (1)	0.0 (0)
6	10.0 (1)	0.0 (0)	12.5 (1)	0.0 (0)	22.2 (2)	0.0 (0)
7	10.0 (1)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)	16.7 (1)

Much less attention **Much more attention**

b. Traffic Signals 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)
3	10.0 (1)	0.0 (0)	12.5 (1)	10.0 (1)	0.0 (0)	16.7 (1)
4	80.0 (8)	62.5 (5)	50.0 (4)	90.0 (9)	55.6 (5)	83.3 (5)
5	10.0 (1)	25.0 (2)	25.0 (2)	0.0 (0)	33.3 (3)	0.0 (0)
6	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	11.1 (1)	0.0 (0)
7	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)

Much less attention **Much more attention**

c. Road Signs (such as 55 MPH) 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	25.0 (2)	10.0 (1)	0.0 (0)	16.7 (1)
4	88.9 (8)	75.0 (6)	62.5 (5)	90.0 (9)	60.0 (6)	50.0 (3)
5	11.1 (1)	12.5 (1)	0.0 (0)	0.0 (0)	20.0 (2)	33.3 (2)
6	0.0 (0)	12.5 (1)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)
7	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	20.0 (2)	0.0 (0)

Much less attention **Much more attention**

d. Street Signs (such as Main St) 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	10.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	12.5 (1)	25.0 (2)	20.0 (2)	0.0 (0)	0.0 (0)
4	40.0 (4)	25.0 (2)	37.5 (3)	50.0 (5)	10.0 (1)	60.0 (3)
5	20.0 (2)	25.0 (2)	12.5 (1)	0.0 (0)	10.0 (1)	40.0 (2)
6	10.0 (1)	12.5 (1)	12.5 (1)	20.0 (2)	40.0 (4)	0.0 (0)
7	20.0 (2)	12.5 (1)	12.5 (1)	10.0 (1)	40.0 (4)	0.0 (0)

Much less attention **Much more attention**

e. Street Addresses 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	20.0 (2)	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	16.7 (1)
2	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	10.0 (1)	12.5 (1)	12.5 (1)	10.0 (1)	0.0 (0)	0.0 (0)
4	40.0 (4)	37.5 (3)	37.5 (3)	40.0 (4)	20.0 (2)	50.0 (3)
5	20.0 (2)	12.5 (1)	12.5 (1)	20.0 (2)	10.0 (1)	16.7 (1)
6	0.0 (0)	12.5 (1)	0.0 (0)	20.0 (2)	40.0 (4)	16.7 (1)
7	10.0 (1)	12.5 (1)	25.0 (2)	10.0 (1)	30.0 (3)	0.0 (0)

Much less attention **Much more attention**

f. Speedometer 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)
3	10.0 (1)	12.5 (1)	25.0 (2)	0.0 (0)	22.2 (2)	0.0 (0)
4	90.0 (9)	50.0 (4)	37.5 (3)	100.0 (9)	66.7 (6)	66.7 (4)
5	0.0 (0)	25.0 (2)	25.0 (2)	0.0 (0)	0.0 (0)	16.7 (1)
6	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	16.7 (1)
7	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	11.1 (1)	0.0 (0)

Much less attention **Much more attention**

g. Mirrors 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)
3	10.0 (1)	12.5 (1)	25.0 (2)	0.0 (0)	20.0 (2)	0.0 (0)
4	90.0 (9)	87.5 (7)	50.0 (4)	100.0 (10)	70.0 (7)	66.7 (4)
5	0.0 (0)	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	16.7 (1)
6	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	16.7 (1)
7	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)

Much less attention **Much more attention**

h. Fuel Gauge 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	25.0 (2)	0.0 (0)	0.0 (0)	0.0 (0)
3	10.0 (1)	25.0 (2)	12.5 (1)	10.0 (1)	10.0 (1)	0.0 (0)
4	80.0 (8)	75.0 (6)	50.0 (4)	70.0 (7)	70.0 (7)	83.3 (5)
5	10.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)
6	0.0 (0)	0.0 (0)	12.5 (1)	20.0 (2)	0.0 (0)	16.7 (1)
7	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)

C3. Please indicate the extent to which driving with the TetraStar system, compared to driving without TetraStar, made you feel:

Always less With TetraStar **Much more With TetraStar**

a. Nervous 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	10.0 (1)	25.0 (2)	37.5 (3)	30.0 (3)	20.0 (2)	33.3 (2)
2	0.0 (0)	12.5 (1)	0.0 (0)	20.0 (2)	30.0 (3)	0.0 (0)
3	10.0 (1)	0.0 (0)	0.0 (0)	10.0 (1)	20.0 (2)	33.3 (2)
4	80.0 (8)	50.0 (4)	62.5 (5)	40.0 (4)	20.0 (2)	33.3 (2)
5	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)
6	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
7	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)

Always less With TetraStar **Much more With TetraStar**

b. Confident 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	12.5 (1)	10.0 (1)	10.0 (1)	16.7 (1)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	20.0 (2)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)
4	20.0 (2)	37.5 (3)	12.5 (1)	40.0 (4)	10.0 (1)	16.7 (1)
5	40.0 (4)	0.0 (0)	37.5 (3)	10.0 (1)	10.0 (1)	0.0 (0)
6	10.0 (1)	37.5 (3)	25.0 (2)	10.0 (1)	40.0 (4)	66.7 (4)
7	30.0 (3)	25.0 (2)	12.5 (1)	30.0 (3)	0.0 (0)	0.0 (0)

Always less With TetraStar **Much more With TetraStar**

c. Confused 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	20.0 (2)	0.0 (0)	25.0 (2)	30.0 (3)	20.0 (2)	33.3 (2)
2	0.0 (0)	37.5 (3)	12.5 (1)	20.0 (2)	40.0 (4)	0.0 (0)
3	10.0 (1)	12.5 (1)	25.0 (2)	0.0 (0)	10.0 (1)	50.0 (3)
4	70.0 (7)	50.0 (4)	37.5 (3)	30.0 (3)	20.0 (2)	16.7 (1)
5	0.0 (0)	0.0 (0)	0.0 (0)	20.0 (2)	10.0 (1)	0.0 (0)
6	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
7	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)

Always less with TetraStar **Much more with TetraStar**

d. Attentive 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	10.0 (1)	0.0 (0)	12.5 (1)	0.0 (0)	10.0 (1)	16.7 (1)
2	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)
3	0.0 (0)	12.5 (1)	0.0 (0)	10.0 (1)	10.0 (1)	0.0 (0)
4	60.0 (6)	50.0 (4)	25.0 (2)	90.0 (9)	10.0 (1)	16.7 (1)
5	20.0 (2)	0.0 (0)	37.5 (3)	0.0 (0)	30.0 (3)	0.0 (0)
6	10.0 (1)	25.0 (2)	25.0 (2)	0.0 (0)	10.0 (1)	50.0 (3)
7	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	20.0 (2)	16.7 (1)

Always less With TetraStar **Much more With TetraStar**

e. Safe 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	12.5 (1)	0.0 (0)	10.0 (1)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	10.0 (1)	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	20.0 (1)
4	80.0 (8)	62.5 (5)	50.0 (4)	70.0 (7)	20.0 (2)	40.0 (2)
5	10.0 (1)	0.0 (0)	0.0 (0)	10.0 (1)	20.0 (2)	0.0 (0)
6	0.0 (0)	12.5 (1)	12.5 (1)	20.0 (2)	30.0 (3)	20.0 (1)
7	0.0 (0)	25.0 (2)	12.5 (1)	0.0 (0)	20.0 (2)	20.0 (1)

Always less with TetraStar **Much more with TetraStar**

f. Stressed 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	25.0 (2)	30.0 (3)	40.0 (4)	16.7 (1)
2	0.0 (0)	37.5 (3)	12.5 (1)	20.0 (2)	10.0 (1)	16.7 (1)
3	30.0 (3)	0.0 (0)	12.5 (1)	10.0 (1)	20.0 (2)	33.3 (2)
4	60.0 (6)	37.5 (3)	50.0 (4)	40.0 (4)	20.0 (2)	0.0 (0)
5	0.0 (0)	25.0 (2)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)
6	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	16.7 (1)
7	10.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	16.7 (1)

Always less With TetraStar **Much more With TetraStar**

g. Relaxed 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	10.0 (1)	16.7 (1)
2	0.0 (0)	12.5 (1)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	20.0 (2)	0.0 (0)
4	50.0 (5)	62.5 (5)	37.5 (3)	40.0 (4)	10.0 (1)	33.3 (2)
5	40.0 (4)	0.0 (0)	12.5 (1)	10.0 (1)	20.0 (2)	16.7 (1)
6	0.0 (0)	0.0 (0)	12.5 (1)	50.0 (5)	20.0 (2)	33.3 (2)
7	10.0 (1)	12.5 (1)	25.0 (2)	0.0 (0)	20.0 (2)	0.0 (0)

	Always less With TetraStar						Much more With TetraStar
h. Frustrated	1	2	3	4	5	6	7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	37.5 (3)	25.0 (2)	20.0 (2)	30.0 (3)	33.3 (2)
2	0.0 (0)	0.0 (0)	25.0 (2)	20.0 (2)	20.0 (2)	16.7 (1)
3	40.0 (4)	12.5 (1)	0.0 (0)	0.0 (0)	20.0 (2)	16.7 (1)
4	50.0 (5)	50.0 (4)	37.5 (3)	30.0 (3)	20.0 (2)	0.0 (0)
5	10.0 (1)	0.0 (0)	0.0 (0)	30.0 (3)	0.0 (0)	16.7 (1)
6	0.0 (0)	0.0 (0)	12.5 (1)	0.0 (0)	10.0 (1)	0.0 (0)
7	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	16.7 (1)

C4. Again, compared to driving without TetraStar, please indicate the extent to which you had the following experiences while driving with TetraStar:

a. Crashes

Always less With TetraStar 1 2 3 4 5 6 7 **Much more With TetraStar**

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	20.0 (2)	25.0 (2)	12.5 (1)	10.0 (1)	50.0 (5)	40.0 (2)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)
3	0.0 (0)	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	20.0 (2)
4	70.0 (7)	75.0 (6)	75.0 (6)	90.0 (9)	40.0 (4)	40.0 (2)
5	10.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
6	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
7	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)

b. Missed Stop Signs

Always less With TetraStar 1 2 3 4 5 6 7 **Much more With TetraStar**

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	20.0 (2)	0.0 (0)	12.5 (1)	10.0 (1)	50.0 (5)	40.0 (2)
2	0.0 (0)	12.5 (1)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	12.5 (1)	12.5 (1)	0.0 (0)	0.0 (0)	20.0 (1)
4	80.0 (8)	62.5 (5)	62.5 (5)	80.0 (8)	50.0 (5)	40.0 (2)
5	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
6	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
7	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)	0.0 (0)

Always less With TetraStar **Much more With TetraStar**

c. Ran Red Light 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	20.0 (2)	0.0 (0)	25.0 (2)	10.0 (1)	40.0 (4)	40.0 (2)
2	0.0 (0)	0.0 (0)	12.5 (1)	0.0 (0)	10.0 (1)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	20.0 (1)
4	80.0 (8)	87.5 (7)	62.5 (5)	80.0 (8)	50.0 (5)	40.0 (2)
5	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
6	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
7	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)	0.0 (0)

Always less with TetraStar **Much more with TetraStar**

d. Ran Off Road 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	20.0 (2)	12.5 (1)	25.0 (2)	10.0 (1)	60.0 (6)	40.0 (2)
2	0.0 (0)	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	20.0 (2)
4	70.0 (7)	75.0 (6)	62.5 (5)	70.0 (7)	30.0 (3)	40.0 (2)
5	10.0 (1)	12.5 (1)	0.0 (0)	10.0 (1)	0.0 (0)	0.0 (0)
6	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)
7	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)	0.0 (0)

Always less With TetraStar **Much more With TetraStar**

e. Crossed Lane Marker 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	20.0 (2)	12.5 (1)	25.0 (2)	10.0 (1)	50.0 (5)	40.0 (2)
2	0.0 (0)	0.0 (0)	12.5 (1)	0.0 (0)	10.0 (1)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	20.0 (1)
4	60.0 (6)	75.0 (6)	62.5 (5)	70.0 (7)	40.0 (4)	40.0 (2)
5	20.0 (2)	12.5 (1)	0.0 (0)	10.0 (1)	0.0 (0)	0.0 (0)
6	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
7	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)	0.0 (0)

D. Valuation

In the following questions, we would like to learn how much you, an experienced user, value the TetraStar system.

D1. For assistance in reaching your destinations, how do you rate the following sources of route-guidance information?

