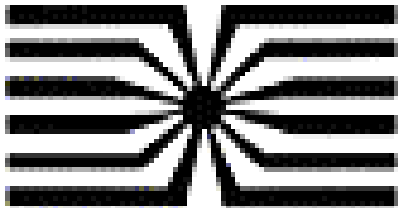


**FINAL
PROGRAM**

**49TH IEEE
HOLM
CONFERENCE
ON
ELECTRICAL
CONTACTS
2003**



**Omni Shoreham Hotel
Washington, DC**

September 8 – 10, 2003



**Sponsored by:
The Components, Packaging, and
Manufacturing Technology Society of The
Institute of Electrical and Electronics
Engineers, Inc.**

2003 HOLM CONFERENCE OFFICERS

CHAIRMAN

Paul Slade, EATON CORPORATION/CUTLER HAMMER

VICE CHAIRMAN

Henry Czajkowski, ROCKWELL AUTOMATION/ALLEN-BRADLEY

**FINANCE CHAIRMAN and CPMT TECHNICAL COMMITTEE 1
ELECTRICAL CONTACTS**

Gerald Witter, CHUGAI USA, INC.

TECHNICAL PROGRAM CHAIR

John Shea, EATON CORPORATION/CUTLER HAMMER

TECHNICAL PROGRAM VICE CHAIR

Pat Lees, TECHNICAL MATERIALS, INC.

**INTENSIVE COURSE DIRECTOR, and US REPRESENTATIVE for
the**

INTERNATIONAL CONFERENCE

Paul Slade, CUTLER-HAMMER INC.

**2003 HOLM TECHNICAL PROGRAM
COMMITTEE**

TECHNICAL PROGRAM CHAIR

John Shea, CUTLER-HAMMER INC., EATON CORP.

TECHNICAL PROGRAM VICE CHAIR

Pat Lees, TECHNICAL MATERIALS, INC.

Bill Balme, PROGRESSIVE SOLUTIONS

John Barsoum, AMES ELECTRO MATERIALS CORP.

Milenko Braunovic, MB INTERFACE

Z.K. Chen, CHUGAI USA, INC.

Stephen Cole, NORTHROP GRUMMAN POLY-SCIENTIFIC

Henry Czajkowski, ROCKWELL AUTOMATION/ALLEN-BRADLEY

Neil Aukland, DELPHI RESEARCH LABORATORIES

Chi Leung, AMI DODUCO

Robert Malucci, MOLEX INC.

Richard Moore, ITT/C&K SWITCH PRODUCTS

Michael Myers, SIGMUND COHN CORPORATION

Brett Rickett, MOLEX INC.

Thomas Schoepf, DELPHI AUTOMOTIVE SYSTEMS RESEARCH
LABORATORIES

Paul Slade, CUTLER-HAMMER INC.

Edward Smith, DERINGER-NEY

Philip Wingert

Gerald Witter, CHUGAI USA, INC.

Xin Zhou, EATON CORPORATION

2003 OPERATING COMMITTEE

Paul Slade, Chair
Henry Czajkowski, Vice Chair
Chi Leung, Past Chair
John Shea, Program Chair
Pat Lees, Program Vice-Chair
Gerald Witter, Finance Chair
Chi Leung, Publicity Chair

2003 AWARDS COMMITTEE

John Shea, Chair
Ed Smith III
Manfred Lindmayer

2003 AWARDS NOMINATING COMMITTEE

Neil Aukland, Chair
Chi Leung
Stephen Cole

2003 PRIZE PAPER AWARD COMMITTEE

Henry Czajkowski, Chair
Brett Rickett
Volker Behrens

2003 – 2004 ASSOCIATE EDITORS – CPMT

John McBride
Milenko Braunovic
Thomas Schoepf

PURPOSE

To provide a forum for the presentation and discussion of the latest developments in the field of electric contacts, as well as, the application of recent advances in materials and processes in electrical, electronic and telecommunications equipment.

FOR WHOM

Practicing designers, engineers, physicists, and research scientists-those new to the field and those experienced. The 2003 IEEE Holm Conference will include excellent papers authored by some of the outstanding technical people in this field. The international contributors come from the USA, Japan, China, Austria, France, Germany, United Kingdom, Canada, and Czech Republic. These papers will provide the attendees with up-to-date information on a wide range of subjects that makes this conference so attractive to the practicing engineer.

