

MINUTES
Control Protocols Working Group
Saturday, January 23, 1999
Marriott Dallas/Ft. Worth
Irving, Texas

Chairs: Steve Carlson; Rosco/Entertainment Technology; Principal; Producer

Recording secretary: Karl G. Ruling, ESTA

Members attending: John Sellers; AIM Northwest; Principal; General interest
Tony de Rijk; Amazing Controls! Inc.; Principal; Producer
Peter Willis; Andera Ltd.; Principal; Producer
Wayne David Howell; Artistic Licence (UK) Ltd.; Principal; Producer
Tobin Neis; Barbizon Companies; Alternate; User
Tim Bachman; Barbizon Light; Principal; User
Lee J. Bloch; Bloch Design Group; Principal; General interest (joined at this meeting)
Doug Fleenor; Doug Fleenor Design, Inc.; Principal; Producer
Philip Nye; Engineering Arts; Principal; General interest
Robert Goddard; Goddard Design Co.; Principal; Producer
Dave Higgins; Gray Interfaces; Principal; Producer
Trevor Forrest; Helvar Lighting Control ; Principal; Producer (change of company affiliation)
Lary Cotten; High End Systems; Principal; Producer
Edward Paget; Jones & Phillips Associates, Inc.; Principal; General interest
Rick Leinen; NSI Corporation; Principal; Producer
Tim Cox; PLASA; Principal; General interest
George Kindler; PRG/Thoughtful Designs; Alternate; User
Bill Ellis; PRG/Vanco Lighting Services; Observer; User
Steve Unwin; Pulsar Ltd.; Alternate; Producer
Mitch Hefter; Rosco/Entertainment Technology (USITT rep); Principal; User
Eckart Steffens; SOUNDLIGHT (VPLT rep); Principal; General interest
Richard Lawrence; Strand Lighting Ltd.; Principal; Producer
Jerry Gorrell; Theatre Safety Programs; Principal; General interest
Brian Dowd; TMB Associates (NJ); Principal; Producer
Ken Wagner; Walt Disney Imagineering; Observer; User

1 Opening Remarks

Steve Carlson called the meeting to order at 9:05 a.m. He told the group that Steve Terry and Greg Heinzle asked him to send their regrets at not being able to attend. Terry was in London on business, and Heinzle was snowed in in Madison, WI.

2 Attendance and membership

2.1 Introductions of those present

Those attending identified themselves to the group, proceeding around the table in a counterclockwise direction.

2.2 Determination of quorum (11 needed)

It was clear that a quorum was present.

2.3 Recognition of alternate voting members

In Steve Terry's absence, George Kindler of Thoughtful Designs was voting for PRG.
In Paul Mardon's absence, Steve Unwin was voting for Pulsar

Carlson noted that Tim Cox is now the principal for PLASA. Tony Douglas-Beveridge has become the alternate.

2.4 Requirements for membership

Carlson reminded the working group that membership is open to all with a material interest in the work of the group. He reminded them that attendance was required for voting members. Failure of a principal and his/her alternates to attend three meetings in a row would result in a change of voting status to observer.

Ruling reminded people that their interest classification is also important. We strive to have a balance of interests in the working group. Ruling asked people to consider their designated interest category carefully so that it truly represents their interests in relation to the topic of control protocols.

2.5 Processing of new membership requests

The following individuals applied for membership with the following voting statuses:

Lee J. Bloch; Bloch Design Group; Principal; General interest
Trevor Forrest; Helvar Lighting Control ; Principal; Producer (Change of company affiliation. Previously with Celco)
Jason Friedman; Creative Realities, Principal, General interest [Note: Voted in as an observer.]
John Huntington; John Huntiington; Observer, User (Change of company affiliation and voting status. Previously with PRG and Alternate.)
John Sellers; AIM Northwest; Principal; General interest
Eddie Kramer; IATSE Local 1, Principal, User

Steve Carlson asked for the group's will for each of the applicants. All were voted in unanimously with the status requested, with the exception of Jason Friedman, who was voted in as an observer.

Friedman was voted in as an observer because he did not attend this meeting. The consensus was that a person applying as a principal should demonstrate a commitment to attending the meetings by attending the meeting at which they are making the application. Unless some reason for their absence is offered, they will be voted in as an observer. This status can be changed if the person attends a meeting and requests his or her status be changed then. Thus, Friedman was voted in with observer status. Eddie Kramer, who also did not attend the meeting, was voted in as a principal because the group understood that he had flown to Irving to attend the TSP meetings, but that a certification committee meeting had been scheduled against the CPWG meeting, and Kramer was not able to be in two places at once.

Carlson reiterated the attendance policy of the working group: Principals or their alternates are expected to attend meetings. If a principal and his/her alternate miss two meetings in a row, they will be sent a warning letter. Upon missing the third meeting they will have their status changed to observer.

3 Approval of the minutes from the previous meeting

Tim Bachman noted that section 6.3 in the November minutes referred to sending power over the Ethernet cable. The discussion was in fact about sending it through the same conduit as used by the cable. The paragraph should be changed to read:

"There was also a discussion of the sentence in section 1.5.2 about local codes and supplying power through the same conduit that is carrying the Ethernet cable. The last sentence was changed from: ..."

Ted Paget moved that the minutes be approved with this correction. Mitch Hefter seconded the motion. Unanimous approval by show of hands.

4 Call for patents

"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."

Carlson asked if there were any patent or copyright issues of which the working group should be aware. Silence reigned.

The Anti-Trust Statement:

"The ESTA Board of Directors, the Technical Standards Committee, and the leadership of this Working Group will reject or nullify any actions that restrain trade. Anyone who feels that an action restraining trade is being or has been taken is requested to bring the 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 any member of this working group may be found individually liable for any action that restrains trade taken by this working group. An individual convicted of a violation of the Sherman Act may be fined as much as \$100,000 and be imprisoned for up to three years. An easy to read pamphlet describing restraint of trade is available from the Technical Standards Committee."

Ruling waved copies of the easy to read pamphlet in the air. Mitch Hefter noted that the antitrust laws are different in the U.S. from those in the U.K. One member from the U.K. took a pamphlet.