	Poor						**Excellent**
a. Standard Road Map	1	2	3	4	5	6	7

	Male			**Female**		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)	0.0 (0)
2	10.0 (1)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)	0.0 (0)
3	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	20.0 (2)	0.0 (0)
4	0.0 (0)	0.0 (0)	12.5 (1)	0.0 (0)	40.0 (4)	0.0 (0)
5	20.0 (2)	37.5 (3)	50.0 (4)	20.0 (2)	10.0 (1)	40.0 (2)
6	40.0 (4)	37.5 (3)	37.5 (3)	40.0 (4)	10.0 (1)	40.0 (2)
7	30.0 (3)	12.5 (1)	0.0 (0)	20.0 (2)	20.0 (2)	20.0 (1)

Poor **Excellent**

b. Verbal Directions from Passenger 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	12.5 (1)	0.0 (0)	10.0 (1)	0.0 (0)
2	0.0 (0)	0.0 (0)	12.5 (1)	20.0 (2)	0.0 (0)	0.0 (0)
3	30.0 (3)	12.5 (1)	37.5 (3)	0.0 (0)	10.0 (1)	0.0 (0)
4	20.0 (2)	12.5 (1)	12.5 (1)	10.0 (1)	20.0 (2)	20.0 (1)
5	40.0 (4)	37.5 (3)	25.0 (2)	30.0 (3)	20.0 (2)	0.0 (0)
6	10.0 (1)	12.5 (1)	0.0 (0)	20.0 (2)	30.0 (3)	60.0 (3)
7	0.0 (0)	25.0 (2)	0.0 (0)	20.0 (2)	10.0 (1)	20.0 (1)

Poor **Excellent**

c. Verbal Directions from Other People 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	14.3 (1)	10.0 (1)	10.0 (1)	0.0 (0)
2	20.0 (2)	12.5 (1)	14.3 (1)	0.0 (0)	0.0 (0)	0.0 (0)
3	30.0 (3)	0.0 (0)	0.0 (0)	10.0 (1)	20.0 (2)	20.0 (1)
4	0.0 (0)	62.5 (5)	28.6 (2)	50.0 (5)	40.0 (4)	20.0 (1)
5	40.0 (4)	25.0 (2)	42.9 (3)	10.0 (1)	0.0 (0)	0.0 (0)
6	10.0 (1)	0.0 (0)	0.0 (0)	10.0 (1)	30.0 (3)	40.0 (2)
7	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)	20.0 (1)

Poor **Excellent**

d. Written Directions 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)
4	20.0 (2)	25.0 (2)	0.0 (0)	10.0 (1)	10.0 (1)	0.0 (0)
5	30.0 (3)	50.0 (4)	37.5 (3)	50.0 (5)	20.0 (2)	20.0 (1)
6	10.0 (1)	25.0 (2)	37.5 (3)	20.0 (2)	60.0 (6)	40.0 (2)
7	40.0 (4)	0.0 (0)	0.0 (0)	10.0 (1)	10.0 (1)	40.0 (2)

Poor **Excellent**

e. TetraStar 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)	0.0 (0)
4	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)
5	0.0 (0)	0.0 (0)	14.3 (1)	0.0 (0)	10.0 (1)	0.0 (0)
6	40.0 (4)	25.0 (2)	28.6 (2)	30.0 (3)	20.0 (2)	16.7 (1)
7	60.0 (6)	75.0 (6)	57.1 (4)	60.0 (6)	60.0 (6)	83.3 (5)

D2. If you were about to drive to an unfamiliar area, which of the following sources of route-guidance information would you like to use?

Definitely would not like **Definitely would like**

a. Standard Road Map 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	20.0 (2)	11.1 (1)	0.0 (0)
2	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	10.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	11.1 (1)	0.0 (0)
4	10.0 (1)	0.0 (0)	37.5 (3)	10.0 (1)	33.3 (3)	0.0 (0)
5	20.0 (2)	25.0 (2)	0.0 (0)	10.0 (1)	0.0 (0)	20.0 (1)
6	40.0 (4)	12.5 (1)	50.0 (4)	30.0 (3)	11.1 (1)	40.0 (2)
7	20.0 (2)	50.0 (4)	12.5 (1)	30.0 (3)	33.3 (3)	40.0 (2)

Definitely would not like **Definitely would like**

b. Verbal Directions from Passenger 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	12.5 (1)	12.5 (1)	20.0 (2)	11.1 (1)	0.0 (0)
3	20.0 (2)	12.5 (1)	12.5 (1)	10.0 (1)	11.1 (1)	0.0 (0)
4	40.0 (4)	25.0 (2)	37.5 (3)	0.0 (0)	11.1 (1)	25.0 (1)
5	10.0 (1)	12.5 (1)	37.5 (3)	20.0 (2)	22.2 (2)	0.0 (0)
6	30.0 (3)	12.5 (1)	0.0 (0)	40.0 (4)	44.4 (4)	50.0 (2)
7	0.0 (0)	25.0 (2)	0.0 (0)	10.0 (1)	0.0 (0)	25.0 (1)

Definitely would not like **Definitely would like**

c. Verbal Directions from Other People 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	12.5 (1)	10.0 (1)	11.1 (1)	0.0 (0)
2	10.0 (1)	0.0 (0)	25.0 (2)	0.0 (0)	0.0 (0)	0.0 (0)
3	20.0 (2)	50.0 (4)	0.0 (0)	30.0 (3)	22.2 (2)	25.0 (1)
4	30.0 (3)	12.5 (1)	50.0 (4)	20.0 (2)	0.0 (0)	25.0 (1)
5	20.0 (2)	25.0 (2)	12.5 (1)	20.0 (2)	11.1 (1)	0.0 (0)
6	20.0 (2)	12.5 (1)	0.0 (0)	20.0 (2)	44.4 (4)	25.0 (1)
7	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	11.1 (1)	25.0 (1)

Definitely would not like **Definitely would like**

d. Written Directions 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	12.5 (1)	0.0 (0)	11.1 (1)	0.0 (0)
2	0.0 (0)	12.5 (1)	0.0 (0)	10.0 (1)	0.0 (0)	0.0 (0)
3	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	25.0 (2)	25.0 (2)	25.0 (2)	0.0 (0)	0.0 (0)	0.0 (0)
5	20.0 (2)	0.0 (0)	25.0 (2)	30.0 (3)	11.1 (1)	0.0 (0)
6	30.0 (3)	37.5 (3)	37.5 (3)	40.0 (4)	33.3 (3)	50.0 (2)
7	30.0 (3)	12.5 (1)	0.0 (0)	20.0 (2)	44.4 (4)	50.0 (2)

	Definitely would not like						Definitely would like
e. TetraStar	1	2	3	4	5	6	7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
5	0.0 (0)	0.0 (0)	12.5 (1)	10.0 (1)	0.0 (0)	0.0 (0)
6	20.0 (2)	0.0 (0)	12.5 (1)	0.0 (0)	10.0 (1)	16.7 (1)
7	80.0 (8)	100.0 (8)	75.0 (6)	90.0 (9)	90.0 (9)	83.3 (5)

D3. For the following items, assume that the TetraStar system was available nationwide. Given this scenario, how useful do you think the TetraStar system would be for:

	Not at all useful						Extremely useful
a. The Commuting Trip?	1	2	3	4	5	6	7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	12.5 (1)	12.5 (1)	20.0 (2)	0.0 (0)	0.0 (0)
2	30.0 (3)	12.5 (1)	0.0 (0)	10.0 (1)	0.0 (0)	33.3 (2)
3	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)
4	10.0 (1)	12.5 (1)	12.5 (1)	20.0 (2)	10.0 (1)	16.7 (1)
5	10.0 (1)	0.0 (0)	12.5 (1)	20.0 (2)	0.0 (0)	16.7 (1)
6	30.0 (3)	0.0 (0)	25.0 (2)	0.0 (0)	0.0 (0)	0.0 (0)
7	20.0 (2)	50.0 (4)	37.5 (3)	30.0 (3)	80.0 (8)	33.3 (2)

Not at all useful **Extremely useful**

b. Out-of-town Vacation Trips? 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
5	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)
6	0.0 (0)	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	33.3 (2)
7	100.0 (10)	87.5 (7)	87.5 (7)	100.0 (10)	90.0 (9)	66.7 (4)

Not at all useful **Extremely useful**

c. Out-of-town Business Trips? 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
5	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)
6	0.0 (0)	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	33.3 (2)
7	100.0 (10)	87.5 (7)	87.5 (7)	100.0 (10)	90.0 (9)	66.7 (4)

	Not at all useful						Extremely useful
d. Local Driving (Nonwork, e.g., for Shopping)?	1	2	3	4	5	6	7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	12.5 (1)	12.5 (1)	11.1 (1)	0.0 (0)	16.7 (1)
2	10.0 (1)	25.0 (2)	0.0 (0)	0.0 (0)	0.0 (0)	16.7 (1)
3	40.0 (4)	0.0 (0)	25.0 (2)	33.3 (3)	30.0 (3)	0.0 (0)
4	10.0 (1)	0.0 (0)	12.5 (1)	0.0 (0)	10.0 (1)	33.3 (2)
5	20.0 (2)	12.5 (1)	12.5 (1)	11.1 (1)	10.0 (1)	16.7 (1)
6	20.0 (2)	12.5 (1)	25.0 (2)	33.3 (3)	10.0 (1)	0.0 (0)
7	0.0 (0)	37.5 (3)	12.5 (1)	11.1 (1)	40.0 (4)	16.7 (1)

D4. How much would you be willing to pay for the TetraStar system as an option on a new car?

$_____

$	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
0	0.0 (0)	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	40.0 (2)
1-49	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
50-199	10.0 (1)	12.5 (1)	12.5 (1)	10.0 (1)	11.1 (1)	0.0 (0)
200-299	10.0 (1)	12.5 (1)	0.0 (0)	10.0 (1)	11.1 (1)	20.0 (1)
300-399	0.0 (0)	0.0 (0)	12.5 (1)	10.0 (1)	44.4 (4)	0.0 (0)
400-499	20.0 (2)	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)
500-599	10.0 (1)	37.5 (3)	37.5 (3)	40.0 (4)	11.1 (1)	0.0 (0)
600-699	0.0 (0)	12.5 (1)	0.0 (0)	10.0 (1)	11.1 (1)	0.0 (0)
700-799	10.0 (1)	12.5 (1)	12.5 (1)	0.0 (0)	0.0 (0)	20.0 (1)
800-899	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)	0.0 (0)
900-999	10.0 (1)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
1000 or more	30.0 (3)	0.0 (0)	0.0 (0)	10.0 (1)	11.1 (1)	20.0 (1)

D5. How much would you be willing to pay to add the TetraStar system to your present car?

$_____

$	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
0	20.0 (2)	12.5 (1)	33.3 (3)	0.0 (0)	0.0 (0)	33.3 (2)
1-49	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
50-199	20.0 (2)	12.5 (1)	0.0 (0)	22.2 (2)	12.5 (1)	0.0 (0)
200-299	30.0 (3)	12.5 (1)	16.7 (1)	11.1 (1)	12.5 (1)	16.7 (1)
300-399	0.0 (0)	0.0 (0)	16.7 (1)	33.3 (3)	62.5 (5)	0.0 (0)
400-499	0.0 (0)	0.0 (0)	16.7 (1)	0.0 (0)	0.0 (0)	0.0 (0)
500-599	0.0 (0)	37.5 (3)	16.7 (1)	0.0 (0)	12.5 (1)	33.3 (2)
600-699	0.0 (0)	12.5 (1)	0.0 (0)	11.1 (1)	0.0 (0)	0.0 (0)
700-799	10.0 (1)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)	16.7 (1)
800-899	0.0 (0)	0.0 (0)	0.0 (0)	11.1 (1)	0.0 (0)	0.0 (0)
900-999	0.0 (0)	0.0 (0)	0.0 (0)	11.1 (1)	0.0 (0)	0.0 (0)
1000 or more	20.0 (2)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)

D6. How much extra per day would you be willing to pay for the TetraStar system as an option on a rental car?

$_____

$	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
0	11.1 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	50.0 (3)
>0-5	22.2 (2)	75.0 (6)	87.5 (7)	44.4 (4)	66.7 (4)	33.3 (2)
6-10	44.4 (4)	25.0 (2)	12.5 (1)	22.2 (2)	16.7 (1)	16.7 (1)
11-20	11.1 (1)	0.0 (0)	0.0 (0)	33.3 (3)	16.7 (1)	0.0 (0)
21-50	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
51-100	11.1 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
101 or more	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)

D7. In your opinion, how important are each of the following factors to the operation of systems such as TetraStar?