Additionally, the 2003 IEEE Holm Conference will make it possible for any attendee to discuss personally, with any author, either additional details concerning the work presented by the author at the conference or any subject related to the author's field of expertise.

BACKGROUND

The Holm Conference began in 1953 as a forum for the discussion of electrical contact phenomena and related fields. In 1968, the conference was named the Holm Conference in honor of Dr. Ragnar Holm. Dr. Holm, whose contributions to the field of electrical contacts spanned 50 years and forms the foundation of the electrical contacts field, was the inspiration and guide of the Conference from its inception until his death in 1970.

In addition to the Annual Conference, the Conference Organization regularly conducts an intensive one-week course on contacts and participates in the biannual International Conference on Electrical Contacts.

Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law, for private use of patrons, those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923. For other copying, reprint, or republication permission, write to the IEEE Copyrights Manager, IEEE Operations Center, 445 Hoes Lane, Piscataway, NJ 08855-1331. All rights reserved. Copyright © 2003 by The Institute of Electrical and Electronics Engineers, Inc.

REGISTRATION

All Participants are encouraged to pre-register to avoid lines at the conference and to obtain the discounted fee.

Advance Registration Prior to 8/8/2003	IEEE Member	\$520
	Non-member	\$545
	Student	\$ 90
	Extra Proceedings	\$ 70
After 8/8/2003 & On-Site	IEEE Member	\$570
	Non-member	\$595
	Student	\$100
	Extra Proceedings	\$ 70
	Monday Social	\$ 60

REGISTRATION HOURS

Sunday, September 7	4:00 p.m. – 6:00 p.m.
Monday, September 8	7:30 a.m. – 5:00 p.m.
Tuesday, September 9	8:00 a.m. – 5:00 p.m.
Wednesday, September 10	8:00 a.m. – 11:00 a.m.

Registration payments: Checks are to be made out to the IEEE HOLM in U.S. funds. Visa, MasterCard, American Express and wire transfers are also accepted. Please mail your payment along with the enclosed registration form to:

IEEE Holm Conference
IEEE Conference Management Services
445 Hoes Lane
Piscataway, NJ 08854
Or fax to +1 732 465 6447

For additional information please contact Holm Registrar, at +1 732 562 3870, via fax to +1 732 465 6447, or email: j.lambert@ieee.org

Conference registration includes admission to technical sessions, Welcome Reception, refreshment breaks, awards luncheon, and printed, hardcover book of Technical Proceedings.

WELCOME RECEPTION

All conference attendees are invited to register early and attend a welcome reception on Sunday, September 7 from 4:00 p.m. – 6:00 p.m. at the Omni Shoreham Hotel, Washington, DC.

HOTEL

The conference this year meets in Washington, DC at the Omni Shoreham Hotel where meeting facilities are well suited to the Conference Sessions and other activities. The hotel is offering special rates of \$179.00 US dollars single/double occupancy to conference attendees. Rates are subject to applicable state, local and occupancy taxes: approximately 14.5%. To make a reservation please call the Omni Shoreham Hotel at +1 202 234 0700 and identify yourself as part of the IEEE Holm Conference on Electrical Contacts in order to receive the special group rate. The special rate is valid until August 7, 2003, reservations received after this date are subject to space and availability.

Check in time: 4:00 p.m. Check out time: 11:00 a.m.

TRANSPORTATION

TRAVEL ARRANGEMENTS

Special discounted airfares for the **2003 Holm Conference** being held on September 8-10, 2003 in Washington, DC have been negotiated by **IEEE Global Travel Services**. **Discounts are as high as 20%** off the lowest published airfares with **Continental, American, and United Airlines**. If Saturday night stays or super-saver airfares are not applicable, deeply discounted airfares are available. Discount code A606098 entitles attendees to receive special rates that have also been negotiated with **Avis Rental Car Company**.

Travel arrangements using the negotiated air carriers or the carriers of your choice can be made through IEEE Global Travel Services by **calling between the hours of 8:30 a.m. and 5:30 p.m. EST. Monday through Friday. Within the US and Canada, call (800) TRY-IEEE, (+1 800 879 4333); and outside of the US and Canada, call +1 732 562 5387**. Or, you may visit their on-line travel service web site at <http://www.ieeetravelonline.org>. This secure site offers simple and convenient service through which you can search, reserve, and ticket your travel anytime, anywhere. Or, you can e-mail your request to travel-team@ieee.org.

