



U.S. Department
of Transportation

**Federal Highway
Administration**

Research, Development,
and Technology

Turner-Fairbank Highway
Research Center
6300 Georgetown Pike
McLean, Virginia 22101-2296

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HUMAN FACTORS LABORATORY

Introduction

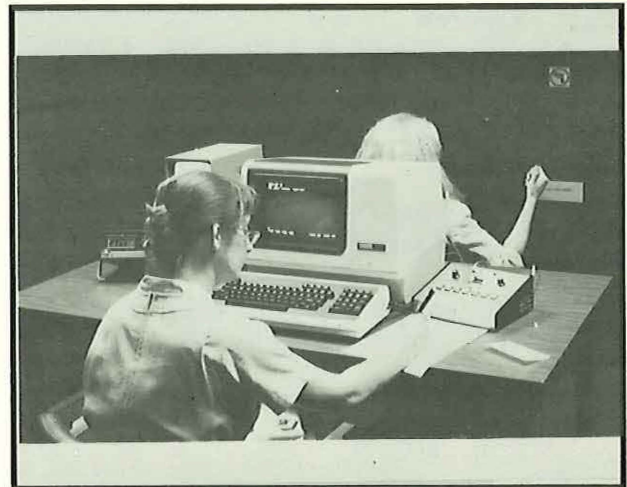
The Human Factors Laboratory (HFL) of the Office of Safety and Traffic Operations R&D, Federal Highway Administration (FHWA), provides a working environment for delineation of drivers' capabilities and limitations. Historically, the facility has been used to conduct applied studies evaluating the potential effectiveness of either new or modified traffic control devices through improvements in conspicuity, legibility, detection, and message content. More fundamental, theoretical studies concerning basic issues of human perception, cognition, and motor functions as related to the driving task also are performed here.

The HFL staff explores critical human factors issues within the broader context of FHWA's research programs. Small-scale studies typically provide (1) information to adequately define the objectives and scope of subsequent larger research efforts; (2) recommendations--through the FHWA Office of Traffic Operations--to the National Committee on Uniform Traffic Control Devices for additions, deletions, and changes to the *Manual on Uniform Traffic Control Devices*; and (3) data for staff research reports on a variety of transportation related research issues.

Experimental Areas and Equipment

The HFL contains two experimental working areas. Area 1 is approximately 12 by 40 feet and provides rear-projection capabilities for slide presentation sequences. This area is painted flat black and is carpeted for noise control. The room has copper screening installed in the walls, ceiling, and floor to exclude radio frequencies and allow collection of very low level physiological signals (heart and respiration rates, galvanic skin response, and electroencephalograms). The

area is equipped with slide projectors, tachistoscopes, stimulus control apparatus, timing devices, psychophysiological measuring modules, and other ancillary electronics. Normally, studies evaluating drivers' detection and reaction capabilities, information retention ability, stress, and other static measures which aid in defining and understanding drivers' needs and limitations are conducted here. (Follow-up studies using the DOT/FHWA Highway Driving Simulator [HYSIM] are conducted in cases where a more dynamic experimental environment is required.)



Experimental Area 2 contains apparatus to study drivers' behavior at intersections, bifurcations, and entry/exit ramps. A modified A Etna Driv-O-Trainer is used with three wide screen projection televisions and synchronized video cassette recorders. This arrangement allows highly detailed, 120-degree field-of-view scenes, similar to motion pictures, to be presented to drivers. Data are collected on gap acceptance, head movements, speed estimation, and similar

Office of Safety and Traffic Operations R&D Traffic
Systems Division

measures to allow recommendations for improvements in road signing and geometry.



The HFL is supported by an associated Graphics Center. This center produces stimulus materials (35 mm slides, pictures, etc.) for both the HFL and the HYSIM. In addition, the center provides visual aids (slides, viewgraphs, and hard copies) to FHWA staff for presentations or publications.

Past research

A few representative studies from the HFL include

- "The Legibility of Features on Interstate Guide Signs."
- "Legibility and Driver Response to Selected Lane and Road Closure Barricades."
- "Driver Perception of Risk and Its Relationship to Highway Geometry."
- "Driver Behavior Analysis of the Highway Guidance System."
- "Driver Response to Intersections: Analysis of Workload-Related Variables."
- "The Performance of Drivers with Physical Limitations at T-Intersections."

Future Research

Current and future HFL emphasis is focused on basic research to define capabilities and limitations of more senior drivers. These studies will (1) identify special needs and (2) delineate

potential remediation for this specific section of the population. In addition, the laboratory will continue to evaluate new and modified traffic control devices.

For additional information, contact
King M. Roberts, Manager, Human Factors
Laboratory, Traffic Systems Division, HSR-10,
(703) 285-2027.