New SAE quick charge EV connector standard gaining momentum

Electric car manufacturers in the U.S. are leaning toward the adoption of a new quick-charge connector standard proposed by SAE International, according to recent reports. This charge format provides for a single, multi-function interface built into the vehicle, rather than two separate plugs.

“Automotive companies are lobbying for only one opening for powering the car to allow for cleaner design,” said Craig Childers, a zero-emissions specialist at the California Air Resources Board, as quoted on the All Cars Electric website.

As Jack Pokrzywa, Director of SAE International’s Ground Vehicle Standards program explained to Electric Vehicle Update, “The approach in the U.S., which is also gaining more support in Europe, is to have a combination coupler that will be an AC as well as a DC standard.” The SAE J1772™ combo-coupler charging standard is being developed through a consensus based process with the participation of more than 100 international stakeholders from car manufacturers, electric utilities, EV charging station companies, suppliers, and software companies. This standard is estimated to be approved and released around the beginning of 2012.

The proposed SAE J1772™ combo-coupler is designed to accommodate AC L1 & L2 and DC L1 & L2 charging all in a single vehicle inlet. Vehicles using this coupler could be capable of being charged at 12 amp - from a regular 110 VAC wall outlet (1.4kw), up to 80 amp @ 240 VAC (19.2kw) or up to 200 amp – 200 to 450 VDC 90kw DC. Communications between the vehicle and off-board charger as well as communication between the vehicle and smart grid will be done by Power Line Carrier.
(PLC) technology and requires no extra pins in the coupler. The communications technology also enables other customer focused features such as accessing the vehicle infotainment system to download multimedia files or receive diagnostic information from the vehicle. Other DC L2 charging system proposals require a separate coupler for AC and DC charging as well as unique control interfaces of AC and DC charging. The SAE Combo solution represents an integrated solution to charging allowing for future customer features enabled by communication with the vehicle.

The proposed SAE J1772™ combo coupler design provides interchangeability of the J1772™ AC level 1 and AC level 2 charge connector currently used by OEM’s. The adaptability of the new J1772™ combo-coupler receptacle to the previous J1772™ design connector provides OEMs and EVSE suppliers with cost effective options.

Current J1772™ AC Level 1 & 2 EV Charge Connector

 combo-coupler receptacle to the previous J1772™ design connector provides OEMs and EVSE suppliers with cost effective options.

**J1772 Task Force lead instructs SAE webinar in August**

Gery Kissel, Task Force Lead for J1772 (Electric Vehicle and Plug-in Electric Vehicle Conductive Charge Coupler) will be the instructor for a new SAE Webinar titled “Plug-In Vehicle Conductive Charging, SAE J1772 Explained” on August 9 and 11, 2011.

Gery Kissel to instruct upcoming SAE webinar "Vehicle and Plug-in Electric Vehicle Conductive Charge Coupler"

The webinar will cover the details behind the J1772 conductive charging interface, looking at overall plug-in vehicle charge strategy, electric safety strategy, electrical and physical interface requirements, and control strategy.

In addition to the J1172 Task Force, Mr. Kissel is active in numerous SAE standards committees. He is the Task Force Co-Lead for J2894 (Vehicle On-Board Charger Quality), and a member of the Fuel Cell Standards Committee, the Hybrid Committee, and the Fuel Cell Safety Workgroup. He was the former Task Force Lead for J1776 (Recommended Practice for Electric and Hybrid Electric Vehicle Battery Systems Crash Integrity Testing).

Several members of the Hybrid Committee were also consulted and approved the proposal for this webinar.

The two-session webinar will be presented live via WebEx™ including a 90-minute session on August 9, 2011 and a two-hour session August 11, 2011. Both sessions begin at 10:30 a.m. ET. Attendees will gain enhanced knowledge of the properties of the Control Pilot and Proximity circuits and the vehicle and Electric Vehicle Supply Equipment (EVSE) control responses necessary for SAE J1772 compliance.