You may also your fax requirements to the IEEE Global Travel Services at + 732 562 8815. When faxing, please be sure to include your travel dates, departure, and return times, and phone and fax numbers. A Travel Counselor will contact you promptly.

LOCAL TRANSPORTATION

The Omni Shoreham Hotel is located in at 2500 Calvert Street, NW, Washington, District of Columbia 20008.

TRANSPORTATION FROM AIRPORTS

Taxis:

Cost is \$15-\$18 from Ronald Reagan National Airport, \$50 from Dulles International Airport, \$70 from Baltimore-Washington International Airport.

There is also a Super Shuttle available from all three airports with the following fees: \$10 from Ronald Reagan Washington National Airport, \$20 from Dulles International Airport, \$30 from Baltimore-Washington International Airport.

Driving:

If you are arriving by your own transportation and you wish to park at the Omni Shoreham Hotel valet parking at \$26/day and self parking at \$22/day are available. For specific driving directions, consult Mapquest at <http://www.mapquest.com> or call the hotel directly at +1 202 234 0700.

The hotel is located steps away from restaurants, shopping and the Metro. Take advantage of some of the most popular and historic sites in America, including the National Mall, the Lincoln Memorial and the Vietnam Veterans Memorial. All are only 10 minutes away. The guest rooms feature hairdryers, cable TV, work desks, two dual-line phones with modem/dataport, and in-room safes.

SOCIAL EVENTS

Dinner at Tony & Joe's Seafood Place

Please join us for dinner. Located in Georgetown's Washington Harbour, Tony & Joe's Seafood Place is romantically situated on the banks of the Potomac River with a great view of the Kennedy Center, the Key Bridge and beautiful Roosevelt Island.

Bus transportation will be provided from the Omni Shoreham Hotel to Tony & Joe's Seafood Place. The bus will depart the hotel at 6:00pm and return at 10:00pm.

Dinner will include:

Maryland Crab Soup
Garden Salad
Roasted Potatoes or vegetables

And your choice of entrée:

Broiled Seafood Platter
Broiled Salmon
Filet Mignon
Maryland Style Crabcakes
Stuffed Founder with Crabmeat
Chicken Florentine
1 ½ lb Lobster

Topped off by Tiramisu or Fresh Fruit

\$60.00 per person, including tax and gratuity

After dinner feel free to walk around and enjoy the view.

Capitol River Cruises

This evening attendees may walk a short distance to the Capitol River Cruises at Washington Harbor on the water (Georgetown at 31st & K Street, NW) to see some of the most spectacular views of Washington from the Potomac River. Cruises last for approximately 45 minutes with historical narration. You will see the Kennedy Center, Key Bridge, Memorial Bridge, Roosevelt Island, Washington Monument, LBJ Memorial, Jefferson Memorial, US Capitol, The Watergate, Lincoln Memorial, Maritime Memorial, Custis-Lee Mansion.

Daily departure schedules are on the hour. Rates are \$10 per adult, \$5 Children (3-12). Last cruise is at 8:00pm.

IEEE Holm Conference Ragnar Holm Scientific Achievement Award Nomination Guidelines

History: The Ragnar Holm Scientific Achievement Award was created by the 1971 Holm Conference Steering Committee in honor of the memory of Dr. Ragnar Holm, the founder of the modern science of electrical contacts. This award is to be granted to the living scientist or engineer who has made significant contributions to the theory or practice of electrical contacts, or for work in related technologies which is directly applicable to contacts. In considering a person's work and selecting a recipient preference will be given for: a.) Nominees that have made contributions to the technology over many years, b.) the originality and scientific importance of contributions, and c.) achievements that have found a high degree of practice. Provided worthy candidates are found, the Award will be granted annually.

Eligibility: Any person may be nominated for this award regardless of IEEE membership. Members of IEEE Holm Awards and Nomination Committee are not eligible to be considered for the award while serving on these committees. Nominations are not accepted for persons deceased. Candidates must have made contributions to the electrical contact field for a period spanning at least ten years.

Nominator Eligibility: Any person may nominate a candidate for this award, with the following exception: members of the award committee.