5 Approval of agenda

Carlson asked that the formation of an EMC working group be added under "New business." Ted Paget moved that the agenda be approved with this addition. Bob Goddard seconded. Unanimous approval by voice vote.

6 Old Business

6.1 E1.3 comments report

Ruling reported that he had mailed the comments to the group. He reported that he was concerned about the issue of maximum transmitter output voltage. He had heard some informal discussions outside the meeting about the acceptability of keeping the maximum voltage lower than some people had asked because only "cheap engineering" would need it higher. Ruling explained that there had to be a technical reason regarding compatibility or safety for setting the maximum transmitter output voltage at whatever it was going to be. The argument that the standard should not condone "cheap engineering" is not proper because could be considered a restraint of trade.

6.2 E1.11

6.2.1 Task group update

Mitch Hefter reported that only two more items from the original proposals needed to be resolved. He said he hoped to have all the actions would be done by the end of today. The group intends to

have the ROP and the crude draft of the next version of DMX ready for the pre-meeting document packet for the March meeting in Toronto.

Dave Higgins talked about the studies his group had done with Cat 5. FTP was better for controlling emissions or noise reception than standard Belden cable, and had the additional advantage that the shield could be used solely for shielding, rather than as a signal common too, as is the case with the Belden cable. The final recommendation is that traditional cable, shielded Cat 5, and unshielded Cat 5 can all be used, but that the unshielded must be installed in metal conduit. Both types of Cat 5 would also be limited to installed use. The Cat 5 is not to be used for portable cables. His group has also assigned pin-outs for the common T568B connector.

Peter Willis reported that the physical layer task group has a working document on DMX protection issues. TIA/EIA-485 has been rewritten, and therefore the DMX standard will refer to 485 with exceptions. He proposes integrate the work of the task group with the general DMX task group for inclusion with the new standard, rather than publishing a separate document.

6.2.2 IEC update

Mitch Hefter read his report about USITT's legal actions to remove its name from DIN 56930. USITT's lawyer in Germany has sent DIN a cease and desist letter with January 26, 1999 as the deadline for the formal response. Hefter reported that the compatibility between DIN 56930 and USITT DMX512-1990 is close -- probably not worse than what exists between various manufacturers now -- but not perfect.

Ruling reported that Mike Stein of Magnetek had sent him an email message Friday, 15 Jan 1999, regarding making E1.11 an IEC standard in which he said that the chairman and secretary of TC 34C agreed that your proposal should be submitted to the IEC Central office by the USNC as a New Work Proposal to TC 34. He attached a new work proposal form, which Ruling filled out as best he could and sent it back to Stein.

6.3 Report of ACN Task Group

Carlson reported that the task group did a lot of work on network configuration management and self-configuration. Some news on this front is that Sun has developed Jini, an attempt to create a universal, spontaneous networking model. Jini is intended to deal with any type of device that has some intelligence in it. The group is studying the Jini specification to see if it can be used or if the concepts in it might be useful. Jini is being developed on the open source code model, which is good for us if Jini is useful. Carlson said the task group is 80% done with the document. It will be hampered today by the absence of Greg Heinze.

Tim Bachman asked about the outcome Steve Terry's direction to the task group to consider hiring a paid consultant. Carlson said a consultant would be better at the implementation stage but would not be useful at the design stage. The task group has contacts in Silicon Valley who have offered to help gratis.

7 New Business

Carlson announced that Bob Luther has proposed a Power Working Group. We are going to end up with one or perhaps two working groups dealing with power and low freq EMC.

8 Other business

Peter Willis offered congratulations to Steve Carlson for the LDI98 presentation "From DMX to ACN".

9 Schedule for future meetings

Carlson announced that the next meeting would be Thursday, March 25, 09:00 to 18:00 at the Royal York Hotel in Toronto. The formal working group meeting will be in the morning; the task groups will meet in the afternoon.

The summer meetings will be held July 16 , 17, and 18.

10 Recess

Mitch Hefter moved that the working group recess now so the task groups can work, and then reconvene at 15:30 to act on any business brought forth by the task groups. Ted Paget seconded the motion. Unanimously approved by voice vote. Steve Carlson declared the meeting recessed at 11:14.

11 Reconvene and further motions

Carlson reconvened the meeting at 15:38.

11.1 Analog task group

Doug Fleenor read the following proposed comment resolutions:

1. **Section 5.2 Mandatory Rules (New): 5.2 Mandatory Rules**
Mandatory rules of this Standard are characterized by the use of the word "shall." Renumber the existing 5.2 through 5.4 to 5.3 through 5.5.

Reason: Requiring the use of a single word to alert the user to mandatory (as opposed to advisory text), will make this standard easier to use. This will also help to ensure that equipment labeled "E1.3, 0 to 10V Analog Control Specification" meets the intent of this document.

Edwin S. Kramer
IATSE, Local 1

Resolution: Reject. The meaning of the word "shall" is well understood, and does not need to be defined in the standard.

2. **Section 5.2 Zero:** "When a controller is sending a level of 'zero' it ~~should~~ shall place its minimum control voltage on its output (see section 6.1.1 for voltage limits). When a dimmer, or other receiving device, has a "zero" control signal (see section 6.2.1 for voltage limits) it ~~should~~ shall be at its minimum output. In the case of motion control, the receiver ~~should~~ shall position itself at one extreme. In the case of speed or rate control, the receiver ~~should~~ shall set speed to minimum or stopped."

"In the case of audio volume it could be off or maximum attenuation. Note that when a console or other sending device is powered down or disconnected, it sends zero volts to all receivers. The "zero" condition of a receiver ~~should~~ shall always be a safe condition."

Reason: Using the word "shall" to indicate mandatory text is common in many codes and standards. The use of this single word will make this standard easier to use and also will help to ensure that equipment labeled "E1.3, 0 to 10V Analog Control Specification" meets the intent of this document.

Edwin S. Kramer
IATSE, Local 1

Resolution: Accept.

