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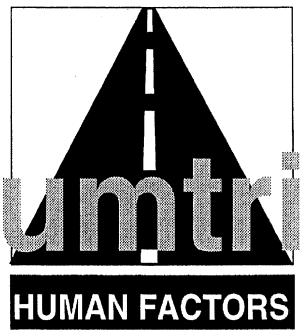
Synopsis of Driver Interface Standards and Guidelines for Telematics as of Mid-2001

Paul Green



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16. Abstract

This report identifies current guidelines and standards for driver interfaces to telematics from SAE, ISO (Technical Committee 22, Subcommittee 13, Working Group 8), and other sources. Information concerning titles, sources, content, and length is provided along with some commentary.

ISO is developing two standards associated with visual displays (visual behavior measurement–ISO standard 15007, legibility--ISO standard 15008), one concerned with auditory displays (ISO standard 15006) and two concerned with message presentation (dialog management–ISO standard 15005, message priority–ISO standard 16951). There are preliminary work items for two process standards (suitability, safety assurance) and an effort on visual distraction that is an expansion of a work item on navigation interfaces.

Basic non-ISO guidelines include European Union Guidelines, and a derivative of them, the Alliance of Automobile Manufacturers Guidelines. These documents are brief, high-level statement principles. Somewhat more detailed are the JAMA guidelines (Japanese industry design guidelines), SAE Recommended Practices J2364 ("the 15-Second Rule") and J2365 (the calculation procedure for 2364), and the TRL checklist (developed in the UK). Finally, there are three sets of detailed (each in excess of 100 pages) and well-documented guidelines (Battelle, UMTRI, HARDIE), that can be used directly for product design. Copies of all non-ISO guidelines appear on the UMTRI Driver Interface Team web site (http://www.umich.edu/~driving).

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Synopsis of Driver Interface Standards and Guidelines for Telematics as of Mid-2001 (Summary)

Technical Report UMTRI 2001-23, June, 2001
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International Standards Organization Driver Interface Work Program

Effort	Summary	Status
Dialog Management	Lists high-level ergonomic principles (compatibility with driving, consistency, simplicity, error tolerance, etc.) for interaction between the driver and the Transport Information and Control Systems (TICS) while the vehicle is in motion	Draft std. 15005
Auditory Information Presentation	Details requirements for signal levels, appropriateness, coding, etc. along with compliance test procedures	Draft std. 15006
Measurement of Driver Visual Behavior	Describes equipment (e.g., cameras) and procedures (subject descriptions, tasks, performance measures, etc.) used to measure driver visual behavior	Draft std. 15007
Legibility (Visual Presentation of Information)	Provides requirements for character size, contrast, luminance, etc. and how each is to be measured.	Draft std. 15008
Message Priority	Develops a prioritization scheme for TICS and other messages presented to drivers while driving based on criticality (likelihood of injury if the event occurs) and urgency (required response time), on 4-point scales	Draft std. 16951
Suitability of TICS While Driving	Describes a process for assessing if a specific TICS, or a combination of TICS with other in-vehicle systems, is suitable for use by drivers while driving. Addresses: (1) user-oriented TICS description and context of use, (2) TICS task description and analysis, (3) assessment, and (4) documentation	Draft std. 17287
Visual Distraction of Information and Communication Systems	Will propose methods and requirements to determine if tasks are too difficult to do while driving. Earlier version of this item concerned navigation accessibility.	Work item
ITS Safety Assurance Process for Design and Development	Provides for a process that incorporates safety impact analysis as a part of TICS R&D. It does not establish design or performance requirements, but includes requirements for safety records and personnel training.	Work item

