TravTek Evaluation
Yoked Driver Study

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Research and Development

FOREWORD

This report is one of eight reports produced as part of the evaluation of the Travtek operational field test, conducted in Orlando, Florida, during 1992-1993. Travtek, short for Travel Technology, was an advanced driver information and traffic management system that provided a combination of traveler information services and route navigation and guidance support to the driver. Twelve individual but related studies were conducted during the evaluation. Evaluation goals and objectives were represented by the following basic questions: (1) Did the TravTek system work? (2) Did drivers save time and avoid congestion? (3) Will drivers use the system? (4) How effective was voice guidance compared to moving map and turn-by-turn displays? (5) Was TravTek safe? (6) Could TravTek benefit travelers who do not have the TravTek system? (7) Will people be willing to pay for TravTek features?

Evaluation data were obtained from more than 4,000 volunteer drivers during the operation of 100 specially equipped automobiles for a 1-year period. Results of the evaluation demonstrated and validated the concept of in-vehicle navigation and the provision of traveler information services to the driver. The test also provided valuable results concerning the drivers' interaction with and use of the in-vehicle displays. This project has made many important contributions supporting the goals and objectives of the Intelligent Transportation Systems Program.

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L Saxton, Director
Office of Safety and Traffic
Operations Research and Development

NOTICE

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7. Author (s) V. Inman, R. Sanchez, C. Porter, L. Bernstein	8. Performing Organization Report No.

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15. Supplementary Notes
Contracting Officer's Technical Representative: Frank Mammano, HSR-12

16. Abstract
The Yoked Driver Study was 1 of 12 investigations conducted as part of the TravTek operational test of an advanced traveler information and traffic management system (ATIS/ATMS). The TravTek system consisted of the Orlando Traffic Management Center (TMC), the TravTek vehicles, and the TravTek Information and Services Center. The TMC broadcast updated travel times for TravTek traffic links to the TravTek vehicles once each minute. The TravTek vehicles broadcast their completed link travel times back to the TMC for transmission to the other TravTek vehicles. The vehicles were equipped to provide route planning, route guidance, and a data base of local services and attractions. The primary purpose of the Yoked Driver Study was to evaluate the value of real-time traffic information, route planning, and route guidance to (a) trip efficiency, (b) navigation performance, and (c) driving performance. The study also examined willingness-to-pay, user perceptions of the system, and user recommendations.

A controlled experiment was conducted in which sets of three TravTek vehicles traveled between selected origins and destinations during peak afternoon traffic. Each of the three vehicles was configured differently: one provided route planning and route guidance that utilized real-time traffic information. A second provided the same route planning and route guidance except that it did not utilize real-time traffic information. The third required that drivers plan the trip and navigate "as they normally would." A total of 222 volunteer drivers participated in the experiment.

TravTek benefits to individual drivers included a travel time saving and a reduction in perceived workload. Real-time traffic information produced a network trip efficiency by routing many of TravTek vehicles that received it onto arterials. Although vehicles that received real-time information tended to travel farther, and to travel farther on lower class roadways, they did not have significantly longer travel times. User perception and performance data suggest that the system was easy to learn and easy to use. Participants in this study indicated that they would be willing to pay about $1000 for a system such as the one they drove.

17. Key Words TravTek, ATIS, ATMS, IVHS, ITS, Real-Time Traffic Information, Route Guidance, Route Planning	18. Distribution Statement No restrictions. This document is available to the public through the National Technical Information Service, Springfield, Virginia 22161

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METRIC/ENGLISH CONVERSION FACTORS

ENGLISH TO METRIC

LENGTH (APPROXIMATE)

1 inch (in) = 2.5 centimeters (cm)

1 foot (ft) = 30 centimeters (cm)

1 yard (yd) = 0.9 meter (m)

1 mile (mi) = 1.6 kilometers (km)

AREA (APPROXIMATE)

1 square inch (sq in, in^2) = 6.5 square centimeters (cm^2)

1 square foot (sq ft, ft^2) = 0.09 square meter (m^2)

1 square yard (sq yd, yd^2) = 0.8 square meter (m^2)