3. **Section 5.2, paragraph 3, sentence 2:** The zero condition is rarely safe, and for example a dimmer at zero is NOT safe! In addition I would NOT want to rely on the integrity of this signal generation and distribution system to keep a source of hazard safely isolated. The standard should avoid any connotation of attempting to give safety instruction/advice. In this case I would expect the off state to be that most operationally acceptable as a default "off".

Recommendation: Replace "safe" with: "state which is acceptable in a default/ unattended/disconnected situation."

David Bertenshaw
David Bertenshaw

Resolution: Accept.

4. **Section 5.2, paragraph 1, sentence 2, and other places:** The word "output" assumes the receiver has an output, which it may not have, and can be confused with the transmitter output signal. A word should be chosen which does not have these connotations.

Recommendation: Replace "output" by "state"

David Bertenshaw
David Bertenshaw

Resolution: Accept.

5. **Section 5.2, paragraph 3, sentence 1:** Strictly the transmitter can not send 0V since it is diode isolated, it just doesn't impose a voltage. A fine point I admit, but the user should not be left thinking that an off console assures no level from anywhere else.

Recommendation: Replace "sends zero volts to all receivers" with "it does not send any voltage to the receivers (though voltages may be imposed from other sources)."

David Bertenshaw
David Bertenshaw

Resolution: Accept in part. Use "it does not send any voltage to the receivers. The parenthetical comment is rejected because it is an informative statement that is not appropriate for a standard. It also complicates the sentence structure.

6. **Section 5.4, paragraph 1, sentence 1:** The translation is also normally expected to be monotonic.

Recommendation: Add "and monotonic" to end of sentence.

David Bertenshaw
David Bertenshaw

Resolution: Reject. The standard specifically says it does not address the details of the receiver response curve, and specifying monotonic would be more detailed than we intend the standard to be. Besides that, few of the readers of this standard would know what "monotonic" means.

7. **Section 6.1, paragraph 1, sentence 4:** Only those specifications where they differ for active vs passive transmitters are shown separately.

Recommendation: Add "where they differ" at end of sentence.

David Bertenshaw
David Bertenshaw

Resolution: Delete entire paragraph. There are no differences between active and passive transmitters. The paragraph refers to differences that were in an earlier draft of the standard, but that now do not exist.

8. **Section 6.1.1 Amplitude (Transmitter):** "The output of the controller shall be a steady DC voltage. When the control level is constant, the output shall not change by more than +/- 20mV. The output is intended to vary between 0 and 10 volts. Zero volts ~~is to~~ shall represent the full off condition and ten volts is to shall

represent the full on condition. The output voltage shall never be less than -0.2 volts nor more than +10.50 volts with respect to signal common."

"If the controller is capable of varying the maximum or minimum output voltage, then the manufacturer's specifications shall state the range of adjustment. Controllers ~~should~~ shall be shipped adjusted for 0 to 10V operation. Controllers not adjusted for 0 to 10V operation ~~must~~ shall not be marked "E1.3, 0 to 10V Analog Control Specification". Any printing on the console referring to the E1.3 specification ~~should~~ shall be covered with a label..."

Reason: Using the word "shall" to indicate mandatory text is common in many codes and standards. The use of this single word will make this standard easier to use and also will help to ensure that equipment labeled "E1.3, 0 to 10V Analog Control Specification" meets the intent of this document.

Edwin S. Kramer
IATSE, Local 1

Resolution: Accept.

9. **Section 6.1.1, paragraph 2, table:** Extend the table to include all the transmitter parameters for convenient reference.

Recommendation: Add columns to table for: "Output impedance", "sourcing current", "sinking impedance", diode blocking voltage", "output stability", "max output voltage"

David Bertenshaw
David Bertenshaw

Resolution: Reject. The standard is not so large that one cannot flip through a few pages. Also presenting the same information in multiple places makes citing requirements and the maintenance of the standard more difficult.

10. **Section 6.1.1:** Section 6.1.1 says "... The Output voltage shall never be less than -0.2 volts nor more than +10.50 volts..." and the table says "Console output at 100%, with a load resistance of 20,000 ohms: 10.00 volts min, 10.5 volts max."

Yes, I agree that equipment should be accurate enough that 100% is represented by a voltage in the range 10.0 - 10.5V. The problem arises however, when more than one signal source in the console arrives at the output op amp summing junction at the same time. If the channel slider on the Top preset is at 100% and then the Bottom Preset slider, the Chase Master and the Sound-to-Light Master are all brought up to 100%, and Bump Button is pressed too, unless special measures are taken, the output of the op amp will approach the top rail. To limit this overshoot to 10.5V is not easy and since it would have to be done on every channel it would add significant cost and certainly a lot of PCB space.

Now since 6.2.1 says the dimmer output must stay at full for an input voltage of 9.8 - 30V what is the point of adding this onerous 10.5V constraint in 6.1.1?

I believe 6.1.1 should either make it clear that the output voltage produced by putting any ONE channel slider to 100% should be the range 10.0 - 10.5V, or that the 10.5V limit should match the 30V figure in 6.2.1.

Paul Mardon
Pulsar Ltd.

Resolution: Accept in principle. Change the maximum voltage to +12.0V.

We understand the engineering problems with limiting the voltage overshoot cost-effectively. However, one of our goals in drafting the standard is to ensure that equipment meeting this standard is not likely to damage legacy receiving equipment in the field that is nominally called "0-10V analog." The output voltage must be kept low enough to make such damage acceptably unlikely. It is believed that little legacy equipment will be damaged by voltages up to and including 12V, but that higher voltages may do so. Twelve volts also believed to be a voltage that is high enough to allow simple bump button circuits with reasonable supply rail voltages

11. **Sections 6.1.1 and 6.2.2:** Sections 6.1.1 and 6.2.2 (Transmitter & Receiver voltages) do not match. No "absolute maximum ratings" have been defined. The absolute maximum voltage range for both is -0.5V ... +30V. Then follows:

Receiver 0%:	$\leq 0.3V$	Transmitter 0%:	$\leq 0.2V$
Receiver 100%:	$\geq 9.8V$	Transmitter 100%:	$\geq 10.0V$

Eckart Steffens
SLH

Resolution: Reject. Make no change. The receiver and transmitter maximum voltage ranges do not match for a purpose. However, one of our goals in drafting the standard is to ensure that equipment meeting this standard is not likely to be damaged by legacy transmitting equipment in the field that is nominally called "0-10V analog." Some legacy equipment can put out high voltages when presets are piled on or bump buttons are pressed. The 30V requirement on receivers is not an onerous requirement and is likely to tolerate the normal output voltages of virtually all known legacy equipment.