Major Non-ISO Telematics Guidelines

Common Document Name	Reference	Size (Pages)	Comments
Alliance Guidelines	Alliance of Automobile Manufacturers (2000, December 6)	6	Restatement of EU principles. Details to be added in 2001.
Battelle Guidelines	Campbell, Carney, and Kantowitz (1997)	261	Voluminous document with references to interface design, especially for trucks. User interface has a Windows flavor, includes physical ergonomics information (e.g., legibility, control sizes) which is not included in the UMTRI guidelines.
EU Guidelines	Commission of the European Communities (1999)	2	Mostly high-level/general statements. Some revisions are expected soon.
HARDIE Guidelines	Ross, Midtland, Fuchs, Pauzie, Engert, Duncan, Vaughan, Vernet, Peters, Burnett, and May (1996)	480	Early set of European guidelines, less data than UMTRI or Battelle but still very useful.
JAMA Guidelines	Japan Automobile Manufacturers Association (2001)	5	First set of detailed design guidelines for driver interfaces. Though voluntary in Japan, they are followed by all OEMs there and sometimes by aftermarket suppliers. Some guidelines are unique to the Japanese driving environment.
SAE J2364 ("15-Second Rule")	Society of Automotive Engineers (2000, January 20). See also Green (1999c,d).	11	Specifies the maximum task time and test procedures for navigation system tasks performed while driving for systems with visual displays and manual controls.
SAE J2365 (SAE Calculations)	Society of Automotive Engineers (2001, March 13 revision). See also Green (1999a,b).	19	Method to compute total task time.
TRL Checklist	Quimby (1999)	18	Simple check list.
UMTRI Guidelines	Green, Levison, Paelke, and Serafin (1996)	111	First set of comprehensive design guidelines for the U.S. Included are principles, general guidelines, and specific design criteria with an emphasis on navigation interfaces.

Source: http://www.umich.edu/~driving/guidelines.html

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INTRODUCTION

Overview

Telematics–applications that use computers and communications to provide information and support to drivers–have significant market presence and should continue to experience significant growth in the near future (Richardson and Green, 2000; Green, Flynn, Vanderhagen, Ziomek, Ullman, and Mayer, 2001). At the present time, the predominant applications are navigation, cellular phone, and entertainment, with emergency crash notification and traffic information increasing in importance.

If the market for telematics products and services is to continue to grow, then these products and services must be safe and easy to use. A variety of safety and usability guidelines and standards concerning driver interfaces for telematics appear in the public domain, and there may be internal corporate documents as well. All of the primary consensus guidelines and standards of which the author is aware are identified in this report. This report has been written to support the primary deliverable for this project, a collection of design guidelines that has been placed on the University of Michigan Transportation Research Institute (UMTRI) Driver Interface Team web site (http://www.umich.edu/~driving). (To access these guidelines, click on "Telematics Guidelines" in the left frame of the window.) These guidelines should eventually also be posted on the Visteon Intranet (the project sponsor).

Driver interface guidelines and standards for telematics can be divided into three categories: Society of Automotive Engineers (SAE) documents, International Standards Organization (ISO) standards, and other guidelines. Because of the significant role that the Visteon staff (notably Dr. James Foley) has played in ISO activities and because of copy constraints with ISO documents, only non-ISO guidelines have been placed on the web site for now.

In the sections that follow, key standards are identified and summarized. Readers are encouraged to examine the full documents on the UMTRI site. For completeness, SAE documents that are related to driver interfaces, but not specific to telematics, are identified in an appendix of this report.

Terminology

For those unfamiliar with the literature, several terms need to be defined with regard to design practice. The definitions used, to a large degree, are adopted from the language in the SAE Technical Standard Board Rules, summarized here and provided in full in Appendix A. The category to which a document is assigned determines the extent to which compliance is required, so terminology matters. Common terms used for documents include information report, guideline, recommended practice, standard, specification, and regulation.

Information Report – This is a term used by SAE to refer to a document in the SAE Handbook (Society of Automotive Engineers, 2000) that summarizes findings on some topic, usually from several studies. Those studies are invariably in the public literature. (See Appendix B.) The

information provided is often useful to know and does not specifically say how something should be designed.

Guideline – This term is not defined by SAE. A guideline is a practice that is desirable to follow, but not one that must be followed in all cases. Guidelines can be quite general (e.g., "be consistent") or quite specific (e.g., "character height should be at least .007 times the view distance, the James Bond Rule") (Smith, 1979).