Nomination Support Materials:

Endorsers: At least two letters of endorsement are required. One is from the nominator and the others are from the endorsers selected by the nominator. Endorsers should be in a position to substantiate the candidate's contributions by providing explicit detail from personal knowledge. The nominator is responsible for submission of the letters of endorsement.

Candidate Personal Data/Education/Work: "Name", provide complete name of candidate, not initials. "Personal", provide date of birth, and citizenship. "Education", list year and exact degree of institute. "Society Membership", list various professional society affiliations. Under society activities list officers and major committee work. "Professional History", list present occupation followed by previous career experiences. Indicate positions held, years, and briefly explain each responsibility.

Technical Accomplishments: "Technical Publications", such as books, papers, reports, and standards are to be listed in chronological order giving author's names, title, book, journal, or proceedings. "Patents", should be listed by date, number, title, and country of origin. Documentation authentication "Development of Products or processes", may be listed for items not covered by patents. "Technical Presentations", such as keynote addresses or courses developed by the candidate should also be listed.

Significant Contributions: Describe the candidate's outstanding contributions in terms of specific items. Provide a short paragraph to each one including a general description of the item, the degree of originality and creativity, and importance of the work to the electrical contact field and the time period over which the contribution was made. Also state cases of examples of practices which were developed or modified through contributions of the candidate.

Forward Nominations To: IEEE Holm Nominations Committee, c/o IEEE Holm Conference Administrator, 445 Hoes Lane, Piscataway, NJ 08854 USA

Nominations Deadline: November 15, 2003

HOLM 2004

The 50th IEEE Holm Conference on Electrical Contacts will be held September 20-24, 2004 at the Sheraton Hotel, Seattle, WA and in 2004 the Holm Conference will also host the 22nd International Conference on Electrical Contacts.

Prospective authors should submit a brief abstract (200 words maximum) in English, in word or pdf format before December 15, 2003 to the Holm Conference Administrator at the address listed below. Authors will be notified concerning acceptance of abstracts in mid-February 2004. The abstract must include: the author(s), organization(s) represented, correspondence authors' postal and electronic addresses, telephone and FAX numbers. Papers will not be reviewed if they do not include complete contact information.

Authors are to submit abstracts electronically in word or pdf format to the following address:
holm2004info@ieee.org

Important Dates

December 15, 2003	Abstract Deadline
February 13, 2004	Notification of Acceptance
April 9, 2004	Completed Paper Deadline
September 20, 2004	Conference Begins

Correspondence Address

IEEE Conference Management Services
50th IEEE Holm Conference (2004)
445 Hoes Lane
Piscataway, NJ 08854
tel: +1 800 810 4333 or +1 732 562 5350
fax: +1 732 981 1203
email: holm2004info@ieee.org

Holm Web site:

www.ewh.ieee.org/soc/cpmt/tc1/

MORTON ANTLER LECTURE

The Morton Antler Lecture is an annual lecture given at the IEEE Holm Conference on a topic of special interest to the electrical contact community. This lecture series was established in honor of Dr. Morton Antler, a long time member of the Holm Steering Committee and participant in the Holm Conference. Dr. Antler was a distinguished scientist and lecturer in the fields of electrical contacts, tribology, corrosion, and electrodeposition.

2003 Morton Antler Lecture

42 Volt Challenges: Technical Potholes on the Highway to Success

By Norman L. Traub
SAE International
Troy, Michigan

Norman L. Traub was named Director of 42 Volt Initiatives for SAE International on February 1, 2001. He was subsequently named Director of Electrical Initiatives in February, 2003.

Traub has lectured extensively on 42V electrical systems, including the SAE World Congress, International Power Electronics Conference, International Society of Automotive Transportation and Technology, IEEE Workshop on Power Electronics in Transportation and two international congresses on 42-V PowerNet. He was the moderator for 42-V Executive Panel sessions held during SAE World Congresses in 2001, 2002 and 2003. Global journalists from England, France, Germany and the USA also have interviewed Traub for his technical expertise and insight.

Currently, Traub holds the position of chairman of the 42-V Battery Connection System Specification Workgroup, a multi-national standards workgroup of vehicle manufacturers, battery suppliers and connection companies. He is a member of the MIT/Industry Consortium on Advanced Automotive Electrical/Electronic Components and Systems (50 multi-national companies). He is also the chairman of the SAE 42V Advisory Committee.