Not at all important **Extremely important**

a. Fuel Savings 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	40.0 (4)	25.0 (2)	25.0 (2)	10.0 (1)	20.0 (2)	16.7 (1)
2	40.0 (4)	50.0 (4)	50.0 (4)	10.0 (1)	10.0 (1)	33.3 (2)
3	10.0 (1)	0.0 (0)	0.0 (0)	10.0 (1)	10.0 (1)	0.0 (0)
4	10.0 (1)	0.0 (0)	0.0 (0)	20.0 (2)	20.0 (2)	16.7 (1)
5	0.0 (0)	25.0 (2)	0.0 (0)	10.0 (1)	0.0 (0)	0.0 (0)
6	0.0 (0)	0.0 (0)	12.5 (1)	30.0 (3)	0.0 (0)	0.0 (0)
7	0.0 (0)	0.0 (0)	12.5 (1)	10.0 (1)	40.0 (4)	33.3 (2)

Not at all important **Extremely important**

b. Reduced Air Pollution 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	30.0 (3)	12.5 (1)	50.0 (4)	20.0 (2)	30.0 (3)	16.7 (1)
2	40.0 (4)	37.5 (3)	37.5 (3)	10.0 (1)	0.0 (0)	16.7 (1)
3	20.0 (2)	12.5 (1)	0.0 (0)	10.0 (1)	10.0 (1)	16.7 (1)
4	10.0 (1)	0.0 (0)	0.0 (0)	10.0 (1)	20.0 (2)	16.7 (1)
5	0.0 (0)	37.5 (3)	0.0 (0)	30.0 (3)	0.0 (0)	0.0 (0)
6	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)	0.0 (0)
7	0.0 (0)	0.0 (0)	12.5 (1)	10.0 (1)	40.0 (4)	33.3 (2)

Not at all important **Extremely important**

c. Traffic Safety 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	12.5 (1)	12.5 (1)	10.0 (1)	0.0 (0)	16.7 (1)
2	20.0 (2)	25.0 (2)	25.0 (2)	0.0 (0)	0.0 (0)	0.0 (0)
3	10.0 (1)	0.0 (0)	12.5 (1)	20.0 (2)	0.0 (0)	0.0 (0)
4	20.0 (2)	12.5 (1)	0.0 (0)	10.0 (1)	10.0 (1)	33.3 (2)
5	20.0 (2)	50.0 (4)	0.0 (0)	10.0 (1)	20.0 (2)	0.0 (0)
6	20.0 (2)	0.0 (0)	25.0 (2)	20.0 (2)	30.0 (3)	16.7 (1)
7	10.0 (1)	0.0 (0)	25.0 (2)	30.0 (3)	40.0 (4)	33.3 (2)

Not at all important **Extremely important**

d. Relief of Highway Congestion 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	10.0 (1)	12.5 (1)	12.5 (1)	0.0 (0)	0.0 (0)	16.7 (1)
2	0.0 (0)	37.5 (3)	12.5 (1)	10.0 (1)	0.0 (0)	0.0 (0)
3	0.0 (0)	12.5 (1)	37.5 (3)	10.0 (1)	10.0 (1)	0.0 (0)
4	20.0 (2)	0.0 (0)	0.0 (0)	10.0 (1)	10.0 (1)	33.3 (2)
5	10.0 (1)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)	0.0 (0)
6	30.0 (3)	25.0 (2)	25.0 (2)	20.0 (2)	10.0 (1)	16.7 (1)
7	30.0 (3)	12.5 (1)	12.5 (1)	40.0 (4)	70.0 (7)	33.3 (2)

Not at all important **Extremely important**

e. Accurate Route Guidance 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
5	0.0 (0)	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)
6	30.0 (3)	12.5 (1)	37.5 (3)	0.0 (0)	0.0 (0)	16.7 (1)
7	70.0 (7)	87.5 (7)	50.0 (4)	100.0 (10)	100.0 (10)	83.3 (5)

Not at all important **Extremely important**

f. Traffic Diverted into Neighborhoods 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	25.0 (2)	0.0 (0)	0.0 (0)	20.0 (2)	16.7 (1)
2	30.0 (3)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)	0.0 (0)
3	10.0 (1)	0.0 (0)	25.0 (2)	10.0 (1)	0.0 (0)	0.0 (0)
4	10.0 (1)	12.5 (1)	37.5 (3)	20.0 (2)	10.0 (1)	33.3 (2)
5	20.0 (2)	12.5 (1)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)
6	20.0 (2)	25.0 (2)	0.0 (0)	10.0 (1)	10.0 (1)	16.7 (1)
7	10.0 (1)	25.0 (2)	25.0 (2)	30.0 (3)	60.0 (6)	33.3 (2)

Not at all important **Extremely important**

g. Ease of Use 1 2 3 4 5 6 7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
2	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
4	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
5	10.0 (1)	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)
6	30.0 (3)	12.5 (1)	62.5 (5)	20.0 (2)	10.0 (1)	0.0 (0)
7	60.0 (6)	87.5 (7)	25.0 (2)	80.0 (8)	90.0 (9)	100.0 (6)

	Not at all important						Extremely important
h. Quick Updates of Road Conditions	1	2	3	4	5	6	7

	Male			Female		
	19 – 29	30 – 64	64 – 80	19 – 29	30 – 64	64 – 80
1	0.0 (0)	25.0 (2)	0.0 (0)	10.0 (1)	0.0 (0)	16.7 (1)
2	10.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3	10.0 (1)	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)
4	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
5	10.0 (1)	0.0 (0)	12.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)
6	10.0 (1)	0.0 (0)	25.0 (2)	30.0 (3)	10.0 (1)	33.3 (2)
7	60.0 (6)	62.5 (5)	50.0 (4)	60.0 (6)	100.0 (10)	50.0 (3)

D8. We are interested in knowing how you would like to see TetraStar improved. **In** the space provided, please tell us two changes that you would like to see made in the system,

Male
16-29

- Use traffic data such as transmitted data from other cars/video
- Extra info in points of interest police, post office, etc.
- Have the voice tell you the name of the road you turn onto
-
- Link it up with a traffic monitoring system & provide the reasons behind varying road conditions.
- Voice More warning of maneuvers
- Find a better way to lock in satellites. On a few occasions I had them either disappear or not register properly which led to inaccurate plotting.
- Quicken the “re-route” section. If you miss a turn, the system takes too long to re-calculate.
- Knowledge of traffic, if possible (and construction)
- More comprehensive selection of businesses and points of interest
- Integrate with system such as Ali-Scout - best of both worlds
- Windshield visual - integrate display into windshield

- Road maps on system seem to be about 6-8 months old (new roads/exits exist to ongoing construction) (Updated info. is desired)
- Accuracy - when &where you can make a left turn (I was directed several times to make a left when no left turns are allowed.)
- When you are driving you are a [icon drawn] on the map screen. I don't like the fact that you can move it up, down, left, right. It can really get you off the mark. I don't think you should be able to move it.

30-64

- Heads up display @ steering wheel controls
- Voice control - auto mute radio
- Dash mounted vs. Transmission hand mounted
- A remote for driver to use
- I would like to combine it with traffic conditions updates by using the installed beacons in towns.
- Suggest turns ahead of time, advising to take left or right lane. I enjoyed the way Tetrastar recovers after changing the recommended route.
- No improvements needed - excellent as is. This is a very highly sophisticated system.
- Expanded memory for guidance history - need more than the 10 presently available.
- The system was good, as is. But at times it gave the wrong direction. When it was cold outside, the system came on but you could not see anything, when you tried to punch in the destination the system would not function.
- Ability to coordinate traffic conditions with route guidance
- Accept voice commands.
- Voice telling how far to destination (at beginning of trip & maybe 1/2 way)
- Improve GPS pickup of location of car - if passenger programs while moving, it sometimes loses location of vehicle.
- Shortest distance route. Use zip codes to find an area.
- List states in alphabetical order. List roads in alphabetical order under appropriate state.
- Provide adjustable screen magnifier over screen to compensate for need to use reading glasses to view display.

65-80

- Street & addresses seem to take too much time.
- Select routes by voice
- Easier instruction book - for people who are computer illiterate
- Built into dash at better eye level.
- Actual driving distance & direction should be larger hard to read in day light

- Mounted up more in line of sight with road. May have trouble with a glare.
- More locations - more memory. When using option NORTH should stay north
- Screen should be larger, clearer
- [Screen should be] positioned to a closer, more convenient location.
- It would be convenient if the unit (or part of it) could be taken into the house for programming.
- Some instructions were inaccurate. System should be checked.
- Relocate the screen so it may be viewed without taking your eyes off the road.
- Enlarge the screen a little for a larger picture.

Female
16-29

- Alert to traffic conditions or potential hazards. A cellular phone with beacon in case of emergencies to notify location to emergency crews.
- Better signal to & from car & satellite (this probably would've minimized my problems w/the system)
- It likes to add miles to trips that can be shortened by taking a back way, less miles = less time.
- Update the road map (ex: Novi Road and Decker Rd.)
- Maybe make a shorter scroll list.
- More accuracy in calculating the shortest route and the most use of freeway system.
- A flip-down keyboard so that one could simply type in a street address & press enter.
- Provide additional notice before having to make turns and have the voice state that a turn is coming & how far up the road.
- It needs to be put in a better place for vision.
- Need to be able to adjust loudness to be a bit higher for those who play the radio.
- Many destinations under "Points of Interest" were missed - update to have a more thorough selection.
- The display apparatus is cumbersome when trying to use the radio, or cup holders etc. - try to make the use of these things more comfortable?

30-64

- If the route is busy the verbal info needs to come a little sooner because more time is needed to maneuver.
- The system malfunctioned - several times - I believe because of messy weather conditions so signals were harder to get. Improve the accessibility to signals if possible.
- Better guidance update when you leave the recommended route.
- Better satellite communication in bad weather.

- Some cases directions were not the most direct.
- To let you know of a problem on roadway so you could divert to another route.
- Increase satellite coverage for further distance.
- More than 10 memory entries.
- If I were to purchase, I would need to know how to reset unit if screen “freezes” or does not appear to receive signal to avoid costly trips for repair or adjustment.
- All unit HEAD to be turned toward driver (left, right, up, down). Would be helpful when sun hits screen as it is very difficult to read screen when sun shines on screen.
- Let you know where there is any traffic congestion.
- Taking you through subdivisions instead of around them.
- Accessibility to more cities that are farther away, ex. Battle Creek?

65-80

- Cellular phone or other reporting device for emergency assistance.
- A means of taking traffic conditions & construction into account.
- Easier reading of bottom line.
- Memory would store full information without having to punch in almost all information to reach guidance.
- On the computer, it would be nice to see the gas mileage or how much gas was used per trip.
- It would be nice if the computer voice was a female voice.
- I would think it must be located in another position if it is a permanent guide! Also very difficult to read when the sun was shining.
- Easier programming.

E. Comparison of TetraStar and ALI-SCOUT In-Vehicle Route Guidance Systems

As a participant in the FAST-TRAC project you have had the unique opportunity to use two distinct navigation assistance systems--TetraStar and ALI-SCOUT. In the next set of questions we are interested in your opinions about how your driving with ALI-SCOUT in the Oakland County Study Area (i.e., the beacon network) compares with all the driving you did with TetraStar.

E1. We are interested in knowing which system gave you the more positive impression or whether you had no preference. For each characteristic please indicate the preferred system or no preference by placing an X in the box provided.