To register for this seminar visit at the SAE website at http://www.sae.org/pdevent/WB1046
IEEE Standards Association and SAE International agree to collaborate on Smart Grid and vehicle-electrification standards

The IEEE Standards Association (IEEE-SA) and SAE International recently signed a memorandum of understanding (MOU) to establish a strategic partnership in vehicular technology related to the Smart Grid. In doing so, IEEE-SA and SAE International are striving to create a more efficient and collaborative standards development environment for the industry participants that they serve.

“Our stakeholders have keen interest in the Smart Grid because it’s the infrastructure needed to recharge hybrid and electric vehicles,” said Jack Pokrzywa, director of global ground vehicle standards with SAE International. “IEEE-SA is a natural partner for us in this area because of its international leadership position in Smart Grid standards development. Closer collaboration between SAE International and IEEE-SA will benefit industry by accelerating more meaningful standards that drive greater improvements in market access, cost reductions and technological innovation.”

Both SAE International and IEEE-SA already have made significant contributions in standards in areas such as plug-in electric vehicles (PEVs), vehicle-to-grid (V2G) communications and power and the Smart Grid. SAE International Ground Vehicle Standards Technical Committees are leading the vehicle transportation industry in the development of standards to provide safer processes and practices for effective implementation of hybrid/electric vehicles. A total of 24 SAE International Ground Vehicle electrification committees with over 780 members have developed 46 standards and are currently working on over 30 new standards in process.

IEEE, the world’s largest professional association advancing technology for humanity, has more than 100 standards and standards in development relevant to the Smart Grid, including more than 20 named in the U.S. National Institute of Standards and Technology (NIST) Framework and Roadmap for Smart Grid Interoperability Standards. Under terms of the MOU signed by IEEE-SA and SAE International in February 2011, each organization will share its draft standards related to the Smart Grid and vehicle electrification for input from the other.

“We are very excited about the potential of this strategic partnership with SAE International in vehicular technology related to the Smart Grid,” said Judith Gorman, managing director, IEEE Standards Association. “By establishing an environment for closer collaboration with this globally recognized thought leader in the mobility industry, both IEEE-SA and SAE International will be able to more quickly roll out better standards. And that translates into faster realization of the revolution that the Smart Grid promises in terms of production, delivery and use of electricity for industry and consumers alike worldwide.”
GM Chairman and CEO Akerson touts standards development

The development, adoption, and promotion of standards was emphasized by Dan Akerson, Chairman and CEO of General Motors Corporation, during his address at the SAE 2011 World Congress Banquet on April 14.

“It’s very important that we work together, with SAE, to develop and promote common standards for the industry as a whole,” Akerson said. “Common standards allow the industry to achieve better results sooner and more efficiently, and (they) accelerate acceptance of new products by the public at large.”

Akerson said that electric vehicle development is creating new sectors within the automotive industry, and that common standards will be important to the growth of those sectors. He cited the SAE-led effort to define a common electric vehicle conductive charging system (“the one now in use on the Chevy Volt,” he noted) as an example of how standards can facilitate growth in those new sectors.

“If we have to focus on meeting many different standards, we will fragment our engineering efforts and make it harder to achieve the results we all want to see,” Akerson said. “Let’s work together, let’s work through SAE, and let’s establish the standards that facilitate the electric vehicle industry we all want to see.”

An update on opposition to the recent EU proposal to WTO on international standards

A hot topic at recent meetings of many standards development organizations (SDOs), including many SAE International standards committee meetings, has been a controversial proposal recently made by the European Union (EU) delegation to the World Trade Organization’s (WTO) Negotiating Group on Non-Agricultural Market Access (NAMA).

The EU proposal expressed a strong preference for standards issued by organizations such as the International Organization for Standards (ISO) and International Electrotechnical Commission (IEC). In doing so, the proposal suggests that only these standards be recognized as “relevant international standards.”