Recommended Practice – This is an SAE-specific term that describes how something should be done. In some situations, a recommended practice can be synonymous with the more commonly used term, "guideline." In other situations, it can refer to a document with greater authority. The author's industry colleagues noted their companies must comply with SAE Recommended Practices. They believe that if their company is involved in a product liability action and the product does not comply with SAE Recommended Practices, their company will lose.

Standard – A standard is a term used by SAE, ISO, and others. A standard is a procedure that must be followed, though neither SAE or ISO have any authority to enforce standards. Deviation from a standard is much less likely than deviation from a Recommended Practice.

Regulation – A regulation is document that must be followed and for which enforcement procedures exist. Regulations are usually created by governments, but sometimes may be created by councils acting on the behalf of several governments. Enforcement may include the prohibition of sale of non-complying items or fines if they are sold.

To provide clarification of the difference between these terms, a listing of driver-related SAE Information Reports, Recommended Practices, and Standards appears in Appendix A.

In contrast to the civilian use of these terms described above, the U.S. Department of Defense uses two terms, standard and specification. In their vocabulary, a standard is a general description of how to design or evaluate a wide range of systems. An example is the human factors bible, Military Standard 1472F (U.S. Department of Defense, 1999). A specification is a set of requirements for a specific item, such as dimensions and materials for a specific type of globe valve or the formulation for a particular type of gray paint.

ISO STANDARDS

The International Standards Organization (ISO) has been extremely active in developing telematics design, performance, and process standards. Much of the recent activity has occurred under the auspices of ISO Technical Committee 22, Subcommittee 13 (ISO TC 22/SC 13-Ergonomics Applicable to Road Vehicles, in particular Working Group 8 (WG8 – Transport Information, and Control Systems or TICS)) (Green, 2000). That working group has existed for about a decade, though related subcommittee work has been in progress for about 30 years.

For those unfamiliar with ISO (http://www.iso.ch), this organization has about 222 technical committees (e.g., fasteners, boilers and pressure vessels, textiles, acoustics, water quality) and several thousand subcommittees. Committee and subcommittee members serve as delegates representing their national standards bodies (ANSI-American National Standards Institute, DIN (Deutsches Institut für Normung-German Institute for Standardization), etc.). Because there is a fee paid by the national standards organizations for each subcommittee on which they participate, countries restrict themselves to those of significant national interest. Thus, the 11 members of TC22/SC 13 are the major vehicle-producing nations (e.g., U.S., Japan, Germany, U.K., France, Sweden, Italy). Above the Working Group level, the ISO operates in a manner similar to the United Nations, dealing with problems of multiple languages, volunteer efforts, and at times, mixing technical and political agendas.

Working Group 8 and its Task Forces meet for several days two to three times per year, usually in Europe. The first two days are typically for Task Forces, which are subgroups of the Working Group, with the full Working Group meeting on only the last day. About 15 delegates attend a typical Working Group meeting. Most of the meeting time is spent discussing proposals for standards, reviewing relevant data, and developing document language.

Proposals for standards are developed informally by delegates from several nations before they are brought to the Working Group as a proposal for a Preliminary Work Item (PWI). For a proposal to become a New Proposal (NP), it must be approved by a majority of the nations participating in the Working Group. In making that decision, delegates consider the need for a standard, the availability of relevant data, the nations favoring such a standard, and whether an adequate number of delegates is available to work on it. Given limited personnel, delegate availability is often a key consideration. Once a proposal is accepted, ISO requires that a standard must emerge in three years or the work item will be dropped from the Working Group agenda. Most of the substantial discussion of a standard occurs in Task Forces and Working Groups. Documents go through a series of stages (Preliminary Work Item, Committee Draft (CD), Draft International Standard (DIS), Final Draft International Standard (FDIS), and International Standard) as they are passed from the Working Group to the subcommittee to the technical committee and finally to the Secretariat for review and approval. The major hurdles are the working group and subcommittee, where passage requires two-thirds approval of the nations participating. The emphasis of this process is on building a voluntary consensus (http://www.iso.ch/iso/en/stdsdevelopment/whowhenhow/how.html).