Traub began his career at the General Motors Research Laboratories in 1967 as a senior engineer in the electrical engineering department, where he became the holder of four U.S. patents and numerous research reports/publications in the areas of automotive multiplexing, large industrial drive systems, electric cars and automotive safety/security systems.

In 1978, Traub transferred to the former Packard Electric Division of GM in Warren, Ohio. His promotion to senior staff engineer in 1990 resulted in his assignment as head of the Systems Development Center. In 1996, Traub was appointed technology integration manager at Delphi Automotive Systems, Packard Electric Division.

Traub received his bachelor's degree in electrical engineering from Valparaiso University and his master's degree in electrical engineering from Michigan State University.

THE 49TH IEEE HOLM CONFERENCE ON ELECTRICAL CONTACTS CONTRIBUTORS

Sponsored by the
Components, Packaging and Manufacturing
Technology Society of The Institute of Electrical and
Electronics Engineers, Inc.

WITH COFFEE BREAK CONTRIBUTION FROM

AMI DODUCO
Brainin Advance Industries, Inc.
Chugai USA, Inc.
Deringer-Ney
Eaton / Cutler Hammer Vacuum Interrupters
ECL
Northrop Grumman Poly-Scientific
NYE Lubricants Inc.
Rockwell Automation / Allen-Bradley
Technical Materials, Inc.

WITH COOPERATION FROM

AMI DODUCO	Ishinomaki Senshu University
Auburn University	ISTEC-Superconductivity Research Laboratories
Beijing University of Posts and Telecommunications	Keio University
Brno University of Technology	Kogakuin University
Chitose Institute of Science and Technology	MB Interface
Delphi	Metalor Technologies SAS
Delphi Research Labs	Military Academy, Czech Republic
Delphi Automotive Systems	Molex Inc.
Eaton Corporation	Nippon Institute of Technology
Eaton Cutler-Hammer	Railway Technical Research Institute
Fujian Province Engineering Institute	Servocell PBT Ltd.
Fuzhou University	Square D Company
G&A Technologies, Inc.	Tyco Electronics AXICOM
Guilin Aerospace Apparatus Company	Tyco Electronics Technology
Harbin Institute of Technology	University of Rennes 1
HARTING KgaA	University of Southampton
Hirschmann Austria GmbH	University of the West of England
HSG-IMIT	University of Tokyo
Huazhong University of Science and Technology	

Technical Program

Monday, September 8, 2003

8:00 a.m.

INTRODUCTION and OPENING REMARKS

Paul Slade, 2003 Holm Conference Chair

8:10 a.m. – 9:10 a.m.

Holm Award

Fretting Corrosion Degradation, Threshold Behavior and Contact Instability, Robert D. Malucci, RD Malucci Consulting, IL

9:10 a.m. – 9:30 a.m.

Coffee Break

9:30 a.m. – 11:10 a.m.

Connectors

Chair: Roland Timsit

Co-Chair: John Shea

1.1 Experimental and Theoretical Investigations on Connector Insertion Phase

A. El Manfalouti, N. Ben jemaa, R. El Abdi, University of Rennes1, France; T. Reiss, Hirschmann Austria GmbH, Austria

1.2 3-D-Signal Integrity Simulation and Measurements on an Electrical Hermaphrodite Connector Interface

Achim Brenner, Horst F. Nowacki, HARTING KGaA, Germany

1.3 Investigate the Influence of Contact Impedance on Digital Signal Transmission by Computer Simulation Method

Chen Ya, Baisheng Sun, Beijing University of Posts & Telecommunications, China

1.4 Friction Behavior of Press-Fit Applications: Test Apparatus and Methodology

Ned Corman, Marjorie Myers, Charles Copper, Tyco Electronics Technology, PA

1.5 Modeling Early Stage Fretting of Electrical Connectors Subjected to Random Vibration

George T. Flowers, Fei Xie, Michael Bozack, Roland Horvath, Auburn University, AL; Robert D. Malucci, Bretton I. Rickett, Molex Inc., IL

11:10 a.m. – 11:30 a.m.

Coffee Break

11:30 a.m. – 12:30 p.m.

