

**Minutes**  
**Control Protocols Working Group**  
Saturday, 18 January 2003  
Dallas/Ft. Worth Airport Marriott South  
Ft. Worth, TX

**Chairmen:** Steve Carlson; High Speed Design, Inc.; P; MP  
Steve Terry; Electronic Theatre Controls; A; MP

**Recording secretary:** Karl G. Ruling; ESTA

**Members attending:** Alfred Langguth; Embedded Controls by Design, LLC; P; MP  
Arnold Tang; Arnold Tang Productions; P; U  
Brian Dowd; TMB; P; U  
Charles Reese; Vari-Lite, Inc.; P; MP  
Daniel W. Antonuk; Electronic Theatre Controls, Inc.; P; MP  
Dave Higgins; Pathway Connectivity Inc.; A; MP  
Doug Fleenor; Doug Fleenor Design, Inc.; P; MP  
Edward Paget; Jones & Phillips Associates, Inc.; P; G  
Edwin S. Kramer; I.A.T.S.E. Local 1; P; U  
Gary Douglas; Pathway Connectivity Inc.; P; MP  
George Kindler; Pelton Marsh Kinsella (Carter & Burgess, Inc.); P; G  
John ("Javid") D. Butler; Mainstage Theatrical Supply; P; DR  
Kevin Loewen; Pathway Connectivity Inc.; A; MP  
Michael A. (Sandy) Twose; AVAB America Inc.; A; MP (joined at this meeting)  
Michael Gonzales; Wrightson, Johnson, Haddon & Williams, Inc.; P; U  
Michael Lay; Strand Lighting (Strand Lighting Ltd.); A; MP  
Milton Davis; Doug Fleenor Design, Inc.; A; MP  
Mitch Hefter; Entertainment Technology (Genlyte Thomas Group), representing  
USITT; P; U  
Peter Willis; Howard Eaton Lighting Ltd.; P; CP  
Philip Nye; Engineering Arts; P; G  
Rick Leinen; Colortran (Leviton Manufacturing Co., Inc.); P; MP  
Robert Goddard; Goddard Design Co.; P; MP  
Roger Lattin; I.A.T.S.E. Local 728; P; U  
Scott M. Blair; Scott M. Blair, representing Hubbell Inc.; P; G  
Tobin Neis; Barbizon Companies; P; DR  
Tom Grimes; High End Systems, Inc.; P; MP  
Tracy Underhill; Electronics Diversified Inc.; P; MP  
Wayne David Howell; Artistic Licence (UK) Ltd.; P; MP

**Visitors:** Bill Price; Barbizon  
Robert Bell; Shock Lighting Limited

**Members not attending but sending regrets:** William Wagner; High End Systems  
Steve Unwin and Paul Mardon; Pulsar Ltd.

**1 Opening remarks**

The meeting was called to order by Steve Carlson at 09:00.

**2 Attendance and membership**

**2.1 Introductions of those present and taking attendance**

Steve Carlson asked those present to introduce themselves. As this was done a chartreuse and pink attendance sign-in sheet was circulated.

## 2.2 Determination of quorum

Steve Carlson looked at the crowded room and said that clearly we have a quorum.

## 2.3 Recognition of alternate voting members

Steve Terry reminded the alternates that they can't vote if the principal is voting. The rule is "One vote per company."

## 2.4 Requirements for membership

Terry reminded those present that membership is open to all who are affected by the work of the group. Voting members are required to attend meetings and to vote on letter ballots. Voting members and their alternates may not miss three consecutive meetings without a loss of voting status.

## 2.5 Processing of new membership requests

Steve Terry read the applications:

Hans Lau; AVAB America Inc.; P; MP

Yngve Sandboe; AVAB America Inc.; A; MP

Michael A. (Sandy) Twose; AVAB America Inc.; A; MP

Ohad Ashery; Compulite Systems; O; MP

Simeon Aladjem; Compulite Systems; O; MP

Yehuda Shukram; Compulite Systems; O; MP

Anders Ekvall; Transtechnik Lichtsysteme GmbH (Electronic Theatre Controls, Inc.); O; MP

Dennis Grow; I.A.T.S.E. Local 728; A; U

Alan M. Rowe; I.A.T.S.E. Local 728; A; U

James Eade; PLASA; P; G

Klas Dalbjorn; Labgruppen AB (TC Group); O; MP

Terry asked for a show of support for the applications. All were accepted by acclamation.