12. **Section 6.1.2, first paragraph, last sentence:** Reword to "Controllers or output devices must have a sinking impedance greater than 50K..." The present wording is a double negative. Reword for clarity.
John Mehlretter
Lehigh Electric Products Co.

Resolution: Accept.

13. **Section 6.1.3 Diode protection:** "Controllers and output devices shall be provided with a blocking diode (or equivalent circuit) such that each output presents an open circuit (50K ohms or more) to any source of voltage more positive than itself. The operation of the product ~~must also~~ shall be unaffected by the presence of such a more positive voltage. This diode or equivalent circuit ~~should~~ shall be capable of blocking voltages of 30 volts or more.

Reason: Using the word "shall" to indicate mandatory text is common in many codes and standards. The use of this single word will make this standard easier to use and also will help to ensure that equipment labeled "E1.3, 0 to 10V Analog Control Specification" meets the intent of this document.

Edwin S. Kramer
IATSE, Local 1

Resolution: Accept.

14. **Section 6.2.1 Amplitude (Receiver):** "The dimmer or other receiving device ~~should~~ shall produce an acceptable minimum output level (position, speed, etc.) with any control signal below 0.2 volts. The dimmer or other receiving device ~~should~~ shall produce its maximum output level (position, speed, etc.) with any control signal above 9.8 volts."

"If the receiver is capable of varying the "zero" or "full" control voltages, then the manufacturer's specifications shall state the range of adjustment. Receivers ~~should~~ shall be shipped adjusted for 0 to 10V operation. Receivers not adjusted for 0 to 10V operation ~~must~~ shall not be marked "E1.3, 0 to 10V Analog Control Specification". Any printing on the receiver referring to the E1.3 specification ~~should~~ shall be covered with a label..."

Reason: Using the word "shall" to indicate mandatory text is common in many codes and standards. The use of this single word will make this standard easier to use and also will help to ensure that equipment labeled "E1.3, 0 to 10V Analog Control Specification" meets the intent of this document.

Edwin S. Kramer
IATSE, Local 1

Resolution: Accept.

15. **Section 6.2.1, paragraph 1, sentence 1:** Again a wooly dimmer oriented spec, which should be made clearer that these "minimum" and "maximum" states should be specified.

Recommendation: Replace after " device" with "shall be at its specified minimum state (position, speed, output, etc)."

David Bertenshaw
David Bertenshaw

Resolution: Accept.

16. **Section 6.2.1, paragraph 1, sentence 2:** As above [6.2.1, paragraph 1,sentence 1], but at maximum.

Recommendation: Replace "output level" with "specified state".

David Bertenshaw
David Bertenshaw

Resolution: Accept.

17. **Section 6.2.1, paragraph 2:** This "suggestion" of 0.3V should be made mandatory, else you will not get a reliable off at off state.

Recommendation: Delete sentence 1. Replace sentence 2 after "minimum" with: "and because an allowance of 0.1 volt is made for noise/offset errors, then the receiver must maintain its minimum/off state (e.g. no ghosting on dimmers) with an input signal up to 0.3 volt.

David Bertenshaw
David Bertenshaw

Resolution: Accept in part. Change "should" to "shall." This accepts the intent of the comment but without adding the explanatory text. The explanatory text is not necessary in a standard, and makes the essential requirements harder to find. Also "any control signal below 0.2 volts" will be changed to "any control signal equal to or less than 0.2 volts" so that we get a reliable off state. As currently written, a transmitter could be "off" at 1.9V and below, but the receiver could put out 2.0V as its "off" state.

18. **Section 6.2.1, paragraph 4:** It is not clear why, if it is acceptable for a continuously-variable-result receiver to not reach 0% until 0.3V, a switched element in said receiver must use 0.5V. It is inappropriate to have two different off states, 0.3V and 0.5V, and if there is insufficient confidence that there is enough margin to ensure a genuine off at 0.3V, then a wider margin must be specified for both. If the need is to correlate switching with power consumption etc, this is a product spec, not a standard.

Recommendation: Delete whole paragraph.

David Bertenshaw
David Bertenshaw

Resolution: Reject. Chatter in a switching device is much less acceptable than a slight ripple in a continuously variable device. The additional hysteresis possible with an minimum "off" signal level of 0.5V makes to easier to avoid chatter. Almost all switching products currently on the market have switch points well above this level, so the minimum level of 0.5V is not likely to have any impact on the market.

19. **Section 6.2.1, paragraph 6:** It is recommend to add a note that the reason (I presume) that there is a 0.2V margin between transmitter min output (10.0V) and the receiver max input at max (9.8V) is to allow 0.1V of cable voltage drop, which normally deducts from the signal and 0.1V of offset/noise immunity. However this cable drop margin is not needed at minimum output (<0.2V) as the only cable drop will be that in the Common, which will act to add a margin to the 0.1V for offset/noise immunity at minimum.

Recommendation: Add a note (FPN?): "The 0.2 volt overlap between transmitter min and receiver max at the maximum (full) level includes 0.1 volt intended to allow for any cable voltage drop and 0.1 volt of general noise/offset immunity to ensure that the receiver can be always be driven to full state. Only a 0.1 volt overlap for general noise/offset immunity is needed at minimum (zero) level, due to the fact that the only cable voltage drop will be that in the common due to other signals, which will act to reinforce the off state."

David Bertenshaw
David Bertenshaw

Resolution: Reject. Fine print explanatory notes make the standard more difficult to read, and are not necessary for stating the fundamental requirements of the standard.

20. **Section 6.2.1:** Recommendation: Like [Bertenshaw's comment on 6.1.1] above, include a combined, all parameters table for receivers. Editor to decide best layout.