Sliding

Chair: Steve Cole

Co-Chair: Dick Moore

- 2.1 **Frictional Work as a Sliding Wear Evaluation Parameter**
Neil Aukland, Charles Harrington, Delphi, MI; George Drew, C. David Wright, Grant Wheeler, Delphi, OH
- 2.2 **Influence of Surface Roughness on Voltage Drop of Sliding Contacts under Various Gases Environment**
Takahiro Ueno, Noboru Morita, Nippon Institute of Technology, Japan; Koichiro Sawa, Keio University, Japan
- 2.3 **Influence of Small Slide Vibration over Au-Au Electric Contact Phenomenon**
Yu Yonezawa, Noboru Wakatsuki, Ishinomaki Senshu University, Japan

12:30 p.m. – 2:00 p.m.

Lunch on Your Own

2:00 p.m. – 3:20 p.m.

Breakers & Contactors

Chair: John Shea

Co-Chair: Henry Czajkowski

- 3.1 **Visual Measurements of Plasma Arc Modes in a High-Current Vacuum Arc with an Axial Magnetic Field**
Erik D. Taylor, Eaton Cutler-Hammer, NY
- 3.2 **Arc Root Mobility on Piezo-Actuated Contacts in Miniature Circuit Breakers**
K. Pechrach, J.W. McBride, University of Southampton, United Kingdom; P.M. Weaver, Servocell PBT Ltd., United Kingdom
- 3.3 **Investigations on Mass Change and Surface Morphology of Contacts in Electromagnetic Contactor**
Masaaki TAKASHIMA, Nahoko YAMAMURA, Koichiro SAWA, Keio University, Japan; Makoto HASEGAWA, Chitose Institute of Science and Technology, Japan; Yoshitada WATANABE, Kogakuin University, Japan
- 3.4 **A Novel Concept for Fault Current Tolerable Contactors**
Xin Zhou, Michael Little, Eaton Corporation, WI

3:20 p.m. – 3:40 p.m.

Coffee Break

3:40 p.m. – 4:40 p.m.

High Current Connectors

Chair: Werner Reider

Co-Chair: Xin Zhou

- 4.1 **Degradation of Power Contacts in Industrial Atmosphere: Plating Alternative for Silver and Tin**
Bella H. Chudnovsky, Square D Company, OH
- 4.2 **The Mathematical Models of Welding Dynamics in Closed and Switching Electrical Contacts**
S.N. Kharin, H. Nouri, T. Davies, University of the West of England, United Kingdom
- 4.3 **Effect of Intermetallic Phases on the Performance of Tin-Plated Copper Connections and Conductors**
M. Braunovic, MB Interface, Canada

6:00 p.m. **Social – Dinner at Tony & Joe's Seafood Place**

Tuesday, September 9, 2003

9:00 a.m. – 10:00 a.m.

Materials

Chair: Jerry Witter

Co-Chair: Thomas Schoepf

- 5.1 **Microstructure Effect on Reignition and Welding Properties of Copper-Tungsten Electric Contact**
Chi Leung, Eric Streicher, Dennis Fitzgerald, Dan Ilich, AMI DODUCO, PA
- 5.2 **The Composition Change of Contact Material Surface**
Wu Xixiu, Di Meihua, Li Zhenbiao, Huazhong University of Science and Technology, China; Liu Chengyan, G&A Technologies, Inc., China
- 5.3 **Welding Characteristics of Ag-based Contact Material Under Automobile Lamp Load**
Liu Xiangjun, Fei Hongjun, Fuzhou University, China; Feng Xiao, Fujian Province Engineering Institute, China

10:00 a.m. – 10:20 a.m.

Coffee Break

10:20 a.m. – 11:20 a.m.

Automotive Arcing

Chair: John McBride

Co-Chair: Z.K. Chen

- 6.1 **Mitigation of Connector Damage During Disengaging DC Loads Using Polymeric Arc Suppressor**

Thomas J. Schoepf, Rafil A. Basheer, Abdellah Boudina, Delphi Research Labs, MI; George A. Drew, Delphi Packard Electrical Systems, MI

6.2 Make Arc Erosion and Welding Tendency under 42 VDC in Automotive Area

L. Doublet, N. Ben Jemaa, University of Rennes1, France; F. Hauner, D. Jeannot, Metalor Technologies SAS, France

6.3 Mitigation and Analysis of Arc Faults in Automotive DC Networks

Thomas J. Schoepf, Malakondaiah Naidu, Suresh Gopalakrishnan, Delphi Research Labs, MI

11:30 a.m. – 12:30 p.m.