Although ISO standards are voluntary (as ISO has no enforcement powers), many countries require compliance with ISO standards for type approval, a requirement for sale. Because it is

too expensive to create vehicles with features specific to one country (except for a large market such as the U.S.), global manufacturers almost always comply with ISO standards. Thus, although they are officially voluntary, compliance with ISO standards is in fact required.

In addition, there also have been related activities in TC204 (Transport Information and Control Systems), Subcommittee 10 (Traveler Information Systems) and Subcommittee 14 (Vehicle/Roadway Warning and Control). Much of that work related to system design, with the driver interface work being coordinated or completed by TC 22/SC 13/WG 8.

Table 1 shows the current Working Group 8 work program. At the present time, WG8 is developing two standards associated with visual displays (visual behavior measurement-15007, legibility-15008), one concerned with auditory displays (15006), and two concerned with message presentation (dialog management-15005, message priority-16951). There are preliminary work items for two process standards (suitability, safety assurance) and an effort on visual distraction that is an expansion of the work on navigation interfaces.

Most of the standards in process are quite general and focus on process and abstract design issues, and except for the legibility standard, not on the design specifics found in the guidelines described later in this report. Such detail is at least a decade away. To promote international harmonization, national standards organizations, technical societies (e.g., SAE), and government organizations (e.g., U.S. Department of Transportation) often permit ISO standards to supercede their own standards, so ISO standards are very important.

Table 1. ISO TC 22/SC 13/WG 8 Work Program

Effort	Summary	Status
Dialog Management	Discusses high-level ergonomic principles (compatibility with driving, consistency, simplicity, error tolerance, etc.) for interaction between the driver and the Transport Information and Control Systems (TICS) while the vehicle is in motion	Draft International Standard (DIS) 15005
Auditory Information Presentation	Provides requirements for auditory messages including signal levels, appropriateness, coding, etc. along with compliance test procedures	DIS 15006
Measurement of Driver Visual Behavior	Generally describes equipment (cameras, recording procedures, etc.) and procedures (subject descriptions, experiment design parameters, tasks, performance measures, etc.) used to measure driver visual behavior	Final Draft International Standard (FDIS) 15007
Legibility (Visual Presentation of Information)	Provides requirements for character size, contrast, luminance, etc. and how each is to be measured.	FDIS 15008
Message Priority	Develops a prioritization scheme for TICS and other system-initiated and driver-requested messages presented to drivers while driving, based on criticality (likelihood of injury if the event occurs) and urgency (required response time), both determined on 4-point scales	Committee Draft (CD) 16951
Suitability of TICS While Driving	Generally describes a process for assessing whether a specific TICS, or a combination of TICS with other in-vehicle systems, is suitable for use by drivers while driving. It addresses: (1) user-oriented TICS description and context of use, (2) TICS task description and analysis, (3) assessment, and (4) documentation	DIS 17287
Visual Distraction of Information and Communication Systems	Will propose methods and requirements to determine if tasks are too difficult to do while driving. Earlier version of this item concerned navigation accessibility.	Preliminary Work Item (PWI)
ITS Safety Assurance Process for Design and Development	Provides for a process that incorporates safety impact analysis as an integral part of TICS research and development. It does not establish design or performance requirements per se, but does include requirements for safety records and personnel training.	PWI

NON-ISO GUIDELINES

Guidelines, generally less stringent than standards, have been developed by several industry groups. (See Table 2.) Most of these guidelines are fairly recent, though the JAMA, UMTRI, and HARDIE guidelines were developed in the mid-1990s. As indicated in Table 2, these guidelines vary quite widely in length. Two sets of guidelines are quiet brief (Alliance, EU) and are merely statements of very general principles (e.g., interfaces should be simple to operate). (As an aside, elaboration of the Alliance guidelines is in progress.)

Others guidelines contain a limited set of specifics (JAMA, SAE J 2364 and J2365, TRL), with a few containing considerable detail (Battelle, HARDIE, UMTRI). Readers are cautioned that the newer or longer sets of guidelines are not necessarily better. The Alliance, EU, JAMA, and SAE guidelines were developed primarily by representatives from industry (with academic involvement for SAE guidelines). The Battelle and UMTRI guidelines were developed by teams of contractors working for the U.S. Department of Transportation. The TRL and HARDIE guidelines were also contracted efforts (in Europe).