David Bertenshaw
David Bertenshaw

Resolution: Reject. The standard is not so large that one cannot flip through a few pages. Also presenting the same information in multiple places makes citing requirements and the maintenance of the standard more difficult.

21. **Section 6.2.2 Input impedance (Receiver):** "The input impedance of a dimmer or other receiving device shall be a nominal 100K ohms (+/- 20%) between each input and signal common when in normal operation. The input impedance ~~must~~ shall not drop below a nominal 50K ohms (+/- 20%) when in a powered down condition.

Reason: Using the word "shall" to indicate mandatory text is common in many codes and standards. The use of this single word will make this standard easier to use and also will help to ensure that equipment labeled "E1.3, 0 to 10V Analog Control Specification" meets the intent of this document.

Edwin S. Kramer
IATSE, Local 1

Resolution: Accept.

22. **Section 6.2.3:** There is a real issue with the fact that the isolating diodes cause the signal to have very asymmetric impedance. Positive noise coupled onto the line sees much longer recovery time constants than negative, and if the line time-constant is substantial, could pump up the signal level, or cause poor response to fast changes. For example, receiver designs that choose to suppress noise/hum with capacitors directly on the input, will discover that the max value is about 1uF before response time gets sluggish (>100mS). I would recommend a 10mS time-constant be mandated.

Recommendation: Add a second paragraph: "The input connection shall have a time-constant when open-circuit to allow sufficient rapidity of voltage discharge to meet all receivers' response time-constant on that signal (there may be paralleled receivers). It is not recommended that any significant R-C filtering (max capacitance 100nF) is connected directly to the input signal, but instead applied after any buffering."

David Bertenshaw
David Bertenshaw

Resolution: Reject. The comment is good advice for a equipment designer, but it goes beyond the intent of the standard and is too detailed in describing equipment design specification.

23. **Section 6.4 Isolation:** "Some manufacturers believe it is necessary to bond control common to earth ground to meet the requirements of local legislation. Products that bond control common to earth ground ~~must~~ shall be clearly labeled in large type with..."

Reason: Using the word "shall" to indicate mandatory text is common in many codes and standards. The use of this single word will make this standard easier to use and also will help to ensure that equipment labeled "E1.3, 0 to 10V Analog Control Specification" meets the intent of this document.

Edwin S. Kramer
IATSE, Local 1

Resolution: Accept.

24. **Section 6.4, paragraph 1:** This standard should not set it self up as a specifier of safe practices for electrical safety. Few authors are competent in this sphere, the reviewing process is inadequate for this, and there is no process set up to ensure that this standard is adapted to progress in the case of field experience (e.g. unlike UL). In addition the current recommendations are insufficient for the purpose (e.g. they do not specify a method of test). Further-more 1500Vac is inadequate for some equipment that might be connected (e.g. double insulated and/or equipment intended for 277V or 347V etc). I would not want the committee to become liable for inadequate advice in the case someone relied upon it and got hurt, even if only morally!

Recommendation: Replace paragraph 1 with: "The control signal shall be isolated from any source of hazardous voltage or charge (e.g. AC mains) to the full extent required in the relevant product safety standard(s), treating the control signal as an accessible conductive part. The standards may vary dependant on the country of use."

David Bertenshaw
David Bertenshaw

Resolution: Accept.

25. **Section 6.4, paragraph 2, sentence 4:** The encouragement should be a recommendation.

Recommendation: Change "encouragement" to "recommendation".

David Bertenshaw
David Bertenshaw

Resolution: Accept.

26. **Section 6.4, paragraph 3, sentence 1:** The usual safety reason for bonding 0V to ground is to allow single insulation between mains and signal common. It is not necessary, other insulation (e.g. double insulation) techniques allow isolation, and in addition if you declare your interface to be SELV, this mandates no bonding! Personally I dislike such bonding because it means that the common bonding to ground is part of the safety construction, and anyone who lifts that bond due to noise problems etc is considerably reducing the product's safety. However because there is the inevitable the show must go on mentality, this happens!

Recommendation: Replace sentence 1 with: "Some manufacturers bond control common to earth ground as part of their method of achieving electrical safety for the product. In this case it is vital that such a bond is not removed, else safety may be compromised."

David Bertenshaw
David Bertenshaw

Resolution: Reject. We do not see how adding this wording to the standard would make the removal of this bond less likely in the field. Anybody contemplating making such a field modification is not likely to be consulting this document when they are doing so.

27. **Section 6.5:** Add a new section to give instruction on the paralleling of receivers. It should be made clear that the standard is designed for only a particular quantity, and anyone who exceeds this should expect to have to engineer the system especially. I recommend the limit is 5 connections, including all transmitters and receivers, e.g. 2 consoles and 3 dimmers. This should cover 99% of all cases. This makes the maximum signal load 10K to 0V in the case that all devices are in their default/power down state.

Recommendation: Add section 6.5, titled: "6.5 Paralleling This standard is specified on the premise that the maximum number of transmitters and receivers connected in parallel on any signal shall not total more than 5 (e.g. 2 consoles driving 3 paralleled dimmers). If a user wishes to make more than 5 connections on one signal line, then the compatibility/correct operation should be independently engineered."

David Bertenshaw
David Bertenshaw

Reject. The standard is written for up to 5 receivers on the line ($100K/5=20K$), if more receivers (or powered down desks) are put onto the line, the system will still work, (full brightness MAY not be achieved, depending on the output impedance of the driving console), we felt it was NOT necessary to get bogged down in any overloading parameters. The standard sets it's limits, a user cannot expect a system to work to the standard outside these limits (we think covers 99% of all cases).

28. **Section 7 Cabling:** " System designers ~~should~~ shall design the cable installation within all the applicable electrical and other building codes, as well as using good engineering practices.

Reason: Using the word "shall" to indicate mandatory text is common in many codes and standards. The use of this single word will make this standard easier to use and also will help to ensure that equipment labeled "E1.3, 0 to 10V Analog Control Specification" meets the intent of this document.

Edwin S. Kramer
IATSE, Local 1

Resolution: Reject. We know that System designers should follow applicable building regulations and good wiring practises, we cannot however, force them to do so. This is the only case where we felt a "should" should remain.