Charles Reese noted that he still works for the same company. Vari-Lite has been split with the manufacturing operations going to Genlyte Thomas, but the R&D section he is in is staying with Vari-Lite, which will be operating under the name of its production arm, VLPS.

The voting body during the meeting, including those not present, was thus:

Name	Company	Representing	Voting status	Int. cat.
John Sellers	AIM Northwest	AIM Northwest	P	G
Arnold Tang	Arnold Tang Productions	Arnold Tang Productions	P	U
Wayne David Howell	Artistic Licence (UK) Ltd.	Artistic Licence (UK) Ltd.	P	MP
Hans Lau	AVAB America Inc.	AVAB America Inc.	P	MP
Yngve Sandboe	AVAB America Inc.	AVAB America Inc.	A	MP
Michael A. (Sandy) Twose	AVAB America Inc.	AVAB America Inc.	A	MP
Tobin Neis	Barbizon Companies	Barbizon Companies	P	DR
George Kindler	Pelton Marsh Kinsella	Carter & Burgess, Inc.	P	G
Rick Szijarto	Cast Software	Cast Group of Companies, Inc.	P	CP
Doug Fleenor	Doug Fleenor Design, Inc.	Doug Fleenor Design, Inc.	P	MP
Milton Davis	Doug Fleenor Design, Inc.	Doug Fleenor Design, Inc.	A	MP
Ken Wagner	Doug Fleenor Design, Inc.	Doug Fleenor Design, Inc.	A	MP
Ed Jones	Edwin Jones Co., Inc.	Edwin Jones Co., Inc.	P	CP
Steve Terry	Electronic Theatre Controls	Electronic Theatre Controls, Inc.	A	MP
Daniel W. Antonuk	Electronic Theatre Controls, Inc.	Electronic Theatre Controls, Inc.	P	MP
Tracy Underhill	Electronics Diversified Inc.	Electronics Diversified Inc.	P	MP
James Johnson	Electronics Diversified Inc.	Electronics Diversified Inc.	A	MP
Alfred Langguth	Embedded Controls by Design, LLC	Embedded Controls by Design, LLC	P	MP
Philip Nye	Engineering Arts	Engineering Arts	P	G
Robert Goddard	Goddard Design Co.	Goddard Design Co.	P	MP
Tom Grimes	High End Systems, Inc.	High End Systems, Inc.	P	MP
William Wagner	Flying Pig Systems	High End Systems Inc.	A	MP
Steve Carlson	High Speed Design, Inc.	High Speed Design, Inc.	P	MP

Peter Willis	Howard Eaton Lighting Ltd.	Howard Eaton Lighting Ltd.	P	CP
Scott M. Blair	Scott M. Blair	Hubbell Inc.	P	G
John Huntington	I.A.T.S.E. Local 1	I.A.T.S.E. Local 1	A	U
Edwin S. Kramer	I.A.T.S.E. Local 1	I.A.T.S.E. Local 1	P	U
Roger Lattin	I.A.T.S.E. Local 728	I.A.T.S.E. Local 728	P	U
Dennis Grow	I.A.T.S.E. Local 728	I.A.T.S.E. Local 728	A	U
Alan M. Rowe	I.A.T.S.E. Local 728	I.A.T.S.E. Local 728	A	U
Richard Thornton Brown	Zero 88 Ltd.	i Light Group PLC	P	MP
Edward Paget	Jones & Phillips Associates, Inc.	Jones & Phillips Associates, Inc.	P	G
Rick Leinen	Colortran	Leviton Manufacturing Co., Inc.	P	MP
Ken Vannice	Colortran	Leviton Manufacturing Co., Inc.	A	MP
Tim Bachman	Leviton/Colortran	Leviton Manufacturing Co., Inc.	A	MP
John ("Javid") D. Butler	Mainstage Theatrical Supply - South	Mainstage Theatrical Supply	P	DR
Ole Bystrup	Martin Professional A/S	Martin Professional A/S	P	MP
Dave Higgins	Pathway Connectivity Inc.	Pathway Connectivity Inc.	A	MP
Gary Douglas	Pathway Connectivity Inc.	Pathway Connectivity Inc.	P	MP
Kevin Loewen	Pathway Connectivity Inc.	Pathway Connectivity Inc.	A	MP
Tony Douglas-Beveridge	PLASA	PLASA	A	G
James Eade	PLASA	PLASA	P	G
Paul F. Mardon	Pulsar Ltd.	Pulsar Ltd.	P	MP
Steve Unwin	Pulsar Ltd.	Pulsar Ltd.	A	MP
Richard Lawrence	Strand Lighting Ltd.	Strand Lighting Ltd.	P	MP
Michael Lay	Strand Lighting	Strand Lighting Ltd.	A	MP
Brian Dowd	TMB (NJ)	TMB	P	U
Mitch Hefter	Entertainment Technology (Genlyte Thomas Group)	USITT	P	U
Charles Reese	VLPS	Vari-Lite, Inc.	P	MP
Michael Gonzales	Wrightson, Johnson, Haddon & Williams, Inc.	Wrightson, Johnson, Haddon & Williams, Inc.	P	U
Mark Jensen	Wybron, Inc.	Wybron, Inc.	P	MP
		TOTALS	34	17 MP 3 CP 2 DR 6 U 6 G