SAE is one of the SDOs actively involved in monitoring this situation and making sure that the positions of SDOs are being heard. SAE’s Government Affairs Office consulted with the U.S. Chamber of Commerce, which sent an April 14th letter to the United States Trade Representative, National Security Council and National Economic Council, and Office of Management and Budget expressing “strong opposition” to the EU delegation’s proposal to the WTO. In addition, the U.S. Delegation to World Trade Organization has circulated a proposal in opposition to the EU proposal.

The Chamber of Commerce letter, signed by 20 trade associations including the American Automotive Policy Council, National Association of Manufacturers, Association of Global Automakers, and Renewable Fuels Association, states that EU’s proposal on international standards “restricts choice and flexibility, not only by naming their list of preferred standardizing bodies and suggesting that only standards developed by these bodies are relevant internationally within the context of the WTO Agreement on Technical Barriers to Trade, but by essentially requiring countries to use standards from those bodies.” SAE was instrumental in securing the signature of the Association of Global Automakers on the Chamber letter.

The letter concludes that “the EU NAMA proposal restricts flexibility and choice in the global standards marketplace” and urges the Office of the U.S Trade Representative to oppose it.

Similarly, the U.S. WTO delegation, in a March 28th communication to the WTO Negotiating Group on Market Access, wrote that the EU proposals would “put the World Trade Organization in the position of picking winners and losers among non-governmental, private sector bodies that produce standards.”

The U.S. delegation offered a counter proposal featuring text which reaffirmed earlier WTO agreements that defined international standards based on the concept of a “Committee Decision.”
This defined an international standard as one developed in accordance with six principles: openness; transparency; impartiality and consensus; relevance and effectiveness; coherence; and the development dimension. Standards developed by SAE International meet all the above requirements. Therefore, SAE is recognized as a global standards developing organization and fully supports the position of the U.S. delegation.

Second summit on safe implementation of electric vehicles scheduled for September 27-28

The National Fire Protection Association (NFPA) and SAE International will co-sponsor the 2nd Annual Electric Vehicle Safety Standards Summit September 27-28, 2011, at the Marriott Detroit Renaissance Center Hotel in Detroit, Michigan.

The 2nd Annual Electric Vehicle Safety Standards Summit is a continuation of the dialogue begun at last year’s groundbreaking Summit initiated in order to support the rapid implementation of electric and hybrid electric vehicles in North America. The Summit provides a forum in which all relevant individuals, organizations and agencies can contribute to the development of action plans regarding the codes and standards necessary to effectively address safety as it relates to electrified vehicles and their infrastructure.

Last year’s Summit led to the identification of three areas for action plan development: vehicle charging infrastructure; battery hazards identification and protection; and training for emergency responders. A summary report of last year’s Summit is available at http://www.nfpa.org/assets/files/PDF/Research/RFUSNEVSSSummit.pdf.

Safety representatives of vehicle and equipment manufacturers, fire protection specialists, electrical safety organizations and emergency responders, as well as governmental entities at the federal, state and local level involved in enhancing consumer safety and interagency communications, are encouraged to participate in the Summit.

“Hybrid-electric and electric vehicles continue to proliferate on our roadways and it is important to build on the positive progress now occurring in the safety infrastructure. We need to remain vigilant in our pursuit of safety on behalf of consumers and emergency responders while working closely with all who are trying to advance this important new technology,” said Christian Dubay, P.E., NFPA vice president codes and standards and chief engineer.

Dave Baxter, SAE Motor Vehicle Council Chair, said, “SAE International is pleased to collaborate with NFPA in hosting a summit that brings together key stakeholders to identify the necessary standards development activities and associated deployment strategies.”

Registration information will be available on the SAE International website at http://www.sae.org/events/nevss/.