29. **Section 7.1, sentence 2:** The total voltage drop (signal plus return) should not exceed 0.1V, for the compatibility reasons above in comment 8.

Recommendation: Add after "conductors": "which in the presence of the maximum signal current (0.08mA) shall not drop more than 0.1V total in the signal and return conductors."

David Bertenshaw
David Bertenshaw

Resolution: Reject. Maximum return signal current is tiny in comparison to PSU current in the common conductor (see number 19's explanation above). Also maximum current per channel (into a 5 receiver load - 20K) is 0.5mA.

30. **Section 7.1.1, table:** To allow other countries (including Canada) to conveniently use the standard, it is recommended to add a square-millimetres conversion column against the AWG.

Recommendation: Add extra column headed "Approx. sq mm" to table, and convert from wire gauges as given.

David Bertenshaw
David Bertenshaw

Resolution: Reject. The suggestion is no longer applicable because the table will be removed.

31. **Section 7.1.1:** From the comments 8 and 16 above [Bertenshaw's numbers, not reproduced, referring to his comments on section 6.2.1, paragraph 6 and section 6.5], the max load impedance is 10K (i.e. 1mA at 10V) and loop cable drop 0.1V max. Since there is bound to be one of the 5 paralleled loads at one end, only 4 can contribute to cable current, thus the cable current is 0.08mA max. The length specified in the current tables is in fact now that for 0.04V, and therefore the lengths may be increased 25% to give a max of 0.05V (recommend a wire resistance recalculation as a check). PS. You could argue that in fact if all 4 remote loads

were at 50K, then in fact the cable voltage is irrelevant, as all are powered down or transmitters. In this case you would only need to allow for 0.07mA, giving a bit longer on the cable length???

Recommendation: Change "0.1 volt" to "0.05 volt", and "5,000 ohms" to "12.5K ohms (max 4 loads at cable end)". Recalculate lengths based on max resistance of 62.5 ohms.

David Bertenshaw
David Bertenshaw

Resolution: Reject. The suggestion is no longer applicable because the table will be removed.

32. **Section 7.1.2, paragraph 1, sentence 3:** The reality here is that you have to consider the actual total loading, including all paralleling, in the calculation of the common conductor, else you are forced into excessive conductor sizes if worst cases are used. I recommend a formulaic approach is used, based on total receiver/transmitter loads at the cable end.

Recommendation: Replace sentence 3 and formula "2,941..." by: "The maximum cable length can be calculated from: $L=L_0*4/N$, where L_0 is the signal cable length from section 7.1.1 and N is the total number of receiver and transmitter loads connected at the receiving end of the cable, served by the common conductor." Correct paragraph 2 to align with above, at Editors discretion.

David Bertenshaw
David Bertenshaw

Resolution: Reject. The common conductor cable current could be anything if the desk is powered from the pack, so cable length tables and formulas cannot be stated, unless the PSU current is measured or assumed.

33. **Section 7.1.2, paragraph 2, sentences 1 and 2:** The first "dimers" should be "receivers". As comment 18, the 0.1V should be 0.05V.

Recommendation: Replace first instance of "dimers used" with "receivers connected". Replace "0.1 volt" with "0.05 volt".

David Bertenshaw
David Bertenshaw

Resolution: Accept in part. The suggestion to replace "dimers used" with "receivers connected" we accept. 0.1V is correct so we rejected the rest of the proposal.

34. **Section 8.2, sentence 1:** Make clear the separate dc and ac limits, as 24V ac is sometimes the limit for totally safe operation.

Recommendation: Add after "volts", "dc or 24 volts ac".

David Bertenshaw
David Bertenshaw

Resolution: Accept in principle. The limit is set to 30 volts peak. This allows for receivers with split +/- 15V rails on the input connectors.

35. **Section 8.2:** "~~No v~~ Voltages higher than 30 volts ~~may shall~~ not be present at a sending or receiving connector."

Reason: Using the word "shall" to indicate mandatory text is common in many codes and standards. The use of this single word will make this standard easier to use and also will help to ensure that equipment labeled "E1.3, 0 to 10V Analog Control Specification" meets the intent of this document.

Edwin S. Kramer
IATSE, Local 1

Resolution: Accept.

36. **Section 8.2:** "No ~~v~~ Voltages higher than 30 volts ~~may~~ shall not be present at a sending or receiving connector."

Reason: Using the word "shall" to indicate mandatory text is common in many codes and standards. The use of this single word will make this standard easier to use and also will help to ensure that equipment labeled "E1.3, 0 to 10V Analog Control Specification" meets the intent of this document.

Edwin S. Kramer
IATSE, Local 1

Resolution: Accept.

37. **Appendix A:**

Common connectors and pinouts

Connector	Typical	Pinouts	Channels
DD-50 (DB-50)	48	1 - 48	channels 1-48
		49 & 50	signal common
DB-25	24	1 - 24	channels 1-24
		25	signal common
DA-15 (DB-15)	12	1 - 12	channels 1-12
		13	power supply
		14	power supply
		15	signal common
DA-15 Strand (DB-15)	12	1 - 12	channels 1-12
		13 & 14	signal common
		15	no connection
CHAMP (Centronics)	32	1 - 32	channels 1-32
		33 & 34	not used
		35 & 36	signal common
Cinch Jones 8 pin	6	1 - 6	channels 1-6
		7	power supply (or fan relay)
		8	signal common
Cinch Jones 10 pin	6	1 - 6	channels 1-6
		7	power supply Not used
		8	signal common
		9	power supply (+15V) Not used
		10	power supply (-15V) Not used

Note 1: There is an extremely large installed base of ten pin Cinch-Jones cables made with 8 conductor cable connected to pins 1-8.

Note 2: There is an large installed base of ten pin Cinch-Jones cables made with pins 7 and 8 tied together.