Deletions from the last meeting include Woody Smith, who is no longer with Hubbell Entertainment, and David George of Spectrum Manufacturing, who was changed to observer at the last meeting. He has now been deleted from the membership entirely because his company has been sold to AC Lighting Ltd. and no application has been received from AC Lighting.

### 3 Approval of the minutes from the previous meeting

Mitch Hefter moved that the draft minutes of the October 2002 meeting be approved as written. The motion was seconded. Except for one abstention, the motion was accepted by a unanimous show of hands.

### 4 Reading of the call for patents

The following was read aloud by Steve Carlson:

"ESTA intends to publish no standard that contains protected intellectual property, unless that property can be licensed by anyone for a reasonable fee. ESTA uses a process of open patent disclosure to implement this intent. ESTA does not conduct patent searches and does not warrant that its standards contain no protected intellectual property.

"In keeping with the open disclosure policy, I ask if anyone present wishes to notify the working group of the existence of a patent or copyright that might protect material in a standard being developed by the working group. You need not be the holder of the patent or copyright in order to notify the working group of its existence."

No protected intellectual property issues were brought to the attention of the group.

### 5 The reading of the anti-trust statement

The following was read aloud by Steve Carlson:

"The ESTA Board of Directors, the Technical Standards Committee, and the leadership of this working group will reject or nullify any actions that unlawfully restrain trade. Anyone who feels

that such an action is being or has been taken is requested to bring that matter to the attention of the chair immediately. Anyone who feels that actions in restraint of trade have been taken and not properly annulled is requested to notify the TSC chair or ESTA president immediately.

"ESTA legal counsel has informed us that violations of the anti-trust laws can have serious consequences. Individuals engaged in certain unlawful conduct can be found criminally liable. An individual convicted of a criminal violation of the Sherman Act may be fined as much as \$100,000 and imprisoned for up to three years. An easy to read pamphlet describing restraint of trade issues is available from the Technical Standards Manager."

Karl Ruling waved some of the easy to read pamphlets above his head to show that they were available. There were no anti-trade issues brought to the attention of the assembly.

## **6 Approval of agenda**

Mitch Hefter asked for the addition of a discussion about the IEC version of E1.11 as 7.1.3. Ted Paget moved that the agenda be accepted with this addition. The motion was seconded. The motion was approved unanimously by a show of hands.

## **7 Old business**

### **7.1 E1.11**

#### **7.1.1 Public review comment resolutions**

Mitch Hefter moved that the suggested comment resolutions (CP/2002-1010) to the second review be accepted. The motion was seconded.

There was discussion in which Bob Goddard pointed out errors in which comment resolutions were not implemented in the draft E1.11 document version 6.0 or the marked-up version 5.8.

There was a long discussion of the resolution permitting the use of two-pair cable to feed two connectors on a panel, with only one pair going to each connector. This was in response to comments 84 and 85 in particular, but also was influenced by comments 55, 56, 60, and 82. A similar proposal to allow only poles 2 and 3 to be wired had been voted against in the November 2001 meeting, so the discussion included a consideration of whether the group would be wise to change previous decisions, as well as a discussion of the this particular set of resolutions.

There was also unhappiness expressed by some over the way their particular comments had been resolved.

The motion was defeated with a show of hands with 8 voting in favor and 16 voting against. (There were 26 voters present, so two did not vote.)