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Engineering Aids from SAE

SAE provides products that support testing procedures set forth in SAE standards, Recommended Practices, Information Reports, and other SAE documents including the OSCAR H-Point Machine, which is used in the design of seating and interior packages and in conjunction with SAE J 826 (rev. 1995), FMVSS regulations, and ISO standards—making it the required design and auditing tool for current production.

Also available is the newly designed HPM II H-Point Machine, which includes enhancements over the OSCAR H-Point machine for use in advance design applications.

Available at http://store.sae.org/ea/
An economical pathway for joint venture research: the Cooperative Research Program of SAE

Cooperative research ventures serve to bring more minds to the challenges and issues faced by industry. The result is a more robust project than each participating organization could complete independently. The pooling of financial resources also affords each participant more efficient use of their research budgets and eliminates duplication of efforts. Whether moving forward on the development of fuel cell standards...researching alternative refrigerants to HFC 134a...or developing a database of human body measurements to foster ergonomic designs, SAE's Cooperative Research Program can assist your company in its collaborative research needs.

To learn more contact Gary Pollak, Program Manager +1-724-772-7196; gary@sae.org
SAE Ground Vehicle Standards “On The Road”

A re-cap of recent and upcoming events at which SAE will participate

- Jack Pokrzywa, SAE International Director of Ground Vehicle Standards, spoke at the Plug-In Electric Vehicle Infrastructure USA 2011 event, March 31-April 1, in San Diego, California. He also spoke at the ANSI Workshop on Standards and Codes for Electric Vehicles on April 5-6 in Bethesda, Maryland.

- Members of the HADD (Human Accommodations and Design Devices) Standards Committee Ron Rose and Meg Wallace, and SAE Ground Vehicle Standards staff member Keith Wilson made presentations at Ward’s Auto Interiors Conference on May 17 in Dearborn, Michigan.

- Robert Gaylen, Chair of the SAE Battery Standardization Steering Committee spoke at the IQPC Automotive Battery Technology Conference on May 9 in Wiesbaden, Germany. He is also scheduled to speak at the 2011 EV Battery Tech USA Summit on September 27-28 in Troy, Michigan.

- Jack Pokrzywa and SAE Ground Vehicle Standards staff member Peter Byk met with senior National Highway Traffic Safety Administration (NHTSA) staff members at NNHTSA Headquarters in Washington, DC on May 25 to discuss vehicle safety initiatives.

- Peter Byk made a presentation to the U.S Department of Commerce on May 25 in Washington, DC, discussing SAE standards for electric vehicle technology and smart grid development. He and Keith Wilson also attended the Michigan DOT Connected Vehicle Conference on June 1 in Dearborn, Michigan.


- SAE participated in the ANSI (American National Standards Institute) Electric Vehicle Standards Panel on June 201-21 in Detroit, Michigan. The meeting was held to initiate work on a strategic roadmap identifying the standards and conformity assessment programs needed to enable the widespread acceptance and deployment of electric vehicles and associated infrastructure in the United States. SAE Ground Vehicle Standards staff members chaired three work groups on energy storage systems, vehicle components, and vehicle user interface.

- SAE International recently provided comments to the International Trade Administration pertaining to regulatory cooperation between the United States and the European Union that would help eliminate or reduce unnecessary divergences in regulation and in standards used in regulations that impede U.S. exports.

Standards Consortium Administration

With over a century of experience providing the common engineering requirements for new mobility vehicles, SAE can be a key component in developing any consortium-based activity, providing the expertise and worldwide technological and human resources to help you turn your vision into a successful operating reality. Each client maintains its desired degree of autonomy, flexibility, and control. Client/project-tailored services include:

- A legal framework
- Fiscal oversight
- Policy and procedure development
- Publishing and distribution services
- Marketing and public relations activities
SAE: A Global Partner in Standards Development

In addition to the maintenance and development of its family of technical standards, SAE International is also an active partner with other standards development organizations, government agencies, and regulatory bodies to support the newest, most robust, and comprehensive standards products for a changing global marketplace.