Cinch Jones 15 pin	12	1 - 12	channels 1-12
		13	24V to dimmer for fan relay
		14	power supply
SRC-16 (Cannon)	12	1 - 11	channels 1-11
		12	power supply (+15V)
		13	power supply (-15V)
		14	not used
		15	signal common
		16	channel 12
CPC-28 (Amp)	8	1 - 8	channels 1-8
		25	power supply (+15V)
		26	power supply (-15V)
		28	signal common
Socapex 337P	<u>30</u>	1 - 30	channels 1-30
		31 - 34	not used
		35 - 37	signal common
DIN 8 pin (Zero 88 and others)	6	1 - 6	channels 1-6
		7	power supply
		8	signal common
DIN 8 pin (Pulsar and others)	6	1	power supply
		2	signal common
		3 - 8	channels 1-6
XLR 5 pin	4	1 - 4	channels 1-4
		5	power supply (+15V)
		shell	signal common
XLR 7 pin	6	1 - 6	channels 1-6
		7	power supply
		shell	signal common

Reason: For many years it was the standard practice in the New York metropolitan area to use 10 pin Cinch-Jones plugs to provide 6 analog control channels. Pins 1-6 were used for channels 1-6. Pins 7 and 8 were used as the common while pins 9 and 10, originally used for a contactor enable, were left unconnected. This led to the use of an 8 conductor cable; however the original installed base of 10 pin plugs on both dimmers and controllers perpetuated this odd arrangement.

There are still many miles of this cable in active use around the country. Listing the use of pins 9 and 10 as a power supply could lead to a system being made inoperative when a piece of old 8 conductor cable is used in a system requiring power in the control cable.

The practice of tying pins 7 and 8 together in the cable, although no longer performed, would have a detrimental effect if users were encouraged to use pin 7 as a power supply with pin 8 as the common.

Missing from the typical "Channels" column for the Socapex connector was the notation "30 channels".

Is this a typo? The Amp CPC-28 is listed as an 8 channel plug. This seems odd for a 28 contact connector.

Edwin S. Kramer
IATSE, Local 1

Resolution: Reject, but consider the suggested text for an application note. On further consideration the committee has decided that the appendices of the draft standard would be better as a separate application note as they are informative material and not a list of requirements. They will be removed from the standard.

Ted Paget move we accept the resolutions. Richard Lawrence seconded the motion.

By roll call ballot:

Name	Company	Rep. status	Int. group	Accept	Accept in principle	Accept in part	Reject	Abstain
John Sellers	AIM Northwest	P	P	X				
Tony de Rijk	Amazing Controls! Inc.	P	P	X				
Peter Willis	Andera Ltd.	P	P	X				
Wayne David Howell	Artistic Licence (UK) Ltd.	P	P	X				
Tim Bachman	Barbizon Light	P	U	X				
Lee Bloch	Bloch Design Group	P	G	X				
Doug Fleenor	Doug Fleenor Design, Inc.	P	P	X				
Robert Goddard	Goddard Design Co.	P	P	X				
Dave Higgins	Gray Interfaces	P	P	X				
Trevor Forrest	Helvar Lighting Control	P	P	X				
Lary Cotten	High End Systems	P	P	X				
Edward Paget	Jones & Phillips Associates, Inc.	P	G	X				
Rick Leinen	NSI Corporation	P	P	X				
Tim Cox	PLASA	P	G	X				
George Kindler	PRG/Thoughtful Designs	A	U	X				
Steve Unwin	Pulsar Ltd.	A	P		X			
Steve Carlson	Rosco/Entertainment Technology	P	P	X				
Eckart Steffens	SOUNDLIGHT (VPLT rep)	P	G	X				
Richard Lawrence	Strand Lighting Ltd.	P	P	X				
Jerry Gorrell	Theatre Safety Programs	P	G	X				
Brian Dowd	TMB Associates (NJ)	P	P	X				
Mitch Hefter	USITT (Rosco/Entertainment Technology)	P	U	X				
				21	1			

Steve Unwin's vote was accompanied by the unresolvable comment, "Pending approval from my boss."

The vote was 21 "accept" out of 22 possible votes present, and one vote for "accept in principle." The motion passed with the required super-majority.

Ted Paget moved that the draft E1.3 document, with these resolutions incorporated into it, be sent to a third public review. Seconded by Tim Bachman.

By roll call ballot:

Name	Company	Rep. status	Int. group	Accept	Accept in principle	Accept in part	Reject	Abstain
John Sellers	AIM Northwest	P	P	X				
Tony de Rijk	Amazing Controls! Inc.	P	P	X				
Peter Willis	Andera Ltd.	P	P	X				
Wayne David Howell	Artistic Licence (UK) Ltd.	P	P	X				
Tim Bachman	Barbizon Light	P	U	X				
Lee Bloch	Bloch Design Group	P	G	X				
Doug Fleenor	Doug Fleenor Design, Inc.	P	P	X				
Robert Goddard	Goddard Design Co.	P	P	X				
Dave Higgins	Gray Interfaces	P	P	X				
Trevor Forrest	Helvar Lighting Control	P	P	X				
Lary Cotten	High End Systems	P	P	X				
Edward Paget	Jones & Phillips Associates, Inc.	P	G	X				
Rick Leinen	NSI Corporation	P	P	X				
Tim Cox	PLASA	P	G	X				
George Kindler	PRG/Thoughtful Designs	A	U	X				
Steve Unwin	Pulsar Ltd.	A	P	X				
Steve Carlson	Rosco/Entertainment Technology	P	P	X				
Eckart Steffens	SOUNDLIGHT (VPLT rep)	P	G	X				
Richard Lawrence	Strand Lighting Ltd.	P	P	X				
Jerry Gorrell	Theatre Safety Programs	P	G	X				
Brian Dowd	TMB Associates (NJ)	P	P	X				
Mitch Hefter	USITT (Rosco/Entertainment Technology)	P	U	X				
				22				

The vote was unanimously "accept." The motion passed. The motion and the revised E1.3 will be forwarded to the TSC for its approval.

11.2 Change of voting status

Philip Nye requested that his status be changed from observer to principal. Unanimous approval by voice vote.

12 Adjournment

Steve Carlson declared the meeting adjourned at 16:54. There were no objections.