1 square mile (sq mi, mi^2) = 2.6 square kilometers (km^2)

1 acre = 0.4 hectares (he) = 4,000 square meters (m^2)

MASS - WEIGHT (APPROXIMATE)

1 ounce (oz) = 28 grams (gr)

1 pound (lb) = .45 kilogram (kg)

1 short ton = 2,000 pounds (Lb) = 0.9 tonne (t)

VOLUME (APPROXIMATE)

1 teaspoon (tsp) = 5 milliliters (ml)

1 tablespoon (tbsp) = 15 milliliters (ml)

1 fluid ounce (fl oz) = 30 milliliters (ml)

1 cup (c) = 0.24 liter (l)

1 pint (pt) = 0.47 liter (l)

1 quart (qt) = 0.96 liter (l)

1 gallon (gal) = 3.8 liters (l)

1 cubic foot (cu ft, ft^3) = 0.03 cubic meter (m^3)

1 cubic yard (cu yd, yd^3) = 0.76 cubic meter (m^3)

TEMPERATURE (EXACT)

[(x-32)(5/9)] ^{o}F = y ^{o}C

METRIC TO ENGLISH

LENGTH (APPROXIMATE)

1 millimeter (mm) = 0.04 inch (in)

1 centimeter (cm) = 0.4 inch (in)

1 meter (m) = 3.3 feet (ft)

1 meter (m) = 1.1 yards (yd)

1 kilometer (km) = 0.6 mile (mi)

AREA (APPROXIMATE)

1 square centimeter (cm^2) = 0.16 square inch (sq in, in^2)

1 square meter (m^2) = 1.2 square yards (sq yd, yd^2)

1 square kilometer (km^2) = 0.4 square mile (sq mi, mi^2)

1 hectare (he) = 10,000 square meters (m^2) = 2.5 acres

MASS - WEIGHT (APPROXIMATE)

1 gram (gr) = 0.036 ounce (oz)

1 kilogram (kg) = 2.2 pounds (lb)

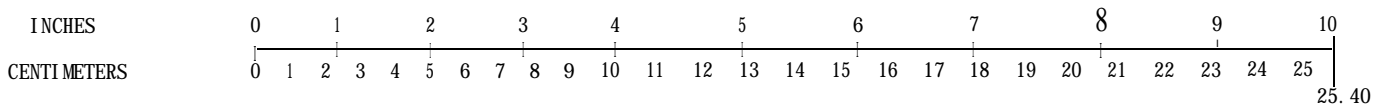1 tonne (t) = 1,000 kilograms (kg) = 1.1 short tons

VOLUME (APPROXIMATE)

1 milliliters (ml) = 0.03 fluid ounce (fl oz)

1 liter (l) = 2.1 pints (pt)

1 liter (l) = 1.06 quarts (qt)

1 liter (l) = 0.26 gallon (gal)

1 cubic meter (m^3) = 36 cubic feet (cu ft, ft^3)

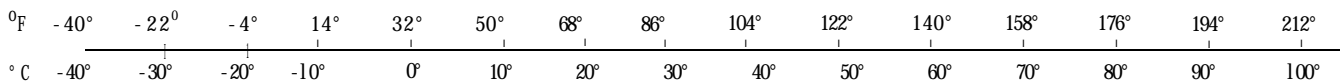1 cubic meter (m^3) = 1.3 cubic yards (cu yd, yd^3)

TEMPERATURE (EXACT)

[(9/5) y + 32] ^{o}C = x ^{o}F

QUICK INCH-CENTIMETER LENGTH CONVERSION

INCHES	0	1	2	3	4	5	6	7	8	9	10

CENTIMETERS 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

25.40

QUICK FAHRENHEIT-CELSIUS TEMPERATURE CONVERSION

^{o}F	-40°	-22°	-4°	14°	32°	50°	68°	86°	104°	122°	140°	158°	176°	194°	212°
°C	-40°	-30°	-20°	-10°	0°	10°	20°	30°	40°	50°	60°	70°	80°	90°	100°

For more exact and or other conversion factors, see NBS Miscellaneous Publication 286, Units of Weights and Measures. Price $2.50. SD Catalog No. Cl3 10286.

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