Bob Goddard moved that permanent cable plant wiring be withdrawn from the standard, that a new task group be set up to investigate DMX cabling issues, and that the meeting recess for two hours after the end of the completion of the agenda to allow the E1.11 task group to modify the documents per this proposal. The motion was seconded. The motion was approved by a show of hands with 19 voting in favor and five opposed.

Wayne Howell moved that there should be a new section in the BSR E1.11 standard under the receivers entitled "Rejection of improperly framed slots." The section shall read:

"A receiver shall check the first stop bit and should also check the second stop bit of all received slots to determine that they have the correct value. If a missing stop bit is detected, the receiver shall discard that and all following slots in the packet."

The motion was seconded. Howell explained why detecting framing errors was necessary. Slots with corrupt stop bits are not a problem in DMX512/1990 so many DMX512 devices don't read the stop bits, even though a complete reading of the DMX byte would include a reading of the stop bits. However, corrupt stop bits need to be detected with BSR E1.20 (RDM), and checking for them is

simply good engineering practice in any case. The motion was approved by a unanimous show of hands.

### **7.1.2 BSR E1.11, version 6.0**

Discussion on this was moot because of the actions taken under 7.1.1.

### **7.1.3 IEC and E1.11**

Mitch Hefter reported that he had received a question from IEC asking for the status of E1.11 and whether we still wanted to send this to IEC.

Eddie Kramer moved that we reaffirm our intention to submit E1.11 to the IEC after it is accepted by ANSI. The motion was seconded. There was discussion. The motion was accepted by a show of hands with all in favor except for one abstention, and none opposed.

## **7.2 E1.20 Remote Device Management with DMX512**

Scott Blair reported that the task group had done a demonstration at LDI, which generated a lot of interest. He also reported that there were problems with the discovery process with older DMX devices that don't detect framing errors. These problems caused glitches, but a solution has been found. There were also issues with the physical layer, but consensus has been reached on these.

Bob Goddard clarified that a RDM will be a subset of DMX. Its requirements will be more restrictive than those allowed in DMX, but will be within the range allowed by DMX.

## **7.3 E1.17**

### **7.3.1 Task Group report**

The status of the BSR E1.17 project was reported as part of the report on the Aarhus meeting in 7.3.2.

### **7.3.2 Aarhus meeting report**

Dan Antonuk reported that Martin had dropped their plan to develop an Ethernet-based BCN (Basic Control Network) when they found out what ACN would do and how far the ACN project had progressed. Martin had invited the members of the ACN task group and many manufacturers to visit Aarhus to learn more about ACN. Members of the task group gave a Power Point presentation on what ACN is and how it works. (This PowerPoint presentation is available and the consensus of the group was that it could be posted on the ESTA website.) The task group also showed some prototype code running on laptops. These prototypes are Windows programs that use SLP to do registration and discovery. SDT and DMP are in great shape, too, and use the wire very efficiently. The prototypes do not use a DDL as sophisticated as that described in October 2002, but they use a quick and dirty version. Antonuk says that most of the remaining work is in DDL. It is intended that DDL will be so much like XML that people who have written XML will immediately understand DDL. This will allow the existing tools for XML can be used on DDL.

Philip Nye explained that DDL is modular so that bits of descriptions can be used for describing a wide variety of different things. Antonuk explained that this also allows standardize descriptions to be used for a variety of devices. That is, complex proprietary devices can be described by building up a series of standardized properties modules. Antonuk expects to have a good version of DDL completed in a few months.

Antonuk asked for some help from anyone interested on how to write DDL so it can be used to talk to DMX devices in DMX. That is, DDL could be used within a DMX controller as a fixture library.

Nye also noted that the SDT document has been reorganized to make it more logically organized and readable.

## **7.4 IEEE report**

Steve Carlson reported on IEEE activities of interest to CPWG members.

The "Get 802 free" standards program is back. Agreement was reached with Board of Governors in July 2002. Standards will be published with a 6-month delay before the free version is released. If you want it right away, you have to pay; if you can wait, you can get it for free. For more info, see <http://standards.ieee.org/getieee802/>. You can get 802.3-2002 right now for free.

IEEE has a new patent policy, which requires the chairman of each working group to read the IEEE patent policy at each meeting, much as we do in our meetings. The patent policies are also similar, as both are based on ANSI patent policy.