	TetraStar Better	**ALI-SCOUT Better**	**No Preference**
Overall Appearance of System	❑	❑	❑
Ease of Learning the System	❑	❑	❑
Quality of Visual Displays	❑	❑	❑
Quality of Verbal Messages	❑	❑	❑
Ease of Selecting/Entering Destinations	❑	❑	❑
Ease of Finding the Start of Route	❑	❑	❑
Accuracy of Guidance	❑	❑	❑
Prevents Getting Lost	❑	❑	❑
Ease of Finding Destinations	❑	❑	❑
Avoids Traffic Congestion	❑	❑	❑
Reduces Travel Time	❑	❑	❑
Clarity of Guidance Instructions	❑	❑	❑
Size of Guidance Area	❑	❑	❑

	Male									Female								
	19-29			30-64			65-80			19-29			30-64			65-80		
	TS	AS	NP	TS	AS	NP	TS	AS	NP	TS	AS	NP	TS	AS	NP	TS	AS	NP
Overall Appearance of System	90.0 (9)	10.0 (1)	0.0 (0)	87.5 (7)	0.0 (0)	12.5 (1)	100.0 (8)	0.0 (0)	0.0 (0)	100.0 (10)	0.0 (0)	0.0 (0)	80.0 (8)	0.0 (0)	20.0 (2)	80.0 (4)	0.0 (0)	20.0 (1)
Ease of Learning the System	90.0 (9)	0.0 (0)	10.0 (1)	75.0 (6)	0.0 (0)	25.0 (2)	100.0 (8)	0.0 (0)	0.0 (0)	90.0 (9)	10.0 (1)	0.0 (0)	100.0 (10)	0.0 (0)	0.0 (0)	83.3 (5)	0.0 (0)	16.7 (1)
Quality of Visual Displays	100.0 (10)	0.0 (0)	0.0 (0)	87.5 (7)	0.0 (0)	12.5 (1)	87.5 (7)	0.0 (0)	12.5 (1)	100.0 (10)	0.0 (0)	0.0 (0)	100.0 (10)	0.0 (0)	0.0 (0)	83.3 (5)	0.0 (0)	16.7 (1)
Quality of Verbal Messages	60.0 (6)	10.0 (1)	30.0 (3)	37.5 (3)	12.5 (1)	50.0 (4)	87.5 (7)	0.0 (0)	12.5 (1)	60.0 (6)	10.0 (1)	30.0 (3)	80.0 (8)	0.0 (0)	20.0 (2)	83.3 (5)	0.0 (0)	16.7 (1)
Ease of Selecting/Entering Destinations	100.0 (10)	0.0 (0)	0.0 (0)	100.0 (8)	0.0 (0)	0.0 (0)	87.5 (7)	12.5 (1)	0.0 (0)	90.0 (9)	10.0 (1)	0.0 (0)	90.0 (9)	0.0 (0)	10.0 (1)	83.3 (5)	0.0 (0)	16.7 (1)
Ease of Finding the Start of Route	70.0 (7)	10.0 (1)	20.0 (2)	100.0 (8)	0.0 (0)	0.0 (0)	100.0 (8)	0.0 (0)	0.0 (0)	80.0 (8)	0.0 (0)	20.0 (2)	100.0 (10)	0.0 (0)	0.0 (0)	83.3 (5)	0.0 (0)	16.7 (1)
Accuracy of Guidance	90.0 (9)	0.0 (0)	10.0 (1)	87.5 (7)	0.0 (0)	12.5 (1)	100.0 (8)	0.0 (0)	0.0 (0)	70.0 (7)	10.0 (1)	20.0 (2)	80.0 (8)	0.0 (0)	20.0 (2)	100.0 (6)	0.0 (0)	0.0 (0)
Prevents Getting Lost	80.0 (8)	0.0 (0)	20.0 (2)	75.0 (6)	0.0 (0)	25.0 (2)	100.0 (8)	0.0 (0)	0.0 (0)	50.0 (5)	10.0 (1)	40.0 (4)	80.0 (8)	0.0 (0)	20.0 (2)	66.7 (4)	0.0 (0)	33.3 (2)
Ease of Finding Destinations	80.0 (8)	10.0 (1)	10.0 (1)	100.0 (8)	0.0 (0)	0.0 (0)	100.0 (8)	0.0 (0)	0.0 (0)	90.0 (9)	10.0 (1)	0.0 (0)	100.0 (10)	0.0 (0)	0.0 (0)	83.3 (5)	0.0 (0)	16.7 (1)
Avoids Traffic Congestion	20.0 (2)	20.0 (2)	60.0 (6)	12.5 (1)	12.5 (1)	75.0 (6)	0.0 (0)	37.5 (3)	62.5 (5)	20.0 (2)	10.0 (1)	70.0 (7)	25.0 (2)	62.5 (5)	12.5 (1)	16.7 (1)	16.7 (1)	66.7 (4)
Reduces Travel Time	50.0 (5)	0.0 (0)	50.0 (5)	37.5 (3)	0.0 (0)	62.5 (5)	12.5 (1)	12.5 (1)	75.0 (6)	80.0 (8)	10.0 (1)	10.0 (1)	40.0 (4)	10.0 (1)	50.0 (5)	16.7 (1)	16.7 (1)	66.7 (4)
Clarity of Guidance Instructions	100.0 (10)	0.0 (0)	0.0 (0)	62.5 (5)	0.0 (0)	37.5 (3)	87.5 (7)	0.0 (0)	12.5 (1)	90.0 (9)	0.0 (0)	10.0 (1)	90.0 (9)	0.0 (0)	10.0 (1)	100.0 (6)	0.0 (0)	0.0 (0)
Size of Guidance Area	100.0 (10)	0.0 (0)	0.0 (0)	87.5 (7)	0.0 (0)	12.5 (1)	100.0 (8)	0.0 (0)	0.0 (0)	100.0 (10)	0.0 (0)	0.0 (0)	100.0 (10)	0.0 (0)	0.0 (0)	100.0 (6)	0.0 (0)	0.0 (0)

E2. We are interested in knowing which system you thought performed better or whether you had no preference. For each route characteristic listed please indicate the preferred system or no preference by placing an X in the box provided.

	TetraStar Better	ALI-SCOUT Better	No Preference
Recommended the Fastest Routes	❑	❑	❑
Recommended the Shortest Distance Routes	❑	❑	❑
Recommended Routes with the Least Traffic	❑	❑	❑
Recommended the Most Scenic Routes	❑	❑	❑
Recommended Routes with the Least Turns	❑	❑	❑

	Male									Female								
	19-29			30-64			65-80			19-29			30-64			65-80		
	TS	AS	NP	TS	AS	NP	TS	AS	NP	TS	AS	NP	TS	AS	NP	TS	AS	NP
Recommended Fastest Routes	60.0 (6)	20.0 (2)	20.0 (2)	50.0 (4)	0.0 (0)	50.0 (4)	71.4 (5)	14.3 (1)	14.3 (1)	60.0 (6)	20.0 (2)	20.0 (2)	90.0 (9)	10.0 (1)	0.0 (0)	83.3 (5)	0.0 (0)	16.7 (1)
Recommended Shortest Distance Routes	77.8 (7)	0.0 (0)	22.2 (2)	62.5 (5)	0.0 (0)	37.5 (3)	75.0 (6)	12.5 (1)	12.5 (1)	80.0 (8)	0.0 (0)	20.0 (2)	90.0 (9)	10.0 (1)	0.0 (0)	66.7 (4)	0.0 (0)	33.3 (2)
Recommended Routes with the Least Traffic	0.0 (0)	33.3 (3)	66.7 (6)	25.0 (2)	12.5 (1)	62.5 (5)	25.0 (2)	12.5 (1)	62.5 (5)	30.0 (3)	10.0 (1)	60.0 (6)	12.5 (1)	50.0 (4)	37.5 (3)	16.7 (1)	16.7 (1)	66.7 (4)
Recommended the Most Scenic Routes	0.0 (0)	0.0 (0)	100.0 (9)	25.0 (2)	0.0 (0)	75.0 (6)	28.6 (2)	0.0 (0)	71.4 (5)	20.0 (2)	0.0 (0)	80.0 (8)	37.5 (3)	12.5 (1)	50.0 (4)	33.3 (2)	0.0 (0)	66.7 (4)
Recommended Routes with the Least Turns	11.1 (1)	11.1 (1)	77.8 (7)	25.0 (2)	0.0 (0)	75.0 (6)	14.3 (1)	28.6 (2)	57.1 (4)	30.0 (3)	20.0 (2)	50.0 (5)	55.6 (5)	11.1 (1)	33.3 (3)	33.3 (2)	0.0 (0)	66.7 (4)

E3. We are interested in knowing which system you would prefer to own, lease, or rent for each of the following scenarios or whether you had no preference. For each of the items assume that the cost for the systems are equal. Please indicate the preferred system or no preference by placing an X in the box provided.

	TetraStar Better	ALI-SCOUT Better	No Preference
Putting in Your Own Car	❑	❑	❑
Getting as an Option on a Rental Car	❑	❑	❑
Getting as an Option on a New Car	❑	❑	❑

	Male									Female								
	19-29			30-64			65-80			19-29			30-64			65-80		
	TS	AS	NP	TS	AS	NP	TS	AS	NP	TS	AS	NP	TS	AS	NP	TS	AS	NP
Putting in Your Own Car	90.0 (9)	0.0 (0)	10.0 (1)	100.0 (8)	0.0 (0)	0.0 (0)	100.0 (8)	0.0 (0)	0.0 (0)	100.0 (10)	0.0 (0)	0.0 (0)	90.0 (9)	0.0 (0)	10.0 (1)	83.3 (5)	0.0 (0)	16.7 (1)
Getting as an Option on a Rental Car	100.0 (10)	0.0 (0)	0.0 (0)	100.0 (8)	0.0 (0)	0.0 (0)	100.0 (8)	0.0 (0)	0.0 (0)	100.0 (10)	0.0 (0)	0.0 (0)	90.0 (9)	0.0 (0)	10.0 (1)	83.3 (5)	0.0 (0)	16.7 (1)
Getting as an Option on a New Car	100.0 (10)	0.0 (0)	0.0 (0)	100.0 (8)	0.0 (0)	0.0 (0)	100.0 (8)	0.0 (0)	0.0 (0)	100.0 (10)	0.0 (0)	0.0 (0)	100.0 (10)	0.0 (0)	0.0 (0)	83.3 (5)	0.0 (0)	16.7 (1)

E4. Considering everything about the two systems you tested, please indicate the system you preferred overall or whether you had no preference.

TetraStar ❑ **ALI-SCOUT** ❑ **No Preference** ❑

	Male			Female		
	19-29	**30-64**	**65-80**	**19-29**	**30-64**	**65-80**
TetraStar	100.0 (10)	100.0 (8)	100.0 (8)	90.0 (9)	100.0 (10)	100.0 (6)
ALI-SCOUT	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
No Preference	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)	0.0 (0)

Question E5. Why was the system selected in the last question preferred or why did you have no preference?

Male
16-29

- [Tetrastar] GPS more available than beacons. GPS more accurate. GPS had better entry of destination.
- Because of its [Tetrastar] visual recommendations. It was like having a road map at your fingers. You didn' t have to select a new destination in order to view different areas.
- [Tetrastar] Overall ease to read. (Larger screen definite benefit. Large text easier to read while driving. Easy to select options (nice large buttons and not too many!).
- For locating unfamiliar destinations, this system is light years ahead of Ali-Scout. The technology and mapping was impressive. Some errors and system lockups were disappointing, but the system accuracy was superb in general.
- I thought the Tetrastar system was better than the Ali-Scout system in that it used the GPS satellites instead of the sensors. This made the area of use much larger and I also liked the fact that the Tetrastar system used its own internal database for guidance. If no satellite communication - Tetrastar could still find its way better than Ali-Scout
- Tetrastar was accurate - it may not always give you the fastest or least congested route, but it gave you accurate directions to your destination. Ali-scout did not do this.
- I liked the screen much better on Tetra-Star and not having all the numbers & letters to type things in was much better.
- 30-64
- Overall - easier to use - learn
- Tetrastar was much more user friendly and not a chore to use like Ali-Scout

- There was no comparison, the Ali-Scout is junk. I wouldn't put one in my car if you gave it to me. It's not accurate, hard to use & destinations move.
- Easier to program, self-correcting. Display is user friendly. Accuracy is much better than AliScout.
- Database is good and area of coverage could be National.
- Tetrastar with no question was extremely more accurate and easier to use. This was an extremely enjoyable experience in using the Tetrastar system.
- I liked the system
- Tetrastar system is much more accurate with better visual displays and covers wider area. It is easier to use as well.
- Tetrastar much easier to program your trip plus you didn't need to pass beacons to establish where you are - GPS knows - easier to use
- Because it gets you to the target, not to the target area
- I consider Tetrastar to be more technologically advanced, better designed, easier to learn and use system. My preference disregards possible differences in costs and maintenance requirements.
- 65-80
- Tetrastar performed better & is a far more improved system. It was much more accurate. Always trusted Tetrastar.
- The TetraStar system is much improved and easier to use.
- [TetraStar] Ease of use. Takes you right to the destination in any area.
- TetraStar much more accurate at destination
- Would like to see option of finding locations by LAT-LON added to Tetrastar for the ability to get locations not in memory - best of two worlds
- Easier to program & understand. Tetrastar more accurate (although it had same problem). It would adapt itself to try to get me back on track, or would set a new route, depending where I was traveling.
- Tetrastar was far easier to use than Ali Scout. The fact that destinations could be pulled up from memory saved time in programming the destination.
- Female
- 16-29
- Preferred the display. Especially the map.
- Ali-Scout only worked well in designated areas w/beacons & TetraStar signal gets weak in areas. W/ a stronger signal, Tetrastar would be my choice.
- It was easier to use - It looked better not as much programming the info was already there, the display map was nice.
- Looked better, worked on GPS. Easier to program.