- US Department of Transportation
- Society of Automotive Engineers of Japan (JSAE)
- German Electrical and Electronic Manufacturers Association (ZVEI)
- US Federal Highway Administration
- China Automotive Technology & Research Center (CATARC)
- National Highway Traffic Safety Administration
- Korean Agency for Technology and Standards (KATS)
- US Department of Energy
- Japan Automobile Research Institute (JARI)
- US Environmental Protection Agency
- Brazilian National Standards Organization (ABNT)
- American National Standards Institute (ANSI)
- Automotive Electronics Council (AEC)
- International Organization for Standardization (ISO); US representative

SAE participates in APEC Smart Grid Interoperability Meeting

Jack Pokrzywa, SAE International Director of Ground Vehicle Standards, spoke about standards for electric vehicles and the need for international harmonization of such standards at a meeting of the APEC (Asia-Pacific Economic Cooperation) Regulatory Cooperation Advancement Mechanism on Trade-Related Standards and Technical Regulations (ARCAM) on May 12-13 in Big Sky, Montana.

The ARCAM “Dialog on Smart Grid Interoperability Standards” brought together trade officials, regulators, and private sector stakeholders to discuss actions that APEC member economies can take to prevent trade barriers related to Smart Grid interoperability standards.

SAE was invited by the U.S. Department of Commerce to participate in this meeting. The meeting was presided over by George Arnold, National Coordinator for Smart Grid Interoperability at the National Institute of Standards and Technology.

At the session titled “Case Study – Electric Vehicles,” Pokrzywa discussed the need for cooperation between standards developing organizations (SDOs) in order to open up electric vehicle markets, reduce costs and improve reliability. Without harmonization, he said, vehicle OEMs will have to package different charge receptacles and have different vehicle controls.

As a result of this meeting, “SAE gained visibility in countries that had no idea SAE existed, or that we developed standards for electric vehicles,” Pokrzywa said.
Volunteer spotlight: SAE Awards

Congratulations to the following SAE 2011 Technical Standards Board Outstanding Contribution Award winners...

**Gary B. Bessee**, Southwest Research Institute, Motor Vehicle Council

**Francine Bovard**, Alcoa LLC, Materials, Processes & Parts Council

**Michael Duoba**, Argonne National Laboratory, Motor Vehicle Council

**Walker H. Flint**, Construction, Agricultural & Off-Road Machinery Council


**Richard Edward Kuhlman**, Fuels and Lubricants Council

**Dr. David A. Lamb**, US Army TARDEC, Materials, Processes & Parts Council

**Alan Leupold**, CNH Global NV, Construction, Agricultural & Off-Road Machinery Council

**Joseph D. Miller**, TRW Automotive US LLC, Motor Vehicle Council

**Prof. Kin P. Moy**, Youngstown State University, Motor Vehicle Council

**Walter Ross**, Specialized Vehicle & Equipment Council

**Larry L. Smith**, Infineum USA LP, Fuels & Lubricants Council

**Frank J. Wassilak**, Motor Vehicle Council

Nominate a deserving individual for an SAE award

As our most valued resource, those engaged in SAE's mission are best qualified to identify outstanding achievements made by their peers. Look closely at those with whom you work. Honor their excellence and celebrate their dedication and consider nominating them for one of the following SAE awards related to the work of the SAE Standards Development process. Submit nominations at www.sae.org/awards Need assistance with an award nomination? Contact the SAE Awards staff at awards@sae.org, 1-877-606-7323 (U.S. and Canada only) or 1-724-776-4970 (outside U.S. and Canada).

**Henry Souther Standards Award**

Nomination Deadline: August 31

Honoring Henry Souther, 1911 SAE President and known as the father of the SAE standards, this award acknowledges accomplishments in standards development in the disciplines of environment, safety, materials, testing and emissions. It is administered by the Environmental Award Committee under the auspices of the SAE Sustainable Development Program Committee.