The IEEE also has a policy of reminding working group members at each meeting of inappropriate topics in a series of bullet points presented in a slide:

- Don't discuss licensing terms or conditions
- Don't discuss product pricing, territorial restrictions or market share
- Don't discuss ongoing litigation or threatened litigation
- Don't be silent if inappropriate topics are discussed. Do formally object.

The D4.0 Sponsor Ballot for Carlson's project, P802.3af DTE Power via MDI, closed on 1 January 2003 and had a response rate of 77% (75% was required) and a 92% approval rate (75% is required). The task force met 7 - 9 January in Vancouver BC to resolve 343 comments. The next meeting is set to be in Milpitas, CA at the Cisco facility, 28 - 31 January to complete the D4. 1 draft for recirculation. The D5.0 draft should be finished in May for approval at the June STB meeting -- and then it will be finished!

The Ethernet First Mile project, P802.3ah, is in task force draft D1.3. The copper track is hung up waiting for a decision by the European T1E1.4 group on ADSL line code. The target date for the standard is July 2004. More info is available at <http://grouper.ieee.org/groups/802/3/efm/index.html>.

There is now a study group for 10GBASE-T. This is sending 10 gigabits/sec over up to 100m of UTP. Sponsors include Intel, Sun, Solarflare, and Plato Labs. It's chaired by Brad Booth of Intel. More info is available at <http://grouper.ieee.org/groups/802/3/10GBT/index.html>.

There is also a study group for 10GBASE-CX4. This is for a low-cost equipment-to-equipment interconnect at 10 gigabits/second using baseband signalling, using coaxial, twinax cable with four signaling lanes. Distances would be up to 15m. Sponsors include H-P (Agilent), 3Com, Cisco, and CDT. It's chaired by Dan Dove of H-P. Check it out at <http://grouper.ieee.org/groups/802/3/10GBCX4/index.html>.

There is also an Executive Committee Study Group for link security in 802 Networks. It's looking at possible physical layer encryption for all 802 networks and devices. It's chaired by Dolores Sala. Info on this is available at <http://grouper.ieee.org/groups/802/linksec/>.

Other IEEE projects, briefly:

- There is work on 802.15.4 for low-power, low-cost, 250Kbps radio links. It's in sponsor ballot.
- There is work on 802.11g, which would have a higher data rate than 802.11b (20Mbps). It's in sponsor ballot.
- There is also an 802.18, Radio Regulatory Technical Advisory Group, which is to work on coordination of all 802 wireless groups with global radio standards.

There is some work of note in ISO/IEC 11801 and TR- 42. There is work on a cabling standard for industrial and building automation, called IEC/ISO/JTC1\SC25\WG3 IPTG (Industrial Premises Task Group). The Technical Advisory Group contact for Europe is Alan Flatman ([a\\_flatman@compuserve.com](mailto:a_flatman@compuserve.com)), while the contact for North America is Dave Hess ([Dave.Hess@Berktek.com](mailto:Dave.Hess@Berktek.com)).

## **8 New business**

None.

**9 Other business**

None.

**10 Changes to observer status due to lack of attendance**

Voting members and alternates who together have missed the previous two meetings in a row and will be moved to observer if this meeting is missed:

John Sellers, AIM Northwest

Steve Terry announced that John Sellers is now an observer due to his chronic absence.

**11 Schedule for future meetings**

Steve Terry announced that the next meeting is scheduled for Thursday, 20 March 2003 at the Hilton Minneapolis.

Carlson then declared the meeting recessed until 16:00. At that time the meeting shall reconvene to discuss changes to the DMX document.

**12 Business after reconvening**

At 16:00 the meeting was reconvened. Mitch Hefter summarized the clauses in version 6.0 that were changed to make 6.1. All references to portable cabling and permanent wiring were removed, which went beyond the motion made earlier in the meeting. This change was discussed.

In response to the removal of the portable cabling clauses and the ensuing discussion, Ted Paget moved that all references to cabling, including portable cabling, be removed from the draft E1.11 standard and moved to another document. The motion was seconded. The motion was accepted by a show of hands, with 23 voting in favor and none voting against. There were two recorded abstentions, and the one chairman able to cast a vote also abstained.