- I think the TetraStar is much more accurate. I felt more comfortable with the TetraStar and it was more fun to use.

- I preferred Tetrastar because there was no programming on my part involved as there was in Ali-Scout. Directions are very accurate and the road map is helpful because it shows your exact location in the area with all of the major roads and intersections. The one flaw I find inTetrastar was that the system sometimes directed me to take a certain route, that I knew was longer. For example when I chose my home as the destination from school in Rochester (Oakland University), I programmed in the most use of freeways and instead of directing me towards M-59 it directed me away from it. Also, there was a road by my house that I take to work (Garfield). While coming down 21-mile road, headed west, I turn left onto Garfield. One day I programmed the intersection of my place of employment, which is M-59 and Garfield. Instead of the system telling me to turn left onto Garfield it directed me toward Hayes, which is about 1.5 miles out of my way. Garfield comes before Hayes, therefore the system should have instructed me to turn left, but didn't.

- Tetrastar was faster and easier. Who has the time or patience to look up longitude and latitude? Also, beacons were not as accurate as satellite.

- I like the wide range of use for the Tetrastar. Finding beacons for using the Ali-Scout system was often difficult.

- TetraStar was great and almost without flaw. It was amazing how well it knew all side street names and could direct you out of every situation. It was just fun to have.

- TetraStar was so much easier to use & learn. the destinations & the info that it did have amazed me.
- TetraStar was more accurate & a great user friendly device.

- 30-64

- TetraStar is much easier to use. Much more accurate. The satellite gave it a bigger area to cover where Ali-Scout would have to use many more beacons.

- I chose TetraStar because it was easy to find destinations, easier to understand, learn, and follow.

- It was great the way it got me where I was going. Most of the time I knew where I was going, but the few times I did not, it got me there.

- TetraStar was more accurate - Ali-Scout depended on beacons and sometimes went long distances without a beacon - also did not always give best routes.

- Easier to use & learn

- The TetraStar system is a lot better than Ali-Scout. It is very user friendly.

- TetraStar was very clear & easy to understand. I liked the advance information that was shown on the screen, so I know my next turn! Thank you so much for giving me this opportunity, even though it was cut short. I would definitely volunteer again! Thank you!

- TetraStar was easier to program, it got you right to your destination rather than in the vicinity. The screen was larger and easier to read.

- Easier to learn to use & easy to use. Not as time consuming to program. Less distracting. No annoying "reminder" when you leave recommended route. Just recalculates new route. Map is great - can see exactly where you are.

- Much easier to use, larger screen & menu.

65-80

- The Global positioning is more accurate and covers a wider geographic area. It is easier to program Tetrastar.
- Tetrastar does not need a map or chart to locate destination.
- Information it gave and its accuracy.
- I really thought the Tetra Star was a very good guide. It turned out to be fun to operate!
- This is much easier to program, easier to understand.
- Would not care to have either system. Takes too long to program. Not needed in familiar area. May be useful for trips out of town.

Miscellaneous Comments Written at End of Survey

Female
30-64

- Really enjoyed using Tetrastar especially in areas I was not familiar with.

65-80

- This unit appears to have problems with the GPS such that it cannot determine the starting point of a trip. The GPS is often red or amber more than green, even when the weather is clear and there are no overhead obstructions. Perhaps this may explain the problems encountered.

APPENDIX G:
DRIVER LOG COMMENTS

TETRASTAR DRIVER LOG COMMENTS

Male
19-29

- I found out that when you are driving, that you (the pink arrow) can be moved by pushing the keypad [diagram drawn]. If you are moving north on John R, you can push [right arrow] and the arrow will be totally off the orad on the map. I did this by accident, but I think that was strange.
- Met some cute girls.
- Trip 1 - Driving on Crooks N.B. keeps telling me to make U turn & take l-75, even when not needed.
- It is giving me directions, which are too long. Using the fastest route makes you go thru expressways (l-75) even these are more traffic lights to go thru.
- Does not recognize that Livernois is a bld. Cannot make left turns anymore.
- The system started showing that the vehicle was traveling about 300 feet east of the road. The system went crazy, it was reset but nothing. System has wrong location.
- System seems to be working ok today.
- Sometimes the GPS wording - the display goes from green to yellow to red.
- GPS Moves from green to yellow to red. Specially under trees.
- GPS red all the time. System really lost. Vehicle replaced [by UMTRI].
- Several trips were made. Some of them were too short. Some of them w/out Tetrastar Rochester, Rochester Hills area.
- Orion Township is not in database.
- The GPS was mostly red or yellow all day on and off
- Fantastic!
- Sometimes, with multi-component turns, the audio prompt will say something like, “Legal U-turn, followed by…” and not finish the sentence. The level of detail is great.
- Trip 2 - An error was encountered near end of destination. It was indicating a merge onto l-69. “GPS” was yellow at some point.
- Trip 3 - I left the route because of traffic conditions, and the system didn’t re-establish well and gave me nonsensical directions.
- Trip 2 - Doesn’t handle it well if I deviate from the “highlighted route” at first. Sometimes the highlighted route is hard to read.
- Trip 1 - Didn’t know exactly where I was starting from. Did a good job of recovering when I messed up this time.
- Trip 3 - System froze and didn’t work

- Trip 4 - System wanted to route me down Holmes Rd . ? I chose Schoenherr Rd., it recovered and did well.
- The level of detail is good.
- Trip 3 - I'm not sure why it routed me down Hayes Rd.
- Trip 1 - Immediately told me to make a U-turn, even though I hadn't begun trip.
- It gave me poor (inaccurate) directions at first and then recovered.
- Trip 4 - Didn't help me find I-75 entrance ramp very well.
- Trip 5 - excellent guidance.
- Trip 4 - Highlighted I-75 but didn't tell me how to get to ramp. I used the Crooks ramp, but then it told me to exit at 14 mile, which was out of the way. At one point, I got a "merge onto 69" text message.
- Trip 1 - At start of the trip, the system told me to merge onto 16 mi after I had been on 16 mi for 1-5 miles. "GPS" was green.
- Trip 2 - Always wants me to go to I-75 from work, even though it doesn't show me ramp. It suggested going S to 14 mi and then Mound to 18 mi again?!
- Trip 5 - When you're at a corner, the system usually routes you on both roads of the intersection instead of considering there may be an entrance on the road you'll stay on longer.
- Trip 5 - System thought I could turn left onto 14 mile from Woodward. It took me across town on 15 mi, which is not the fastest route.
- Trip 2 - I used street intersections when I entered E. Long Lake first, it didn't list Rochester Rd as a cross street! Trip 3 - [diagram drawn] If you are at "X", they system usually wants you to go to the N/S road and then left on the E/W road, instead of just left on E/W road.
- Trip 4 - At Livernois, University Dr. is called Walton Blvd., not vice versa.
- Trip 5 - [diagram drawn] System wanted to send me down Rochester Rd. (Difficult left turn, slightly out of the way, heavier traffic). Also, the system thought I could turn left onto Livernois (main) from Univ. Drive, even though it requires a boulevard U-turn.
- Trips 6 & 7 - Good recoveries when route was left.
- A system like this is indispensable time saver for house hunting. It could be extremely useful for sales agents, service people, police, fire, etc. It was extremely accurate for house hunting.
- Trip 4 - System totally froze and was useless until Trip 5.
- Trip 5 - Took some detours - system didn't use 696 for some reason.
- Trip 2 - I chose a different route than the one suggested, and the system was out of sync. Most of the way home.
- Trip 2 - False U-turn request on Coolidge near 14 mi.
- Trip 3 - System inaccurate near end of trip - signaled Cubberness St. .1 mi early.

- Trip 1 - System wanted me to go S on Rochester Rd., but I needed to go N to get from 16 mi to 18 mi.
- I didn't care for the system voice.
- Left vehicle at work overnite
- Could not find post offices under points of interest. Would be nice addition to menu.
- Selected shortest time route - was probably shortest geographic distance - poor choice for rush hour .
- Return home not same as outgoing route - return used very little expressway - was still pretty fast.
- Selected shortest time route both ways.
- Selected point of interest, shopping, Kroger - but did not have our Kroger store - the closest store on the menu. Store has been there a minimum of 5 years. Menu had several other local stores as well as other Krogers
- GPS signal not available, "GPS" red color in display - not accurate location - quit using. GPS signal intermittent. Did not use to navigate, just monitor. Unit off by approx. 20 miles at times.
- GPS still not working properly - poor signal. GPS working properly again good yellow or green signal.
- At about midpoint of trip said cancel then I entered same destination again and I got a different route. I did this because I doubted initial route as being fastest. Tetrastar should have an automatic recalculate routine.
- Had restaurant in points of interest menu.
- Burger King was in points of interest menu. I like this feature - even though I already knew where it was.
- Airport was on the points of interest menu.
- Used intersection mode
- GPS system weak "red" system got lost.
- GPS signal weak - at about 1/2 way signal got better and was correct.
- Route seemed poor choice so we went our own way and very quickly system agreed with new route.
- Not on point of interest - did not know intersection.
- GPS signal weak "red" did not use. Later trip used intersection.
- GPS lost at first "red" found location about 1/2 way to work
- Male/Female voice option?
- Trip 1 - I couldn't locate "Moose" - tried to send re South on Woodward
- Trip 3 - No roads programmed for N Oakland County
- Map was off - effected by cold? Do not line up w/mapped roads. As this docs with cities (it remembers last entry) It should do it w/streets & addresses.

- Shouldn't voice tell you what road you are eon instead of looking @ display?
- I think the unit should actually "tell" you what street you are eon as well as impending turns (How many feet till you turn on -- street) - This helps eliminate people having to look down @ the screen. (or, it will reduce the amount of time looking @ the display).
- I was trying to program several destinations so I could bring them up when needed. St. Clair Shores was "not available": Future trips to St. Clair Shores will not incorporate Tetrastar.
- For some reason (probably one satellite was found) Tetrastar could not identify where I was accurately & directed me through East Detroit. I turned the system off & then reset ti and everything worked fine.
- When using the system from home to Howell, (trip 3) it instructed me to take 75 to l-69! Way out of the way. The true direct route was M-59 west to Michigan Ave in Howell.
- It seems to get lost @ intersection of l-75 & Rochester Rd ext ramp. It tells me I am on a side street but corrects itself after a mile or so.
- Had an idea where was going; I just typed in my friend's new address & Tetrastar got me there!
- As I pulled in to my driveway, there was a nasty burning odor present. I shut the car off immediately, opened the hood, and there was smoke coming from the belt area. Called [UMTRI] [date] and left a message. Would be happy to drop car off @ [car dealer] by my house if requested. Awaiting call back.
- Dealer indicated problem could not be diagnosed. Left receipt in glove box. Car seems fine.
- My friend has a new home & I didn't bother with his directions, rather I programmed his address and let Tetrastar guide me. It worked well, especially on only 1 satellite beacon.
- It did freeze up however when I was driving home. It could not calculate a route & stuck on the "calculating route" screen.
- GPS sign stayed red most for day. Only went green once. Yellow for a while.
- GPS light was green for most of day. I guess it fixed itself.
- System got very lost on way home. About half way home it figured out where it was.
- System ran like I think it should've.
- Home - changed to Rochester. Watched a house for a friend.
- Sometimes location of car would be inaccurate. Map froze & nothing could be inputted. It was fixed by turning car off for a length of time.

30-64

- Tetrastar, made an error, it told me to make a right turn which was correct, but than it told me to make a U-turn which was not correct [diagram drawn].
- Going to work Tetrastar told me to make a right turn Vandyke to Big Beaver Road which was correct but than it told me to make a next U-turn which was incorrect. Otherwise it worked good.

- Upon trying to input the destination, the computer froze up. It came back on after I stopped for gas and started the car up.
- For the first time the computer told me to make a left turn, with no left turn allowed. It should have been a right turn .
- After programming the address for home the Tetrastar told me to turn right vice left, and then to make a U-turn. It corrected itself after about 10th of a mile.
- Much improved since previous test drives - other system no good. This works great 8 is easier to use.
- The system is excellent - has worked super for all trips & is easy to use - it would be excellent for anyone doing a lot of local travel & not familiar with area.
- Only 1 morning did I have any trouble - GPS had trouble with my location - recalculated 3 times before it had me correct
- Its recovery time if you vary from directions is very fast & accurate.
- Incorrect directions - eastbound onto northbound Squirrel - can turn left - no need for right turn, then U-turn onto Squirrel - only problem so far.
- Good directions.
- This unit still working great, as long as you program next location while standing still. If passenger programs while moving - it seems GPS doesn't pick up existing location for a while. Also, if city does not show preprogrammed streets, there is no way to enter street & address, but then I suppose this unit could not direct you unless it could identify new street name if entered.
- The last day or two, voice seems to be loosing its battery or (?) - says half sentences
- Voice not working sometimes
- Voice not working at all today
- Voice - PROBLEM
- Trip 5 - Voice did not work. Trip 6 - Voice back.
- Trip 1 - Unit locked up. Did not get out of showing address. Turned it off & on, still didn't work.
- Worked fine now.
- Trip 1 - Unit not working correctly. Once underway it works.
- Trip 1 - Satellite problems. GPS in red. Shut unit off. Trip 2 - Still many problems.
- Trip 1 - Sent me to closed Davison freeway.
- Impressive, accurate almost to the foot! Shortest route (item 4) is not necessarily the fastest!
- Unit is very easy to operate, I like the feature for programming cross roads.
- On the down side, it is not easy to determine what city you are in. To use this feature, also must know where streets become east or west.