All of these guidelines are voluntary. However, as a matter of practice in Japan, contextual pressure makes the JAMA guidelines de facto guidelines for that country. In the U.S., the most important guidelines from the perspective of authority are SAE Recommended Practices J2364 and J2365, especially J2364. Although these documents are still drafts, eventual approval is expected and many manufacturers are already complying with them.

The guidelines developed by the Alliance, EU, JAMA, and SAE are being revised as this report is being written and that process is expected to continue for several years. Readers are therefore advised to either contact the authoring organization or see the UMTRI web site for the latest revisions.

Table 2. Major Non-ISO Telematics Guidelines

Common Document Name	Reference	Size (Pages)	Comments
Alliance Guidelines	Alliance of Automobile Manufacturers (2000, December 6)	6	Restatement of EU principles. Details to be added in 2001.
Battelle Guidelines	Campbell, Carney, and Kantowitz (1997)	261	Voluminous document with references to interface design, especially for trucks. User interface has a Windows flavor, includes physical ergonomics information (e.g., legibility, control sizes) which is not included in the UMTRI guidelines.
EU Guidelines	Commission of the European Communities (1999)	2	Mostly high-level/general statements. Some revisions are expected soon.
HARDIE Guidelines	Ross, Midtland, Fuchs, Pauzie, Engert, Duncan, Vaughan, Vernet, Peters, Burnett, and May (1996)	480	Early set of European guidelines, less data than UMTRI or Battelle but still very useful.
JAMA Guidelines	Japan Automobile Manufacturers Association (2001)	5	First set of detailed design guidelines for driver interfaces. Though voluntarily in Japan, they are followed by all OEMs there and sometimes by aftermarket suppliers. Some guidelines are unique to the Japanese driving environment.
SAE J2364 ("15-Second Rule")	Society of Automotive Engineers (2000, January 20) See also Green (1999c,d).	11	Specifies the maximum allowable task time and test procedures for navigation system tasks performed while driving (for visual displays and manual controls only).
SAE J2365 (SAE Calculations)	Society of Automotive Engineers (2001, March 13 revision). , See also Green (1999a,b).	19	Method to compute total task time.
TRL Checklist	Quimby (1999)	18	Simple check list.
UMTRI Guidelines	Green, Levison, Paelke, and Serafin (1996)	111	First set of comprehensive design guidelines for the U.S. Included are principles, general guidelines, and specific design criteria with an emphasis on navigation interfaces.

Source: http://www.umich.edu/~driving/guidelines.html

CLOSING THOUGHTS

There are a significant number of driver interface guidelines and standards in the literature. Compliance with them, which for all practical matters is required because of product liability concerns (at least in the U.S.), should greatly enhance the safety and usability of telematics products and services.

Given the number of pages of standards and guidelines written to date, some might conclude that designers and engineers have all the information they need. Nothing could be further from the truth. Many of these documents are undergoing revision because they are far from complete. In many cases, such as SAE J2364, there is significant disagreement as to how guidelines and standards should be revised because of a lack of research data on proposed procedures. This lack of research has slowed the development of telematics standards and will slow the development of telematics products and services.

Further, designers sometimes do not know which driver interface guidelines and standard they need to consider or how to access them. This is primarily a problem in smaller organizations, especially those without a professional human factors staff. This report and the associated web site are steps to overcoming that problem. In the future, the author hopes to be able to overcome copyright limitations and post relevant SAE and ISO documents on the Driver Interface web site.

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Society of Automotive Engineers (2001, March 13 revision), SAE Recommended Practice Calculation of the Time to Complete In-Vehicle Navigation and Route Guidance Tasks (SAE J2365), Warrendale, PA: Society of Automotive Engineers.

United States Department of Defense, (1999). Department of Defense Design Criteria Standard Human Engineering (Military Standard MIL-STD 1472F), Washington, D.C.: U.S. Department of Defense.