Ted Paget moved that the comment resolutions document (CP/2002-1010) for the second public review of BSR E1.11 shall be accepted, with the exception of the resolutions for the following comments: 2, 42 through 58, 60, 64, 67, 79, and 82 through 86. The motion was seconded. The motion was accepted by a show of hands, with 22 voting in favor, two voting against, and one voting to abstain. (The one chairman able to cast a vote abstained.) The motion was accepted.

There was extensive discussion of Philip Nye's concerns about the need to state the addressing used in E1.11 explicitly. The data addressing scheme used in null start code packets depends on position. All packets go to all recipients. Each recipient identifies its data by its position in the packet. This is a very different scheme than is normally used in serial communications, so this needs to be made clear in the E1.11 document.

It was decided that the task group shall create a 6.1 version, a draft of the next draft, that the working group shall consider. This shall be done by January 31. The working group shall return approval or comments by February 14 to the task group. The task group shall prepare a revised document for distribution in time for the March meeting.

Gary Douglas moved that we create a cabling task group. The motion was seconded. Javid Butler volunteered to lead the task group. The motion was accepted by a unanimous show of hands, except for one abstention.

Philip Nye moved that the new task group, as its first task, shall produce documents specifying portable and fixed cabling for E1.11. Seconded. The motion was accepted by a show of hands with 24 voting in favor and none against. (The one chairman able to cast a vote abstained.)

Gary Douglas moved that the task group shall be directed to ensure that every 5-pin XLR connector shall have the primary and secondary data link wired. The motion was seconded. The motion was accepted with 11 in favor and 10 opposed, a vote that required the vote of the chairman Steve Carlson to break a tie. There were four abstentions.

**13 Adjournment**

Ted Paget moved that the meeting adjourn. The motion was seconded. The motion was accepted by acclamation. The meeting was declared adjourned by Steve Carlson at 17:51.