- Destinations stored in memory are used most frequently. It is interesting to not the route pattern that computer assigns. In many instances, it is different than that which I would normally take. I also like the correction feature where computer will reprogram itself to get you back in correct route.

- Trip 5 (turning home from work): Tetrastar was programmed for most use of freeways as I normally do for both going and returning from work. En route to work I ignore recommended route (Southfield freeway) and travel l-75. Tetrastar will normally recalculate 3 + times before accepting l-75 route which is approx. 1.5 miles farther but much faster.

- On return trip home I decided to follow Tetrastar recommendation and use Southfield. At US10 intersection of Southfield, Tetrastar directed me to go W on 10 which was in opposite direction from where I liked. I did not do this. I believe the intent was to direct me to next closest freeway (in this case l-696) and then take l-696 east. Although this would have fully utilized the freeway system it would have been approx 10 miles longer and much slower. (Even so, I'm still impressed with this system!!)

- Trip 2 - On return home from work, Tetrastar, recalculated route several times even though I was on original course. It did this several times and appeared disoriented. Weather was heavy snow and very overcast. Does weather effect Tetrastar sensitivity?

- Very impressed with accuracy and amount of detail provided on frequency instructions, especially to metropolitan airports. Tetrastar essentially took us right to the gate and avoided a lot of confusion we normally have in such trips. Fantastic!!

- Trip 6 - On return trip home Tetrastar again became disoriented, weather was rain/snow. (Apparently this answers my question). Disorientation was such that computer could not align vehicle with any road. Vehicle as shown on road map appeared to be showing we were driving off of roads in vicinity. (le - cutting thru backyards - not on any road).

- Trip 5 - While washing vehicle I noted right hand rear tail lamp lens was cracked at bottom of lens. This vehicle had previous scuff mark on rear bumper near the tail lamp area. I did not notice this crack in lens when vehicle was picked up or use in study although scuff mark was noted. If this crack in lens has not been previously reported it is possible that perhaps someone may have hit vehicle in same area while it was parked and failed to notify me of incident. I have no other knowledge of this incident and do not know how it otherwise could have occurred, Please call me if you would like to discuss further. Note: Lens is not broken out, only cracked.

- I tried to make expway on trip 3 the machine locked up. Even if I turned it off and back on it stayed in the calculate a route mode.

- All seems o.k.

- Coming from lunch - system wants me to make U turn - thinks my work is on the west side of Stephenson Hwy.

- System gave wrong direction going to Bloomfield Hills furniture store. System - instruction me to go to Lahser Rd. then I stopped at a store on Long Lake Rd. and the system corrected itself.

- Was not able to program Hampton movies Rochester/ Hamlin Rd.

- System worked great on the trip to Ann Arbor. Right on the money.

- I like this unit. It is user friendly!!

- When I entered the Birmingham address when leaving work in Warren the system was leading me to a jammed up expressway entrance to l-75 north in Troy? I just did not get on and let the system re-adjust which it did automatically.

- I did not agree with turning on Rochester Rd. S. when there was 15 cars in the right turn lane so I proceeded east on Big Beaver and the system recalculated itself and had me turn South of Ryan Rd. instead. Last trip to Somerset Mall North disagreed with route home and had to turn off unit as it did not redirect or turn off at home.

- Trip 9 - Trip to Detroit Opera Theater & home was absolutely wonderful using Tetrastar instead of a map or verbal directions or written instructions - I was totally confident.

- Thank you for the use of this vehicle. I would gladly be available to test any other system or vehicle.

- Unusual selection for routes to enter freeways (trip #1 & #3).

- Gives good notice when turns or exits are coming up.

- Took route designated by guidestar (trip 4). Initially thought was on unusual but turned out to be better than I normally take.

- Trip 4 - used “most highway use” - when turning left on top Evergreen, it seemed to lose the location of the car, recalculated route and stated ‘proceed to the designated route’ which I never left at any time.

- Trip 3 - Went through entire route before I ever got there! Drove approx. 1 mile. Stated I reached destination I canceled program & reset & it functioned normally

- When starting trip 3 & 4 - seemed to have difficulty identifying where vehicle was located. After couple of tried it corrected itself.

- Trip 4 - System “froze up” during this trip. Would not power down after car turned off. Manually powered down system - No buttons affected screen. System began working again when powered up - However, the indicated starting point trip 5 was incorrect

- Trips 2,3 - System non-functional

- Trip 1 - No satellite signal

- It said to turn left when I couldn’t, missed a U-turn on Woodward @ Eaton. (it wanted me to go north past [unreadable] to complete U-turn). Came up with some interesting alternate routes!

- I didn’t like the recommended route. It took me south to 696 to 75 N. to 12 mile. Woodward is a better route. North on Woodward - west past Catalpa for the boulevard “u” turn - there is one south of Catalpa that is better.

- System shut down & rebooted trip 5.

- Trip 1 - recommends Coolidge north instead of Woodward? Not really a faster route - speed limit is 25 on Coolidge, 45 on Woodward.

- Trip 2 - recommended south on Woodward to 8 mile then north on side street - could have been more direct if the side street suggestion was different [diagram drawn].

- It would be nice to be able to scroll the map to identify streets - I wasn’t sure of an intersection & had to guess.

- Trip 1 - Had to reset system. The map was still off 45 [degrees] to direction of travel - signal may have been blocked by houses.

- I get different directions to work depending on which way the vehicle is facing on the side street. One suggests taking Coolidge via side streets - not Catalpa - the other suggests Woodward. Tetrastar seems to ignore Catalpa as a viable faster route than other side streets with more stop signs and turns

- Trip 5 - Dropped off tickets in Royal Oak - instructions suggested while Eastbound on 696 to pass cross street, loop back to cross over 696 (northbound) I could have just turned left [diagram drawn].

- Trip 2 - Only to west side of Ann Arbor. Trip 3 not on maps.

- Trip 1 - Tried Tetrastar - it gave directions but no map view by telling it I was heading to home – Meijer is on the way. Trip 2 - Couldn't program return. Trip 3, this time a map booted up!

- Trip 3 - Joe Dumars is in Shelby Twp - but the map location (intersections) is in Utica

- Trip 1 - indicated -take a U-turn on N. bound Coolidge before 14 mile - it should have said turn right on 14 & left on Coolidge as it has in the past. It corrected itself before I got to 14 mile

- Trip 3 - shut off by itself, trip 4 - had directions to home ok then recalculated (when I turned around in parking lot) & the map was skewed 15 [degrees].

- Trip 8 - Gave better route home - different than before (I-75 north from 696). It suggested 696 to Woodward.

- Trip 4 - Started Tetrastar @ Crooks & 14 - normally it suggests to 13 mile (to Coolidge) but here it said to turn on 14 mile.

- The system works accurately

- Error report - mt_[unreadable]_pol_city Line 500. dm_spell_sel_fway Line 028. No street found.

- The system stopped responding to any street, apparently the database for streets is empty.

- The system is not working. No data available.

65-80

- Trip 3 - I deviated from planned route because I did not have electronic gate card to enter gatehouse area. Guidestar re-calculated route and prompted me to turn on streets which were shortest distance to my home but they did not provide access into the gatehouse area.

- Trip 1 - System working perfectly

- Trip 1 - Somewhat circuitous route, but ok. Good directions. Trip 2 - More circuitous route. 1

- Directed me to pass my street as I drove north on Woodward.

- I followed directions and reached my destination.

- Trip 1 - Set up program "shortest time route". Then, "Least Use of Freeways." Both were accurate. 1:43 PM - turned north on Northwestern, system indicated I had left the route. GPS turned red; it turned green again began working.

- Trip 2 - On 14 mile east, the system seemed to think I was on Northwestern approaching 12 mile. It indicated a right turn on Franklin & a left on 12 Mile. I started the program again and it corrected itself/ Trip 3 - System is perfect.

- Trip 4 - system fine until 12 mile and Southbound Woodward; system wanted me to make a U-turn at the turnaround on Woodward, go north on Woodward to 12 mile, to Sunset Blvd. It is more direct to take Woodward South to Sunset Blvd, which I did. It should be noted the recommended route would have worked, too. The program directs me to 12 mile & Sunset, whenever I return home.
- Trip 1 - worked fine. Trip 2 - worked fine, except turn off southbound Woodward, as usual.
- Worked fine. Map on screen hard to read. Arrow directions are fine.
- All short trips.
- Trip 1 - The system selected a very circuitous route. I followed it & it got me to Woodward, where the bank is located. It was accurate then.
- Trip 2 - The system seems to have odd & even numbers reversed on either side of my home street. It directs me to make a legal U-turn, wanting me on the west side of the street. I live on the east side of the street.
- Trips 4,5 system wanted me to exit l-75 at exit 77 - I stayed on l-75 & the system adapted, giving me a new route.
- Trip 1 - Instructions misleading and incorrect.
- Trip 2 - Instructions not the best route. System adjusted itself to my route.
- Trip 1 - very effective, after a slightly confusing start.
- The picture became extremely difficult to read. Then, I discovered the “screen brightness control.” Picture much better now.
- Trip 5 - Directions given were too involved and aroundabout. Did not use system
- Trips 1 & 3 - Route recommended is correct, but not as direct to the area I want.
- Trip 6 - Return trip was very roundabout. I may not have indicated “most use of freeways”, but it was still confused. Trip 9 - local travel.
- Computer says make legal U-turn at intersections with regular turns. Kind of confuses you at first.
- Suggest monitor should be up higher so as to keep a line of vision close to straight ahead
- Need more highways 8 main roads (Troy) Rochester Livernois Crooks Adams Miles roads etc Just more stuff or the ability to enter same
- Could not find location in computer where I went 10 mi/Harper - St Clair Shores would be helpful to locate any location by lat/long
- Computer (GPS) worked great in Marshall (Schuler’s) and back. When you can find it in program –it worked well
- Computer could be located away from radio & ashtray & cu holders but if higher for greater line of sight it would present a glare problem –it was exactly accurate on trip to Marshall & Carson City
- Pretty accurate
- Am learning to use GPS much better and faster

- Could not find Sterling Heights - 16 mi/Dequindre or Meijers/Aco shopping center on GPS so didn't use it
- I wish the option heading north would stay unless changed - it always goes back to heading up. Nice car! GPS is surprisingly accurate to ones used on boats !!
- So far so good
- This system is much more improved than the previous one. It looks like a keeper
- Called Fast Trac office to correct problem [UMTRI]
- After filling windshield washer hood would not close took K. car to Ford dealer 10 mi Haggerty fixed latch no charge
- Sometimes have trouble with voice. It will not work. Then for no apparent reason it comes back on.
- Trips 1-2 - Going I took X ways, returning street rds. Diff. of 2 miles with X way But faster
- Trip 5 - Unable to program Novi route. Trip 6 - tried to program restaurant - got completely lost Guid system failed me
- Trip 3 - Guidance system - failed - designated route out of airport unknown - could not follow. Guidance system froze on unknown route.
- Trip 3 - Not the shortest route by far
- Trip 1 - Tetrastar came on then froze in follow designated route mode would go no further. After shopping it came back on.
- Trip 4 - not the shortest route.
- Trip 1 - Engaged guidestar in driveway- went to first turn when system stayed a first start. System would not work after 2 miles so I shut system down for 10 min. Turned it back on again & the screen was blank. Shut system down. Trip 2 - system back on.
- Trips 1 & 2 - I could not locate data necessary to record trip on Tetrastar. Did not have time to determine reason for above problem.
- Trip 2 - GPS could not determine location of vehicle at start of trip 1. I moved vehicle and restarted engine to correct problem.
- Trip 1 - Database address orientation for E. Grand River in Brighton is incorrect.
- When starting for home from trip #3 I turned on the unit and went thru the sequences until I got to the type of route (shortest time) and the unit would not get out of this mode. When I turned the car off the unit remained on. I used the power button to shut off so as not to run down the battery.
- Shut system off on third trip, route was taking me too far out of my way to achieve my destination. Later found that by using Less Freeways it would have worked better
- Confined to bed by doctor.