**Technical Standards Board Outstanding Contribution Award**

Nomination Deadline: December 31

This award recognizes individuals for outstanding service in the technical committee activities of the Society. This includes valuable contributions to the work of SAE technical committees, unusual leadership in the activities of an SAE technical committee, significant contributions as a representative of the Society to the accomplishments of technical committees of other organizations or of government agencies, and outstanding contributions to SAE technical committee work in the form of research, test methods and procedures, and/or development of standards. It is administered by the SAE Technical Standards Board.
Gain a competitive advantage. Impact your bottom line. Invest in standards.

Standards. The workhorse documents that commonize practices, processes, and products throughout the ground vehicle industry are also paramount to the advancement of technology. Standards documents are more than the practices of today. They account for history and anticipate the future of technology, regulation, and business. The direct benefits of standards are simple in concept but extraordinary in their global impact toward ever-safer, cleaner, more efficient worldwide transportation.

**Technical standards enable and enhance:**
- consistent and clear expectations for product performance and reliability
- regulatory compliance
- consistent product quality
- compatibility and interoperability
- more efficient procurement

**Standardization also:**
- lowers trade barriers
- lowers purchasing costs
- decreases design time
- promotes innovation
- increases new technology speed to market

Because industry can rely on standards for globally harmonized solutions to common issues, individual companies can devote more time and resources to advance their proprietary technology. In this way, standards help foster competition, which advances the collective technology of industry and in turn, creates the need for new and revised standards. This has been the cycle for ground vehicle standards solutions.

And, at the heart of those solutions is SAE International, the recognized leader in mobility engineering for over 100 years. It plays the central role in developing North American automotive standards and a key role in bringing US documents to the global standards table, working hand-in-hand with the global community to advance industry.

While participation in the standards development process helps the advancement of the industry it can also contribute to the advancement of your company and personal career.

**Corporate Benefits**
- Input into the direction of the standards
- Competitive intelligence through advance knowledge of standard direction
- Advance warning of pending regulations and influence over the technical basis of the regulation
- Insight into the competitive environment
- Product liability protections
- Strong relationships with customers and suppliers
- Association with the leading society for advancing mobility technology

**Individual Benefits**
- Professional development from continuous working contact with peers
- Peer recognition for advancing your industry's sectors technologies
- Excellent networking and learning opportunities from product developers/users around the world
- Discover emerging technologies
- Contribute to the industry's body of technical knowledge

To learn more about SAE Technical Standards Development—and for a schedule of Technical Committee meetings—visit us on the web at
http://www.sae.org/standards/

**Become a better you. Volunteer for an SAE Standards Development Committee.**
Standards development committees seeking volunteers

**Chassis Systems**  Specifically, Electric Power Steering Committee; Hydraulic Brake Components Committee; Brake Linings Standards Committee; and Highway Tire Forum Steering Committee

**Electrical Systems**  Specifically, Vehicle E/E Systems Diagnostics; Electrical Distribution Systems Steering; Electrical Connectors Electrical Harness Covering; Electromagnetic Compatibility; Vehicle Network for Multiplex & Data Communications; Automotive Electronic Systems Reliability; Vehicle Flat Panel Display; Circuit Protection; Vehicle Electric Power Supply; Functional Safety; and Vehicle Electrical Systems Security

**Fuel Cells**  Specifically, Fuel Cell Performance

**Materials, Processes and Parts**  Acoustical Materials; Automotive Adhesives and Sealants; Carbon and Alloy Steels Committee; Metals Technical; Plastics; Spring; and Vibration Control

**Powertrain Systems**  Specifically, Battery Standardization; Gasoline Fuel Injection; Belt Drive; Vehicle and Engine Emissions Standards; and Filter Test Methods