## Working Group Membership and Contact Information as of 2003-02-07

Name	Company	Representing	Voting status	Int. category
John Sellers	AIM Northwest	AIM Northwest	O	G
Arnold Tang	Arnold Tang Productions	Arnold Tang Productions	P	U
Wayne David Howell	Artistic Licence (UK) Ltd.	Artistic Licence (UK) Ltd.	P	MP
Steve Friedlander	Auerbach Pollock Friedlander	Auerbach Pollock Friedlander	O	U
Hans Lau	AVAB America Inc.	AVAB America Inc.	P	MP
Yngve Sandboe	AVAB America Inc.	AVAB America Inc.	A	MP
Michael A. (Sandy) Twose	AVAB America Inc.	AVAB America Inc.	A	MP
J. B. Toby	Avolites Ltd.	Avolites Ltd.	O	MP
Shahid Anwar	Avolites Ltd.	Avolites Ltd.	O	MP
Richard Salzedo	Avolites Ltd.	Avolites Ltd.	O	MP
Barbara Wohlsen	Barbara Wohlsen	Barbara Wohlsen	O	U
Tobin Neis	Barbizon Companies	Barbizon Companies	P	DR
Bernardo Benito Rico	Ben-Ri Electronica S.A.	Ben-Ri Electronica S.A.	O	MP
Lee J. Bloch	Bloch Design Group Inc.	Bloch Design Group Inc.	O	G
Soo-Myong Chung	Bloch Design Group Inc.	Bloch Design Group Inc.	O	G
Bradley Klinkrad	Bradley Klinkrad	Bradley Klinkrad	O	G
Ted Fregon	Bytecraft Pty. Ltd.	Bytecraft Pty. Ltd.	O	MP
Bill Ellis	Candela Controls, Inc.	Candela Controls, Inc.	O	U
George Kindler	Pelton Marsh Kinsella	Carter & Burgess, Inc.	P	G
Rick Szjarto	Cast Software	Cast Group of Companies, Inc.	P	CP
Marty Lazarus	Chicago Spotlight, Inc.	Chicago Spotlight, Inc.	O	G
Ohad Ashery	Compulite Systems	Compulite Systems	O	MP
Simeon Aladjem	Compulite Systems	Compulite Systems	O	MP
Yehuda Shukram	Compulite Systems	Compulite Systems	O	MP
Jason Friedman	Creative Realities, Inc.	Creative Realities, Inc.	O	G
David Bertenshaw	David Bertenshaw	David Bertenshaw	O	G
Bob Toms	Design Advantage LLC	Design Advantage LLC	O	G
Doug Fleenor	Doug Fleenor Design, Inc.	Doug Fleenor Design, Inc.	P	MP
Milton Davis	Doug Fleenor Design, Inc.	Doug Fleenor Design, Inc.	A	MP
Ken Wagner	Doug Fleenor Design, Inc.	Doug Fleenor Design, Inc.	A	MP
Gary Dove	Dove Systems	Dove Systems	O	MP
Jussi Kallioinen	Eastway Sound & Lighting	Eastway Sound & Lighting	O	U
Ed Jones	Edwin Jones Co., Inc.	Edwin Jones Co., Inc.	P	CP
Joost van Eenbergen	ELC Lighting	ELC Lighting	O	MP
Bill Fehrmann	Electrol Engineering, Inc.	Electrol Engineering, Inc.	O	MP
Daniel W. Antonuk	Electronic Theatre Controls, Inc.	Electronic Theatre Controls, Inc.	P	MP
Adam Bennette	Electronic Theatre Controls Ltd.	Electronic Theatre Controls, Inc.	O	MP
Hans Leiter	Transtechnik Lichtsysteme GmbH & Co. KG	Electronic Theatre Controls, Inc.	O	MP
Anders Ekvall	Transtechnik Lichtsysteme GmbH	Electronic Theatre Controls, Inc.	O	MP
Steve Terry	Electronic Theatre Controls	Electronic Theatre Controls, Inc.	A	MP
Tracy Underhill	Electronics Diversified Inc.	Electronics Diversified Inc.	P	MP
Paul Bennett	Electronics Diversified Inc.	Electronics Diversified Inc.	O	MP
James Johnson	Electronics Diversified Inc.	Electronics Diversified Inc.	A	MP
Alfred Langguth	Embedded Controls by Design, LLC	Embedded Controls by Design, LLC	P	MP
Philip Nye	Engineering Arts	Engineering Arts	P	G
Robert Goddard	Goddard Design Co.	Goddard Design Co.	P	MP
Sierk Janszen	Ground Zero	Ground Zero	O	U
Alan P. Symonds	Harvard College	Harvard University	O	U
Trevor Forrest	Helvar Lighting Control	Helvar Lighting Control	O	MP
Bill Hewlett	Hewlett Electronics	Hewlett Electronics	O	CP
Tom Grimes	High End Systems, Inc.	High End Systems, Inc.	P	MP
William Wagner	Flying Pig Systems	High End Systems Inc.	A	MP
Steve Carlson	High Speed Design, Inc.	High Speed Design, Inc.	P	MP
Peter Willis	Howard Eaton Lighting Ltd.	Howard Eaton Lighting Ltd.	P	CP
Scott M. Blair	Scott M. Blair	Hubbell Inc.	P	G
Edwin S. Kramer	I.A.T.S.E. Local 1	I.A.T.S.E. Local 1	P	U
John Huntington	I.A.T.S.E. Local 1	I.A.T.S.E. Local 1	A	U
Roger Lattin	I.A.T.S.E. Local 728	I.A.T.S.E. Local 728	P	U
Dennis Grow	I.A.T.S.E. Local 728	I.A.T.S.E. Local 728	A	U
Alan M. Rowe	I.A.T.S.E. Local 728	I.A.T.S.E. Local 728	A	U
Richard Thornton Brown	Zero 88 Ltd.	i Light Group PLC	P	MP
Gian Carlo C. Bartolotti	Ibeam SP / Banco de Eventos	Ibeam SP / Banco de Eventos	O	U