- Unit showed designated route when programmed but did not provide any further sequence all the way home. When the car was shut off the map remained lit and had to use the button to shut off the unit.

- Unit came up with previously requested route when I entered the destination for trip # 1, would not operate until we re entered the address.

- No problems whatsoever - very accurate

- Very accurate - programming much easier.

- Very accurate info

- Trip 1 & 2 - The destination address was very complicated. We inserted the correct address in the computer & arrived at the destination without any problems. Without the "Fast Trac", it would have been very difficult to follow the manual instructions. I recommend the "Fast- Trac" project for any individual in all vehicles. I will endorse the project for any person or company at any time. It is great.

- Very accurate

- It was a real experience having this program. The computer was very accurate & educated. You can call me again to handle any further research you desire. Sincerely, [signature].

- Trip 1 - faulty directions

- Consistently bad from home to work down Maple to Telegraph wants to turn left to Long Lake Rd.

- **Female**
- **19-29**

- The only problem I have so far is that Tetrastar doesn't give the best direction to Oakland University. When I could simply keep straight and enter OU, it tells me to do a turn around. Also, it never reaches destination at OU. This may be due to the fact that OU is a large destination and Tetrastar has only one point that I never reach.

- On trip 4, Tetrastar did not give me enough notice to make my right turn onto Wattles Road in Troy.

- I was able to make my turn because there was not traffic. However, had there been traffic, it could have been dangerous to get into the turning lane so quickly.

- On trip 2, I went off the guided route but Guidestar did not correct its guidance. However, this may have been because I took the highway instead of the guided road, which was parallel to the highway.

- Trip 2 - didn't acknowledge destination reached

- Trip 2 recognized approaching destination, but not arrival. Trip 3, did same as trip 2.

- Trip 7 - Gave alternative route, then changed intersection by less than 1/4 mil. Route 'looked faster' yesterday [date]. There were no traffic delays yesterday. This "new" route usually has traffic delays, today didn't. Today, time wise was a few minutes faster.

- Trip 2 - Does not acknowledge arrival at destination.

- Trip 4 - Alerted approaching destination 4-5 miles early. (Snowing) Trip 5 - Didn't follow route due to traffic with snow.

- Trip 5 - Did not have town, cross streets, etc. to destination (near Rochester and Romeo).
- Trip 5 - Gave different directions when entering cross-streets in opposite order.
- Trip 1 - left directions in until passed school on way to trip #2. Acknowledged reaching destination just south of location. Trip 2 - left directions in until passed brothers work on way to #3 acknowledged reaching destination just west of location.
- Trip 2 - exited I-75 south, veered left, turned right, made legal U-turn. Audible directions were to slow to follow directions, if I had not known intersection. Decided on way home to stop at video store.
- Trip 1 - Snow mixed with ice out. Daughter home sick from school. Began to use Tetrastar as usual .25 miles screen froze, directions ceased. Tried turning on/off to reset. Still would not reset. Turned off Tetrastar.
- Trip 2 - after leaving off red button, turned back on. Recalculated in wrong location (home) to home. Gave incorrect directions for 1/2 mile. Recalculated with correct directions. Audible & map showed I turned incorrectly. Recalculated gave correct directions from Square Lake and John R.
- Trip 6 - Does not have town, cross street, etc. on mapping system, yet still in Oakland County. Last cross street is Gunn and Rochester Rd in Oakland Twp. Oakland Twp. or Leonard are not listed.
- Trip 6 - Exit 275 (going North) on to 696 East - audible and visual - confusing. Exit on to North 275. North from 14 audible says wrong lane.
- Trip 4 - Gave directions on to Square Lake from Telegraph, twice. (Even though I was on Square Lake the second time.) County Courthouse/clerk's office was NOT listed as a point of interest. Other courthouses in Oakland County (districts) were. This would be helpful.
- Trip 1 - The system wanted me to go Keith, Willow, & Hiller. Back to Commerce. Instead of staying on Commerce. [diagram drawn].
- Trip 2 - The Tetrastar didn't register me on Orchard Lake Rd.
- Trip 1 - Tetrastar froze right after I left the house. I unplugged it and started it over.
- Trip 2 - Tetrastar didn't know directions around Decker and Novi Rd.
- Trip 1 - the Tetrastar had trouble with the roads around decker Rd and Novi Rd.
- Would like if the system SAID which way to turn, when you're supposed to turn.
- System got discombobulated for a few minutes.
- Trip 5 - System couldn't find Oakhill & Harley Rds of Clarkston!!
- System has difficulty finding my house from time to time
- On [date] the system would screw up on our way to Livonia. Instead of taking Telegraph straight thru it would of off on side streets. Sorry I didn't note it earlier! [diagram drawn].
- Trip 4 - System wanted me to take off on side streets instead of straight shot.
- This did not seem to be the most direct route vs. other ways I've taken in the past. this has happened before, but I thought I was wrong - now that it has happened again, I wonder.

- Tetrastar on the way home from Henry Ford Hosp. kept telling me to turn off Livernois on to side streets, then when I did would immediately tell me to turn back to Livernois. Did this about 6x. I finally stayed on Livernois until 9 mile got lost so to get home it was 5 more miles.

- I was coming home from Oakland University traveling south bound on Adams Road. I programmed the computer using the “Most Use of Fwys” option and it told me to turn left onto Avon Road when it should have directed me towards M-59 East.

- Used Tetrastar. I think it thinks I’m in Troy because before I knew it, it was directing me t Big beaver. Luckily I wasn’t really following it. Just seeing where it wanted me to go.

- It still thinks I’m in Troy!

- Still had problems. None of the roads mapped on the system were anywhere near where I was. Showed me traveling on no road when I was actually on Rochester. Didn’t recognize any of the road names on the system

- Trip 7 - It was way off on the shortest time route was about 1.5 miles more than actual all roads were same speed

- Way off added about 3 miles to the trip I used my route

- I used my own route

- Instead of telling me to make a left Tetrastar tells me to go straight then take the nearest streets & backtrack? There was a left turn light Trip 7 I forget that I can use intersections & don’t use the Tetrastar & is an intersection

- Trip 2 - It told me to take M-59 home which add about 2 miles to the ride so I said no highways so it told me to take Auburn Rd which added another mile to the ride my usual rout is Avon or Hamlin those roads are about the same as Auburn except closer?

- Vandyke us not the name of streets is it M-53? Found it !!

- Other [restaurant] are in the computer, but the [restaurnat] I work @ is not (trip 3)

- Trip 2 - On my way home the device got confused - thought I was on 15 mile & Mound when really I was on 12 mile. I turned it off & back on again and it was fine.

- Trip 4 - I thought a movie theater would be under entertainment I tried to find a category but couldn’t. But I'll look again.

- Trip 3 - When on a road the map showed me not driving on it but a little to the left. Kept recalculating route until it slowly corrected itself.

30-64

- Unit did not work from the time I entered the vehicle on Thursday morning screen read System Suspended

- Clinton Twp: Couldn’t get Clinton Twp. on the system. When we arrived at our destination the twnsp appeared on the screen. How do you program cities that are not on the system?

- Trip 1 - info on Tetrastar system cannot be seen when sun is shining on screen GPS letters on screen were red whenever I could make out what was on screen.

- Trip 2 - GPS letters on screen remained red entire trip - directions given by Tetrastar were incorrect. Trip 3 - GPS letters red most of my way home - directions incorrect. When nearly home (in my subdivision) letters turned yellow for a few seconds, directions by Tetrastar became almost correct. GPS letters turned green for a few seconds & directions correct. There are no tall buildings near my home to obstruct signal.

- Trip 1 - GPS signal remained red - gave correct directions. Trip 2 - GPS signal green most of the time. About half way thru trip, signal changed between all colors a few times. Directions accurate.

- Trip 4 - Signal remained red whole trip.

- For both trips, GPS system was mostly in red or yellow. Letters would be in green for very short periods of time, (a few seconds to 3-4 minutes), off and on during the trip. Also - the screen, when showing route, told me to remain on "77" when I was actually on I-75. All other route directions were correct. Showed incorrect freeway number (77 instead of 75) both directions.

- Trips 4 & 5 - GPS letters red only. Trip 5 - Route screen did not tell me to make a necessary left turn onto Madison from Kings Point in my subdivision. This is necessary info for someone trying to find destination on this trip.

- Trip 1 - GPS letters red entire trip. Directions correct. Trip 2 - GPS letters red - system calculated a route and advised me to proceed to route. However, the screen appeared frozen in that advice. I could not cancel or do anything else. The command keys do not respond. Turning system off, then on again, made no difference. When I checked later in day, appeared to be operating – I checked it in my driveway.

- Trips 1 & 2 - System did not give correct route information. GPS letters red for both trips, entire time. Even though it registered the correct addresses, the routes were very incorrect. Trip 1 – tried to route me beginning in a neighboring subdivision about I-112 miles away. Trip 2 - showed my beginning position somewhere in Rochester Hills! In fact, I was in Troy, 2 miles from destination. I tried different ways to request route - did not make a difference. Tried turning system off & starting over - no change.

- Trip 1 - Screen at very beginning said it could not read data. Directed me to turn off car & make sure disk cartridge was on inserted properly. I simply restarted car & screen worked 2nd time. Trip 3 - Route & map incorrect - both functioned, but showed my starting location in Auburn Hills when it is actually Troy. All directions wrong. Same problem. Moved vehicle icon manually to Roth. Hills, where I was, but it changed to Auburn Hills. Kept recalculating route by itself until screen finally "froze" - didn't show movement & I couldn't cancel or change anything. Keys didn't work , screen did not shut off when I turned off car. Had to turn off with red button. Trip 5 same problem. Trip 6 - During trip, GPS letters turned yellow & system corrected all info. Showed car in correct route to destination. As soon as the GPS letters went from red to yellow, the correction occurred. Did make 3 or 4 re-calculations - corrections occurred with each re-calculation.

- Trip 6 - Screen said: "Cannot read data from disk. Turn off ignition key & check disk cartridge is inserted to main unit properly." I turned off car and restarted car. System worked okay then.

- When I drove, the map was correct, however, the route & verbal directions were "behind." I'd already turned, then it would tell me to turn. I re-entered the destination while at stop light & the system then showed correct info.

- GPS letters red until trip 5 when then changed to yellow. On trip 6, letters green this trip.

- Trip 1 - system worked great.

- Trip 2 - System worked until the 696/Telegraph Rd. Split. It directed me to take the Telegraph Rd. I chose to stay on l-696. The screen “froze” while trying to enlarge map. Did not work rest of the trip - screen remained frozen. Had to manually turn off unit (red button on side of screen) because screen did not go dark when car was turned off.

- Trip 1 - unit showed my location as the destination of the trip made on [previous day]. Showed my location in Farmington Hills & gave all directions from there. GPS letters red. Trip 2 - Tried to manually correct by moving car to current location as the same situation exists as in trip 1. Gave up - too time consuming. Trip 3 - Same problem. GPS letters red. Keeps recalculating route with Farmington Hills location. Vehicle icon does move, but it is not on recommended route because I’m not in Farmington, I’m in Troy. Trip 4, same problem.

- Trip 1 - Unit showed my position in Farmington Hills. Unit recalculated route several times due to the fact it shows my position in Farmington Hills. GPS letters red. Same situation trip 2,3,4. Basically, the unit cannot help me with directions because it is stuck in the Farmington location. It appears the unit is not receiving a signal so it can correct itself.

- Unit said the system was suspended. Told me t turn off ignition & check disk. I restarted the car & the system came up okay. Still shows me in Farmington hills. Several route recalculations from that location. At one point the icon representing the car moved a short distance & bounced back to Westmeath St. Did this a few times. GPS letters red. Continues to calculate route from Farmington Hills. GPS red. Trip 3 - Screen went black. Would not accept commands. Screen did not go dark when car was turned off. Accepted location, out during trip, screen suddenly froze in place & accepted no new info when I tried to re-enter destination. Red GPS letters.

- Trip 1 - unit still calculating route as if I were located in Farmington Hills. GPS letters red. Same for trips 2,3,4.

- Unit still calculating route as if I were located in Farmington Hills. GPS letters red. All trips.

- Unit still calculating route as if I were located in Farmington Hills. GPS letters red. All trips.

- Trips 1 & 2 - same problem as previous days. Trip 3 - Alleluia! Drove about a mile & unit finally showed my correct location. (After over 10 days of not functioning properly!) GPS letters yellow or green. Only rarely red. Unit working great. (Now that it appears to receive signal). Same for trips 4,5,6.