APPENDIX A – WHAT SHOULD BE IN AN SAE STANDARD, RECOMMMENDED PRACTICE, AND INFORMATION REPORT?

Introduction

As was noted in the body of the report, understanding standards-related terminology is not only generally useful, but it is particularly important in SAE deliberations. Within SAE, especially the SAE ITS Safety and Human Factors Committee and its subcommittees, there have been ongoing discussions of the desired classification for human factors and safety documents. This appendix should provide data for those discussions and closure to the debate.

Classifications of documents should be made based on two principles:

1. Classifications should be consistent with the SAE rules.
2. Classifications should be consistent with prior SAE Committee decisions, especially related to drivers.

SAE Rules

The SAE rules (Preparation of SAE Technical Reports, Technical Standards Board document 002, http://www.sae.org/technicalcommittees/tsb002.pdf, section 5), concern the classification of technical reports, SAE jargon for standards, recommended practices, and information reports. In brief, standards include"broadly accepted engineering practices," specifications, or "test methods." A recommended practice provides "guides to standard engineering practice." An information report is a "compilation of reference data or educational material." The exact wording TSB 002 follows:

5 Classification of Technical Reports—Technical reports are approved for SAE publication by a cognizant Council of the Technical Standards Board, and must be based on sound technology and cooperative engineering work. Before publication, a report must be classified by the originating group in one of the following categories, established in Section 7.3 of the Technical Standards Board Rules and Regulations:

5.1 SAE Standard—A documentation of broadly accepted engineering practices, or a specification for a material, product, process, procedure, or test method. Standards fall into broad categories:

5.1.1 PRODUCT STANDARD—This is primarily a descriptive report covering dimensions, composition, and/or other details.

5.1.2 PERFORMANCE STANDARD—This is a documentation of requirements or levels against which a product or function can be evaluated. It may define test methods by which the requirements can be measured. Performance requirements and test methods should preferably be in separate reports. If this is not practical, they should be in distinct and separate sections of the same report.

5.2 SAE Recommended Practice—A documentation of practices, procedures, and technology that are intended as guides to standard engineering practice. The content may be of a more general nature, or may present data that have not yet gained broad engineering acceptance.

5.2.1 A Technical Committee developing a recommended practice may add an introductory note stating:

"This SAE Recommended Practice is intended as a guide toward standard practice and is subject to change to keep pace with experience and technical advances."

5.3 SAE Information Report—A compilation of engineering reference data or educational material useful to the technical community.

5.4 SAE Draft Technical Report—A Draft Technical report may be identical to an SAE Standard or Recommended Practice, except that it has not had consensus approval by the sponsoring Division/Council or the Technical Standards Board. It may be an existing company or government standard or an existing international standard.

5.4.1 EACH DRAFT TECHNICAL REPORT SHALL INCLUDE THE FOLLOWING NOTE IN THE FOREWARD: "The purpose of this Draft Technical Report is to give the technical community the opportunity to review, comment on and use is content prior to final approval by SAE. Comments on this draft are welcome and should be submitted in writing to Secretary, Technical Standards Board, SAE, 400 Commonwealth Dr., Warrendale, PA 15096."

5.4.2 The words "COMMITTEE DRAFT" shall be appended to the document number and date on the top of every page.

5.5 SAE Technical Data Report—A documentation of technical and nontechnical information that is intended to support the content of an SAE Technical Report. Examples include: rationale reports, results of round robin or field testing, and compilations of industry research results. They may also report on state-of-the-art technology or be a technology needs-assessment.

Technical Data Reports are published as ARDs (Aerospace Resource Documents) in Aerospace documents, and as RJs (Research J) in Surface Vehicle documents.

5.5.1 Research reports shall have a maximum life of 5 years. They cannot be revised or reaffirmed.

5.5.2 Research reports need not be in the format outlined in Section 7. However, they shall have at least the following content:

5.5.3 A statement of Scope indicating the nature of the report.

APPENDIX B –SAE DOCUMENTS RELATING TO DRIVERS

Table 3 lists all documents appearing under "drivers" in the table of contents of the year 2000 SAE Handbook. Also listed are several documents related to drivers not appearing under that heading. Most of these additional items appear in section 34 of volume 3 of the Handbook, where driver-related documents also appear. No claim that every driver-related document has been included, but the overwhelming majority of them are included, especially those commonly used. Documents are listed in numeric order and grouped into three sections: (1) standards, (2) recommended practices, and (3) information reports.