Working Group Membership as of the End of the January 23, 1999 Meeting

Name	Company	Vote Stat.	Int Cat
Andre Broucke	ADB, Theatre and TV Lighting Division	O	P
John Sellers	AIM Northwest	P	G
Tony de Rijk	Amazing Controls! Inc.	P	P
Peter Willis	Andera Ltd.	P	P
Wayne David Howell	Artistic Licence (UK) Ltd.	P	P
Steve Friedlander	Auerbach & Associates, Inc.	O	U
Sierk Janszen	Avenger Showcontrol	O	P
J. B. Toby	Avolites Ltd.	O	P
Shahid Anwar	Avolites Ltd.	O	P
Richard Salzedo	Avolites Ltd.	O	P
Tobin Neis	Barbizon Companies	A	U
Tim Bachman	Barbizon Light	P	U
Lee J. Bloch	Bloch Design Group	P	G
Ted Fregon	Bytecrafft Pty. Ltd.	O	P
Murray Mason	Bytecrafft Pty. Ltd.	O	P
Marty Lazarus	Chicago Spotlight, Inc.	O	G
Tal Miron	Compulite R & D	O	P
Fred Lindauer	Compulite R&D	O	P
Jason Friedman	Creative Realities, Inc.	O	G
Mikael Fahl	Dataton AB	O	P
David Bertenshaw	David Bertenshaw	O	P
Doug Fleenor	Doug Fleenor Design, Inc.	P	P

Name	Company	Vote Stat.	Int Cat
Gary Dove	Dove Systems	O	P
Ed Jones	Edwin Jones Co.	P	P
Bill Fehrmann	Electrol Engineering, Inc.	O	P
Bruce Lehnus	Electronic Theatre Controls, Inc.	O	P
Ed Prasser	Electronic Theatre Controls, Inc.	P	P
Bill Florac	Electronic Theatre Controls, Inc.	O	P
Dennis Varian	Electronic Theatre Controls, Inc.	A	P
Jon Ide	Electronic Theatre Controls, Inc.	A	P
Greg Heinzle	Electronic Theatre Controls, Inc.	A	P
Adam Bennette	Electronic Theatre Controls Ltd.	O	P
Paul Bennett	Electronics Diversified Inc.	O	P
Ed Arend	Electronics Diversified Inc.	P	P
Scott Rempel	Electronics Diversified Inc.	A	P
Tracy Underhill	Electronics Diversified Inc. (Colorado)	A	P
Philip Nye	Engineering Arts	P	G
Paul K. Ericson	Ericson Lighting Design	O	U
Nick Archdale	Flying Pig Systems Ltd. (UK)	A	P
Tom Thorne	Flying Pig Systems Ltd. (UK)	O	P

Name	Company	Vote Stat.	Int Cat
Nils Thorjussen	Flying Pig Systems Ltd. (US)	P	P
Robert Goddard	Goddard Design Co.	P	P
Dexter McNeil	Goddard Design Co.	A	P
Dave Higgins	Gray Interfaces	P	P
Michael (Sandy) Twose	Gray Interfaces	A	P
Trevor Forrest	Helvar Lighting Control	P	P
Lary Cotten	High End Systems	P	P
Scott Blair	High End Systems	A	P
Edwin S. Kramer	IATSE, Local 1	P	U
Geoffrey O. Thompson	IEEE 802.3 / Nortel Networks	O	G
Larry Schoeneman	Interesting Products, Inc.	O	G
John Huntington	John Huntington	O	U
Edward Paget	Jones & Phillips Associates, Inc.	P	G
Philippe Jean	Kunst Macchina Production Company	A	P
Louis-Philippe Demers	Kunst Macchina Production Company	P	P
John Mehlretter	Lehigh Electric Products Co.	O	P
Mark T. Kraft	Lehigh Electric Products Co.	O	P
Andrew Sherar	Lightmoves PLC	O	P

Name	Company	Vote Stat.	Int Cat
Tracy Schwenk	Martin Professional Inc.	O	P
Gerard Cohen	Martin Professional Inc.	O	P
Rick Leinen	NSI Corporation	P	P
Tim Cox	PLASA	P	G
Tony Douglas-Beveridge	PLASA Standards Office	A	G
George Sabbi	PRG Lighting Division	A	U
Paul M. Kleissler	PRG/BASH Lighting Service	O	U
Steve Terry	PRG/Production Arts	P	U
George Kindler	PRG/Thoughtful Designs	A	U
Bill Ellis	PRG/Vanco Lighting Services	O	U
Paul F. Mardon	Pulsar Ltd.	P	P
Steve Unwin	Pulsar Ltd.	A	P
Stephen J. Tyrrell	Quantum Logic	O	P
Charlie Richmond	Richmond Sound Design Ltd.	O	P
Ken Bell	Richmond Sound Design Ltd.	O	P
Steve Carlson	Rosco/ Entertainment Technology	P	P
Mitch Hefter	USITT (Rosco/ET)	P	U
Mick Martin	Showcad Control Systems	O	P
Eckart Steffens	SOUNDLIGHT (VPLT rep)	P	G
Milton Davis	Strand Lighting	A	P
Richard Lawrence	Strand Lighting Ltd.	P	P

Name	Company	Vote Stat.	Int Cat
Jerry Gorrell	Theatre Safety Programs	P	G
Thom Weaver	Thom Weaver	O	G
Colin Waters	TMB Associates	O	U
Brian Dowd	TMB Associates (NJ)	P	P
Achim Russ	Transtechnik GmbH	P	P
Hans Leiter	Transtechnik GmbH	A	P
Anders Ekvall	Transtechnik GmbH	O	P
Ken Wagner	Walt Disney Imagineering	O	U
Keny Whitright	Wybron, Inc.	A	P
John Sondericker III	Wybron, Inc.	P	P
Peter Brooks	Zero 88 Ltd.	P	P
Richard Thornton Brown	Zero 88 Ltd.	A	P

Voting Status

- P Principal voting representative for a company or organization
- A Alternate voting representative for a company or organization
- I Individual representing no organization other than himself or herself
- O Observer; non-voting

Categories of interest

- P Producer (manufacturer) of control equipment
- U User of control equipment
- G General interest in control equipment