**Service Development Technology Committee**

**Truck and Bus**  Specifically, Truck and Bus Wheel

**Vehicle Engineering Systems**  Specifically, Odometer / Speedometer; Exterior Sound Level; Vehicle Aerodynamics

**Vehicle Safety Systems**  Specifically, Seat Belt Systems, Inflatable Restraints

Express interest at http://www.sae.org/standardsdev/participationReq.ht

New committees, chairs & vice chairs

**Lenora Hardee**, Navistar Inc. – Chair, Truck and Bus Human Factors Committee

**Dennis Winn**, Orscheln Products LLC – Chair, Truck and Bus Corrosion Committee

**Thomas Livernois**, Design Research Engineering – Chair, Odometer and Speedometer Standards Committee

**Paul Aurand**, Performance Friction Corp. – Chair, Brake Lining Standards Committee

**David Antanaitis**, General Motors Corp. – Chair, Hydraulic Brake Components Standards Committee

**Mark Riefe**, General Motors Corp. – Vice Chair, Hydraulic Brake Components Standards Committee

**Michael Messman**, Clemson-ICAR – Chair, Tire Tests for Road-Load Tire Model Parameters Task Force

**Tom Forest**, General Motors Corp. – Chair, Vehicle Electrical System Security Committee

**Jack Danahy**, IBM – Vice Chair, Vehicle Electrical System Security Committee

**Dave Hartfelder**, General Motors Corp. – Chair, Functional Safety Committee

**Vehicle Electrical System Security Committee** – New Committee

**John Capp**, General Motors Corp. – Chair, Active Safety Systems

Upcoming Standards Technical Committee Meetings

A current schedule can be found on the SAE website.

http://www.sae.org/standards/
Volunteer recognition: Document Sponsors (April & May 2011)

The SAE Standards Development Program thanks its Document Sponsors. These individuals have served not only as active committee members but have dedicated their time and talent in guiding the development of standards documents from the preparation of all drafts through balloting and publication.

Thank you.

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Richard Wood, Solus-Solutions and Technologies
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Ground Vehicle Standards Committees & Staff Contacts

Match your expertise with the many SAE Technical Standards Development Committees that are writing the common engineering requirements for the advancement of the ground vehicle industry.

### Motor Vehicle Council
- **Powertrain Systems Group**
  - Air Cleaner Test Code Standards
  - All Wheel Drive Systems Standards
  - Automatic Transmission Friction
  - Battery Committee
  - Automatic Transmission Transaxle
  - Coaxial Transmission
  - Engine Cooling
  - Engine Oil
  - Engine Oil Additives
  - Engine Oil Test Procedures
  - Fuel Systems
  - Engine Fuel Injection Equipment
  - Driveline
  - Engine Power Test Code
  - Filter Test Methods
  - Fluids Systems
  - Ground Vehicle Standards Committees & Staff Contacts
  - Ground Vehicle Standards Committees
  - Motor Vehicle Council
  - Vehicle Safety Systems
  - Vehicle Engineering Systems
  - Vehicle Systems

- **Electrical Systems Group**
  - Vehicle E/E Systems Diagnostic
  - Electronic Design Automation
  - Vehicle Arch. for Data Communications
  - Vehicle Electronic Power Supply
  - Embedded Software
  - Automotive Electronic Systems Reliability
  - Vehicle Flat Panel Display
  - Electromagnetic Compatibility (EMC)
  - Electrical Distribution Systems Steering Council
  - Connector Systems
  - Cable Standards
  - Harness Covering
  - Circuit Protection & Switch Devices
  - Functional Safety
  - Automotive OEM EMC
  - Event Data Recorder

- **Green Technology Systems Group**
  - Green Bio-Materials Task Force
  - Green Technical Steering Committee

- **Service Development Technical Committee**
  - Service
  - Calibration
  - Tovability
  - Graphics Based Service Info