Morton Antler Lecture

42 Volt Challenges: Technical Potholes on the Highway to Success, Norman L. Traub, SAE International, MI

12:30 p.m. – 2:00 p.m.

Awards Luncheon

- Ragnar Holm Scientific Achievement Award

Dr. Robert Malucci

- Dr. Morton Antler Lecture

Norman L. Traub

- 2002 IEEE Holm Conference Erle Shobert Prize Paper Award

D. John J. Shea “Gassing Arc Chamber Wall Material Effect on Post Current-Zero Recovery Voltage Breakdown”

2:00 p.m. – 4:00 p.m.

Workshop on the Transition to a Lead-free Industry

Chair: Pat Lees

Legislative pressure to remove lead-containing materials from electronic products is rapidly increasing. The pending impact on the contact and connector community has prompted a great deal of research activity, including many screening evaluations of lead-free solders, lead-free plating finishes, and lead-free compatible manufacturing / processing strategies. This workshop is intended to help the attendee develop a better understanding of the relevant issues through a review that will include:

- background on the principal legislative initiatives
- reliability of lead-free solders
- reliability of lead-free solderable, contact, and press-fit plated interfaces
- plating chemistries / processes utilized for depositing lead-free finishes
- potential impact of lead-free finishes on the metal stamping process
- inevitable concerns about the formation of metallic whiskers from pure tin.

The workshop will commence with a series of short presentations by each panel member on the subjects mentioned above, and then the session will be opened up for a moderated, panel-like discussion driven by questions from the audience.

Panel Members-

Wayne Johnson, Auburn University

Pete Elmgren, Molex

Robert Hilty, Tyco Electronics

Neil Brown, Shipley

Jonathan Best, Delphi Packard Electric Systems

4:15 p.m. – 5:30 p.m.

TC1 Meeting

Chair: Gerald Witter

Wednesday, September 10, 2003

8:00 a.m. – 10:00 a.m.

Relays

Chair: Pat Lees

Co-Chair: Chi Leung

7.1 RF Performance of Ultra-miniature High Frequency Relays

Werner Johler, Tyco Electronics AXICOM, Austria

7.2 An Experimental Study on Operating Characteristics of Ag, Pd and Cu Contacts in Argon Atmosphere

Makoto Hasegawa, Kenta Imai, Chitose Institute of Science & Technology, Japan; Jiro Makimoto, Koichiro Sawa, Keio University, Japan

7.3 Research on the Analytical Method of Contact Vibration Performance of Reed Relay

ZHAI Guofu, REN Wanbin, XU Feng, Harbin Institute of Technology, China

7.4 Research on the Relationship between Contact Breakaway Initial Velocity and Arc Duration

LIANG Huimin, MA Guangcheng, CAI Ling, Harbin Institute of Technology, China; XIE Yong, XIE Guoqiang, Guilin Aerospace Apparatus Company, China

7.5 Testing of Low-Current Contacts Quality and Reliability by Using Third Harmonic Distortion

Karel Hajek, Military Academy, Czech Republic; Josef Sikula, Brno University of Technology, Czech Republic

7.6 Particle Impact Noise Detection in Sealed Relays Based on Neural Network

MA Guangcheng, YI Guoxing, WEN Qiyong, WANG Changhong, Harbin Institute of Technology, China

10:00 a.m. – 10:20 a.m.
Coffee Break

10:20 a.m. – 11:40 a.m.

MEMS & Hybrids

Chair: Milenko Braunovic

Co-Chair: Michael Myers

8.1 Hybrid Micromachined Push-Button Switches

Kai Hiltmann, Eugen Wolf, Hermann Sandmaier, HSG-IMIT, Germany

8.2 Contact Properties of Micromachined Ni Probes

T. Itoh, S. Kawamura, K. Kataoka, T. Suga, University of Tokyo, Japan

8.3 Development of Low-force Copper Contact Processes

Kenichi Kataoka, Toshihiro Itoh, Katsuya Okumura, Tadatomo Suga, University of Tokyo, Japan

8.4 Contact Resistance Characteristics of High Temperature Superconducting Bulk – II

Naoki Yamamoto, Takuya Imaizumi, Koichiro Sawa, Keio University, Japan; Masaru Tomita, Railway Technical Research Institute, Japan; Masato Murakami, ISTECSuperconductivity Research Laboratories, Japan