SAE identifies documents that describe how to do something (compute, estimate, determine, measure) or provide design criteria that must be followed and have reached broad consensus as Standards, in contrast to Recommended Practices, where acceptance is less broad or the data are more general. Documents that identify relevant literature are Information Reports.

Table 3. SAE Documents Relating to Drivers

Document #	Type	Title	Section & Page	Comments
J826	Standard	Devices for Use in Defining and Measuring Vehicle Seating Accommodation	3:34.109	Provides a means to determine key body-related locations
J2331	Standard	Operator's Field of View—Engineering Evaluation	3:340.137	Stationary test method
J2402	Standard	Symbols	3:34.260	Shows standard symbols
J100	Rec. Practice	Class "A" Vehicle Glazing Shade Bands	3:34.126	Establishes boundaries
J287	Rec. Practice	Driver Hand Control Reach	3:34.170	Describes boundaries of hand controls that can be reached (how to determine if)
J941	Rec. Practice	Motor Vehicle Driver's Eye Locations	3:34.272	Establishes location of driver's eyes for the purpose of measuring
J964	Rec. Practice	For Measuring Haze and Reflectance of Mirrors	3:34.131	Methods of determining
J1050	Rec. Practice	Describing and Measuring the Driver's Field of View	3:34.278	Methods to describe and measure
J1052	Rec. practice	Motor Vehicle Driver and Passenger Head Position	3.34.396	How to determine where heads are located
J1091	Rec. Practice	Earthmoving Machinery—Operator's Field of View	3:40.129	Establishes a test method

Document #	Type	Title	Section & Page	Comments
J1138	Rec. practice	Design Criteria–Driver Hand Controls Location for Passenger Cars, Multipurpose Passenger Vehicles, and Trucks (10,000 GVW and under)	3:34.211	Where controls should be placed and how to label them
J1139	Rec. practice	Direction-of-Motion Stereotypes for Automotive Hand Controls	3:34.214	"provides design recs" for controls
J1516	Rec. Practice	Accommodation Tool Reference Point	3:34.328	How to determine accommodation points
J1517	Rec. Practice	Driver Selected Seat Position	3:34.332	Estimate where % of drivers position seats
J1521	Rec. Practice	Truck Driver Shin-Knee Position for Clutch and Accelerator	3:34.345	Describes 2D contours (to estimate)
J1522	Rec. Practice	Truck Driver Stomach Position	3:34.348	Describes how to determine
J1750	Rec. Practice	Describing and Evaluating the Truck Driver's Viewing environment	3:34.205	Establishes method to describe and evaluate
J1903	Rec. practice	Automotive Adaptive Driver Controls, Manual	3:34.255	Procedure to assure controls provide driving capability to disabled (how to)
J1967	Rec. Practice	Retroreflective Materials for Vehicle Conspicuity	3:34.136	Establishes test procedures
J985	Info Report	Vision Factors Considerations in Rear View Mirror Design	3:34.134	Provides additional information
J1606	Info report	Headlamp Design Guidelines for Mature Drivers	3:34:286	Provides info to supplement J1383
J1980	Info Report	Guidelines for Evaluating Out-of-Position Vehicle Occupation Interactions with Deploying Airbags	3.33.60	How to test, but not a Recommended Practice due to lack of real world data
J2054	Info Report	Vehicle and Control Modifications for Drivers with Physical Disabilities Terminology	3:34.253	Collection of definitions
J2119	Info report	Manual Controls for Mature Drivers	3:34.219	Summarizes data
J2217	Info Report	Photometric Guidelines for Instrument Panel Displays that Accommodate Older Drivers	3:34.287	Provides introductory information

Document #	Type	Title	Section & Page	Comments
J2338	Draft report	Recommendations of the SAE Task Force on Headlamp Mounting Height	2:24.119	Tech report–research results