- **Cooperative Research Projects**
  - MAC Refrigerant Blends (OMB CRP)
  - Alternative Refrigerants
  - CRP12 Refrigerant Assessment
  - CRP10 Low GWP Refrigerants Assessment
  - High Temperature Battery Study
  - Emergency Vehicle Lighting
  - Truck Cab Anthropometric Study
  - On-Road Trauma
  - Vehicle Sound Level for Pedestrians
  - Plastic Materials for Use with H2 Fuel Cell Station Breakaways, Hoses, Fittings and Nozzles

- **Standards Derivative Program**
  - Road Vehicle Standards
  - Automobile Standards
  - Electronic Systems
  - Coaxial Transmission
  - Engine Cooling
  - Engine Oil
  - Engine Oil Additives
  - Engine Oil Test Procedures
  - Fuel Systems
  - Engine Fuel Injection Equipment
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  - Vehicle Engineering Systems
  - Vehicle Systems

- **Track & Bus Council**
  - Advanced & Hybrid Powertrain Steering
  - Alternative Fuels
  - Chassis
  - Transmission & Power Take-Off
  - Engines
  - Hybrid Safety
  - Hybrid Electric
  - Body & Occupant Environment Steering
  - Truck
  - Crashworthiness
  - Windshield Wipers & Climate Control
  - Human Factors
  - Electronic/Electronic Steering Control
  - Low Speed Communications Network
  - Control and Communications Network
  - Event Data Recorder
  - Electrical Systems
  - Brake and Stability Control Steering Council
  - Foundation Brake
  - Brake Actuator
  - Brake Systems
  - Electrificationally Controlled Brake Systems
  - Brake Supply and Control
  - Hydraulic Brake
  - Wheel
  - Stability Control Systems
  - Air Brake Tubing & Tube Fittings
  - Total Vehicle Steering
  - Tire Pressure Monitoring Systems
  - Corrosion
  - Vehicle Characterization
  - Coupling & Interchaingability
  - Noise, Vibration and Harshness (NVH)
  - Aerodynamics
  - Fuel Economy
  - Tire

- **Materials, Processes & Parts Council**
  - Automotive Corrosion & Prevention
  - Acoustical Materials
  - Fasteners
  - Metals Technical Executive Steering
  - Carbon & Alloy Steels
  - Metals Test Procedures
  - Automotive Iron Steel Castings
  - Short & Steep Steel
  - Elev Top Prop of Forged Metals
  - Automotive Adhesives & Sealants
  - Plastics
  - Spline B92
  - Spring Steering Crane
  - Cooling
  - Leaf Spring
  - Pneumatic Spring
  - Suspension Bar Spring & Stabilizer Bars
  - Textile & Flexible Plastics
  - Marine Technical Steering Council
  - Connecting Rods & Cranks
  - Connectors & Terminals
  - Automotive Electronic Systems Reliability
  - Automotive Electronic Systems Reliability
  - On-Road Trauma
  - Vehicle Sound Level for Pedestrians

- **Construction, Agricultural & Off-Road Machinery Council**
  - Common Tests Technical Steering
  - Cranes
  - Electrical
  - Components
  - Cool Weather Operations
  - Human Factors
  - Advisory Group
  - Driver Vision
  - Human Factors Steering Council
  - Functional Safety
  - Automotive OEM EMC
  - Event Data Recorder
  - Interchangeability
  - Noise, Vibration and Harshness (NVH)
  - Aerodynamics
  - Fuel Economy
  - Tire

- **Specialized Vehicle & Equipment Council**
  - Personal Watercraft
  - Small Engine & Powered Equip
  - Motorcycle
  - Marine Technical Steering Council
  - Marine Engine Fuel Systems
  - Marine Electrical Systems
  - Trailer
  - Gooseneck & Fifth Wheel
  - Tire Dynamics
  - Conventional Towing to 20,000 lbs
  - MBF
  - Commercial Vehicle Steering Council
  - Fluid Systems & Components
  - Piston Ring
  - Fuel Systems