CONFERENCE REGISTRATION

49th IEEE Holm Conference on Electrical Contacts

September 8-10, 2003

Omni Shoreham Hotel, Washington, DC

Please print clearly or type or visit us at

www.ewh.ieee.org/soc/cpmt/tc1/

Family Name _____ First Name _____

Name to be printed on badge _____

Affiliation _____

Address _____

City _____ State _____ Postal Code _____

Country _____ e-mail _____

Telephone _____ Fax # _____

**To receive confirmation please enter a valid email address. If you do not have an email address confirmation will be faxed to you.

Circle One Fee/Items	Up to 8/8/03	After 8/8/03
IEEE Member Number _____	\$520	\$570
Non-member	\$545	\$595
Student	\$ 90	\$100
Extra Proceedings	\$ 70	\$ 70
Monday Social at Tony & Joe's	\$ 60	\$ 60
Seafood Place Monday Sept 8		

Enclosed:
Registration \$ _____
Extra Proceedings ____ @ \$70 = \$ _____
Monday night Social ____ @ \$60 = \$ _____
Total Enclosed \$ _____ (USD)

Meeting registration includes admission to technical sessions, refreshment breaks, awards luncheon and printed, hardcover book of Technical Proceedings.

ð CHECK – Make checks payable to IEEE/Holm 2003

Please note: IEEE will accept checks in any denomination as long as the conversion rate is equivalent to the United States Dollar amount listed above.

ð WIRE TRANSFERS please include conference name with the wire transfer information. Wire transfer information : 1. Fleet Bank Boston, Mass., USA. 2. Account # 8459001469. 3. IEEE Travel Services 4. ABA # L011000138

SPECIAL INSTRUCTIONS: Be sure to add appropriate wire transfer charges to the registration fees being transferred in order to avoid an outstanding balance. To insure proper credit to your account you MUST SPECIFY in the WIRE TRANSFER "TRANSFER DESCRIPTION" area the CONFERENCE AND ATTENDEE NAME. Upon completion of the transfer attach a copy of the transfer RECEIPT to copy of your registration and provide it to this office. THESE INSTRUCTIONS MUST BE FOLLOWED IN ORDER TO APPLY PAYMENT ACCURATELY TO YOUR FEES.

ð Am. Express ð Visa ð MasterCard ð Diners Club
Card # _____ Exp. Date _____
Signature _____ Name on Card _____

Form and registration payment must be received at IEEE by Aug. 25 2003. To pre-register, fill out this form and submit payment in US dollars to:

IEEE Holm Conference – IEEE Conference Management Services
445 Hoes Lane, Piscataway, NJ 08854

Phone +1 732 562 3870 Fax +1 732 465 6447 email:

j.lambert@ieee.org

Refund policy: There will be a \$50 service charge for processing refunds. Requests for refunds must be in writing and received no later than August 25, 2003. No refunds will be issued after Aug 25, 2003.

HOTEL RESERVATION FORM

49th IEEE Holm Conference on Electrical Contacts
September 8-10, 2003
Omni Shoreham Hotel, Washington, DC

Reservation Deadline: August 7, 2003
Special Conference Rate: \$179.00 single or double
Rates are subject to applicable state, local and
occupancy taxes: approximately 14.5%

In order to guarantee a room reservation for arrival after 3:00 p.m., the hotel requires a deposit of one night's stay by a major credit card or check. If you do not cancel your reservation before 4:00pm on the day of arrival you will be charged for one night's stay and tax.

Check in time: 3:00 p.m. **Check out time: 12:00**
noon
We accept American Express, Visa, MasterCard, Diners
Club

If you would like to call direct, please call reservations at +1 202 234 0700
Be sure to indicate that you are attending the IEEE Holm Conference on Electrical Contacts.

Please print clearly or type

Family Name First Name

Title

Affiliation

Address

City State Postal Code

Country Fax

Day Phone

Sharing with:

Last name First name

ARRIVAL DATE / TIME DEPARTURE DATE / TIME

Account Number Exp. Date

Name on Card

Signature

Mail to:
Omni Shoreham Hotel
2500 Calvert Street, NW
Washington, DC 20008 USA
Phone: +1 202 234 0700 Fax: +1 202 756 5120