Geoffrey O. Thompson	Nortel Networks, Inc.	IEEE 802.3/Nortel Networks	O	G
Rob Johnston	Interactive Technologies, Inc.	Interactive Technologies, Inc.	O	MP
Larry Schoeneman	Interesting Products, Inc.	Interesting Products, Inc.	O	G
David Timmins	Jands Electronics	Jands Electronics	O	MP
Helge Hoffmann	JB Lighting	JB Lighting	O	MP
Edward Paget	Jones & Phillips Associates, Inc.	Jones & Phillips Associates, Inc.	P	G
John Mehlretter	Lehigh Electric Products Co.	Lehigh Electric Products Co.	O	MP
Mark T. Kraft	Lehigh Electric Products Co.	Lehigh Electric Products Co.	O	MP
Rick Leinen	Colortran	Leviton Manufacturing Co., Inc.	P	MP
Ken Vannice	Colortran	Leviton Manufacturing Co., Inc.	A	MP
Tim Bachman	Leviton/Colortran	Leviton Manufacturing Co., Inc.	A	MP
Klaus Amling	Licht-Technik	Licht-Technik	O	P
Andrew Sherar	Lightmoves PLC	Lightmoves PLC	O	MP
Gary Pritchard	LSC Lighting Systems PTY Ltd	LSC Lighting Systems PTY Ltd	O	MP
J. P. Steiner	Lutron Electronics	Lutron Electronics	O	MP
Jim Holladay	Luxence	Luxence	O	G
John ("Javid") D. Butler	Mainstage Theatrical Supply - South	Mainstage Theatrical Supply	P	DR
Ole Bystrup	Martin Professional A/S	Martin Professional A/S	P	MP
Hiroshi Kita	Marumo Electric Co., Ltd.	Marumo Electric Co., Ltd.	O	MP
David A. Boller	Organic Machines LLC	Organic Machines LLC	O	CP
William Benner	Pangolin Laser Systems	Pangolin Laser Systems	O	MP
Gary Douglas	Pathway Connectivity Inc.	Pathway Connectivity Inc.	P	MP
Dave Higgins	Pathway Connectivity Inc.	Pathway Connectivity Inc.	A	MP
Kevin Loewen	Pathway Connectivity Inc.	Pathway Connectivity Inc.	A	MP
James Eade	PLASA	PLASA	P	G
Tony Douglas-Beveridge	PLASA	PLASA	A	G
Mac Perkins	PNTA Inc.	PNTA Inc.	O	G
Paul F. Mardon	Pulsar Ltd.	Pulsar Ltd.	P	MP
Steve Unwin	Pulsar Ltd.	Pulsar Ltd.	A	MP
Stephen J. Tyrrell	Quantum Logic	Quantum Logic	O	MP
Douglas Franz	QVC Network	QVC Network	O	U
Charlie Richmond	Richmond Sound Design Ltd.	Richmond Sound Design Ltd.	O	CP
Kenneth Mockler	Sceno Plus	Sceno Plus	O	U
Mick Martin	ShowCAD Control Systems	ShowCAD Control Systems	O	MP
Jon R. Farley	Sixteenth Avenue Systems	Sixteenth Avenue Systems	O	CP
Robert Barbagallo	Solotech Inc.	Solotech Inc..	O	U
Ujall Kar	Standard Robotics & Lighting	Standard Robotics & Lighting	O	G
John Mitchell	Sterling Technical Services	Sterling Technical Services	O	U
Richard Lawrence	Strand Lighting Ltd.	Strand Lighting Ltd.	P	MP
Michael Lay	Strand Lighting	Strand Lighting Ltd.	A	MP
Paul K. Ericson	Syska Hennessy Group Lighting Design	Syska Hennessy Group Lighting Design	O	U
Stephen Bickford	T. Kondos Associates	T. Kondos Associates	O	U
Tad Trylski	Tad Trylski	Tad Trylski	O	U
Klas Dalbjorn	Labgruppen AB	TC Group	O	MP
Jerry Gorrell	Theatre Safety Programs	Theatre Safety Programs	O	G
Brian Dowd	TMB (NJ)	TMB	P	U
Colin Waters	TMB	TMB	O	U
Matt Stroud	University of Texas at Austin	University of Texas at Austin	O	G
Jason Potterf	University of Texas at Austin	University of Texas at Austin	O	G
Mitch Hefter	Entertainment Technology (Genlyte Thomas Group)	USITT	P	U
Charles Reese	VLPS	Vari-Lite, Inc.	P	MP
Eckart Steffens	Soundlight	VPLT	O	G
Eric Cornwell	West Side Systems	West Side Systems	O	U
Michael Gonzales	Wrightson, Johnson, Haddon & Williams, Inc.	Wrightson, Johnson, Haddon & Williams, Inc.	P	U
Mark Jensen	Wybron, Inc.	Wybron, Inc.	P	MP
John Sondericker III	Wybron, Inc.	Wybron, Inc.	O	MP

**Key to codes:** P principal voting member  
A alternate voting member  
I individual voting member  
O observer, non-voting

MP mass-market producer interest category  
CP custom-market producer interest category  
DR dealer or rental company interest category  
U user interest category  
G general-interest interest category