- Unit worked fine today. GPS letters red. Trip 11 - It was too good to be true. Screen would not change on menu for street, guidance history, etc. When it finally changed - did so rapidly – beeping at the same time. Same thing when I tried to choose my city & again for street. Has my location wrong. Shows me heading south when I am going west. Repeatedly recalculated because it thinks I’m at home location.

- Did not work properly. GPS red. Very cold temperatures today. Manually I turned off unit as it did not go off when I turned car off. Took unit about 4 minutes to turn off after I turned off ignition.

- Trip 2 - After exiting l-75 onto 14 mile Rd it calculated a new rte & told me to make a legal U-turn but then the calculation kicked in &told me to proceed straight ahead on the monitor to continue in correct direction.

- Trip 1 - At Telegraph & Square Lake - had to keep calculating route - map screen didn’t indicate where I actually was. Must have been unable to pick up signal. Didn’t have any trouble any other day. Trip 2 - Same as morning but lasted for a shorter period of time. Before calculations became correct. Weather bad.

- Trip 4 - coming home from restaurant system could not find the route home. Map was incorrect. Didn't have car on the Rd I was driving on. Didn't have me at my destination which was home sitting in front of my house. The map indicated I was on another street .3 miles from my home. Tried resetting system to go another location still couldn't make me at home. Weather bad. Heavy winds.
- Trip 1 - When turned on Rte map still the same as yesterday wrong worked itself out & was great.
- Trip 2 - System froze up on Proceed to Route screen - never gave directions - screen wouldn't shut off when I arrived home - turned monitor off with button on side of monitor.
- Trip 3 - Recalculated rte at Sq Lake & Telegraph even though I was following rte. Re-calculated & gave incorrect direction while driving rte. & Recalculated after exiting l-75 while following correct rte home, also giving bad directions & didn't actually acknowledge that I reached my entered destination.
- Trip 2 - Had system on but didn't follow directions - so it kept rerouting which was good. Rds were bad didn't want to get on freeways they were parking lots.
- Trip 2 - directed me but I got confused with directions. Rerouted & followed until it directed me onto a closed freeway. Re routed a couple for other times - change routes because of traffic.
- Trip 1 - traffic was bad on l-75. Lots of big trucks. System didn't work very well. It kept recalculating and loosing the way. Didn't have an accurate location of my vehicle on the proceed to route map.
- Trip 1 - The directions aren't accurate at my street corner. It recalculates telling me it didn't take the route & I did
- Trip 2 - My friend gave me directions to her house - I used her directions - Tetrastar would have taken me out of the way about 6 miles & would have been longer.
- I did make stop along the way which I thought about after setting out - car wash & gas.
- Works great.
- Had a little trouble getting intersection programmed .
- Had trouble with intersection etc.
- Worked good - used intersections
- Told me to take 696. When I passed it to go to M59 it told me to make a U-turn on M23 - once I failed to do this it directed me to M59 and home
- Did not work on my way home.
- Did not work just a clear screen on my way home from work
- It got a work out Thursday night going home. I kept changing the route because of traffic.
- When I got to Marysville only took me to exit 266 (Gratiot) the system didn't go any further into city.
- On the way home the system was confused. Didn't get me on route until I was on l-75 south.
- System didn't work right away said to turn car off to reload disc. Did that and it worked.

- Database cartridge did not respond immediately. System is now retiring this happened in the morning - I waited for a few minutes and it worked.
- At first the system didn't come on. When I left my house it didn't come on until I turned it off then back on.
- When going to bank had correct address but car kept trying to put me on wrong side of the street.
- Would not work locked up. When we got home we had to turn the Tetrastar off with button on side because when I turned the car off Tetrastar stayed on.
- Before I started I had to walk to comp. back to my house from my friends house [St.Clair Shores]. Once I had the starting point form my home, it started or work right. The Tetrastar was at the wrong starting point.
- When I started off for work it started right. But when I got off the freeway the Tetrastar was giving me the route like I was still on the main roads. Once I hit cancel & freeway route it started working right.
- Address for the bank [address given]. It started off right but when I got to E. Big Beaver Tetrastar tried to put me on the wrong side of the street.
- Trip to work - Tetrastar work, but the voice did not work. On the way home it was working.
- Wow, works great!
- Trip 1 - wouldn't proceed @ city screen - stuck - turned off power, hit cancel, wouldn't proceed. Trip 2 - started up again, but current position was set up from starting point. Trip 3 - Leaving Hollywood Supermarket to home - car in wrong area of map. Boo Hoo!
- Trip1 - perfect, no problem.
- Trip 2 - Did not work.
- Trip 3 - When leaving video store - the program seemed ok - but after I turn the system started calculating a route again for [address given]. As I proceeded, I read correct direction until I was on 696 E & it started to calculate a route AGAIN. Then it wanted me to exit, when I knew I shouldn't because of the original route calculated this morning. I then canceled.
- Trip 1 - Forgot I had or stop at store & went different route & it recalculated destination!
- No problems, worked great!
- Followed rte from Mound & turn r on 59E - When I tuned the screen said calculating rte, turn r on [unreadable] then turn r on Garfield! (I knew to stay on 59E & R on Garfield). Trip 2 - Frm bowling alley to home - hit construction on M-59 & directions making me turn a different way! Trip 3 – Forgot to set up for stop for gas
- No problems. Too rushed to use up for trips 1 & 2. Sorry.
- Trip 4 - Turned R onto Big beaver - computer wanted me to make a legal U turn when the bank was on the RIGHT SIDE! Wrong directions!
- Trip 11 - error occurred in calculating route - did it twice - started or leave on route & tried again and it worked! When driving route for #9, it was great directions!

- No problems {smiley drawn]
- Each trip was perfect. No problems.
- Trip 3 - When leaving gas station, made wrong turn - screen said recalculating route, screen showed S on Campbell & I proceeded; BUT screen FROZE & did not move at all.
- Arrived home & then it would not cancel or turn off when I turned off key. Turned off on side – but could still hear a humming noise. Waited 10 minutes & checked screen & it finally came back on to normal starting screen!
- Trip 1 - Re-calculate rte that was out of area of destination.
- Trip 2 - Tried to use & map showed us off course at start of 2nd trip. Trip 3 - all messed up – screen showed us in a different area of the city, then where we really were! Trip 4 - same as trip 3. Trip 5 - Still off but finally recalculated & worked fine! Thank you! [smiley drawn].
- 65-80
- Gave correct address had me turn right not left 1 st entered
- Can't get out of proceed to route
- Today I called [FT Coordinator] for assistance he was very helpful - however I'm still not feeling good about programming.
- Could not get city of Birmingham Did not know how to get in right range for my particular address. A very round a-bout route - could be I didn't ask for shortest - I really did not think the machine was very accurate
- Today I just went to work & home - the address for [work] is Big Beaver. I go beyond for parking so the directions are not good. I really think I could use in car instructions now that I am more used to the Fast Trac. I want to delete 2 locations I am not successful.
- Trip to work I really did not understand directions. Home was fine.
- Did not send these in because I know I would be turning in the car & paper work.
- Worked well coming home.
- I found that the GuideStar map was good but directions were confusing - it required looking at the instrument which was a distraction May be it was my instructions but I don't think all of it was my fault
- On trip 3 - I chose to take Lincoln to Adam's instead of Maple - because Friday PM traffic through Birmingham is prohibitive. Tetrastar recalculated the trip - after I turned on Lincoln.
- Trip 4 - for some reason Tetrastar asked me to turn left at Kensington (before Adams Rd) & when I didn't it wanted me to go beyond Adams & turn left. Found out later it was a better route.
- Trip 3 - at the end of the trip 3 the screen held the map showing car at destination - could not get into. Trip 4 - So I turned it off for trip 4. On trip 5 the sequence was normal. Trip 8 - Had just blank lighted screen. So did not use it on trip 9.
- Trip 1 - Tetrastar did not get passed 'Street address".
- Trip 2 - all worked well.

- Trip 2 was especially great since we knew nothing of the area and had not been there before. Trips 3 & 4 were not programmed in.
- Trip 3 - Took a long time to reboot - was ok by trip 4.
- Trip 1 - Did not follow recommended route through B'ham because of traffic but took direct route from the time I failed to turn west until destination Tetrastar kept asking me to turn south. I was on the street of destination. However, when I reached destination it was right on.
- Trip 2 - unprogrammed - didn't have an address
- Trip 3 - wanted 29712 [address range], but stopped at 20999 on street address, not further entries could be made. Trip 5 - working again.
- Trip 1 - Upon entering street # ,display stuck before complete street # could be entered.
- Trip 2 - now working ok.
- Trip 1 - Routing often not the best, routes s in opposite direction several streets before focusing onto the best way. Trip 3, ditto.
- Trip 8 - No directions from Boyne City [meeting] to farm (4.5 miles)
- No directions from farm to town - just instructions to proceed to a familiar road
- Trips 1 & 2 - Very accurate for mileage distance & directions of routes 7 turns
- Trip 5 - Screen stuck on map image - won't cancel or change. Trip 6 - Map thinks we are still at #5. No map to 'home', then it corrected itself to correct route. Trip 8 - Would not zero in on destination, should be 2.8 miles.
- Trip 4 - Machine stuck on one map on trip to Taylor - no response or commands.
- Trip 5 - Machine works ok on way home.
- Trip 1 - System error message, 'Database cartridge did not respond immediately' etc ... Trip 2 – Thought we were at home (see #1) so would not calculate a route.
- Trip 1 - Screen stuck while scanning for street name. Trip 2 - Thinks we are still at home. Can't enter next destination. Canceled guidance, re-entered. Still same problem ; but finally worked ok.
- Trips 3,4 - working ok.
- Trip 7 - Did not work. no screen display.
- Trip 1 - Would not work right - showed previous day information. Trip 2 - mileage shown incorrect.
- Trip 3 - worked ok.
- Thanks for allowing me to participate. I enjoyed it. Interesting!
- Not able to program [number given] address
- Sun shining very difficult to read guide Trac
- System worked very good!
- Trip 1 & 2 - Sun was shining! Very hard to read - gave some good verbal directions.

- 1st trip sun shining. Really hard to read especially on Xpressway.
- 5th trip. Thought it didn't give vocal directions soon enough when telling me to turn left off Woodward on to 11 mile!
- Trip 2 - I took all express ways. Missed my left turn on l-96. Vocal recalculated my trip. Thought that was good!
- My girl friend thought the system was very good!
- 2nd trip - Took two different routes! The only problem was when I was on l-96 which I really don't take it was more difficult to follow the map when you are in heavy traffic
- Didn't have time to wait for Tetrastar
- Tetrastar did work good!
- Very good directions both trips!
- Too short a trip!
- Very good directions on Xpress way - Hard to read Tetrastar in sun light
- No problem
- Trip 1 - This trip Tetrastar tells me to turn on [unreadable] to 9 mile I will be taking I94 the Tetrastar says to turn left off of 9 mile to I 94! You can not do this you must turn right off 9 mile then a left to I 94 there is no left turn sign on 9 mile to I 94
- Trip 1 - On Orchard Lk Rd. - driving through Keego Harbor. Voice said I was not following route. Map showed me off road which was not correct. Trip 2 - Coming from W. Long Lake Rd to Orchard Lk. Rd - map showed me driving in the lake. Voice said to follow route ., GPS was red.
- Trip 1 - Wrong info - GPS is red - map is incorrect. Trip 2 - Tetratsar was locked in previous incorrect position, couldn't use.
- Trip 3 - All okay - worked great
- Trip 2 - Tetrastar didn't come on. Trip 4 - Tetrastar didn't go off. I pressed red button.
- Trip 2 - Tetrastar would not turn on.
- Trip 1 - Tetrastar was stuck at Knights Bridge & Orchard Lk Rd GPS is red.
- Trip 1 - Tetrastar did not come on. Trip 2 - System stopped working at route selection (Least Use of Freeways). Started up again at 13 mile Rd.
- Trip 2 - Telstar came on but would not program a route. Was stuck in same position until we got home & turned off system.
- Trip 1 - Tetrastar was stuck in Isabella County when I started. Corrected itself after 3-4 miles.
- Trip 3 - Tetrastar would not turn on.
- Trip 1 - Tetrastar gave names of streets that I never heard of incorrect destinations. Very confused. Trip 4 - T.S. is stuck. Trips 5,6,7 - GPS T.S. not working.

- Weather rainy - very cloudy - T.S. worked great.
- Trips 1 & 2 - Tetrastar did not turn on.
- Trip 1 - T.S. started out ok. Then switched to incorrect route. Trip 2 - worked fine.