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USITT DMX512-A
Asynchronous Serial Digital Data Transmission Standard for Controlling Lighting Equipment and Accessories
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The Control Protocols Working Group, which authored this standard, consists of a cross section of entertainment industry professionals representing manufacturers, consultants, dealers, and end-users. ESTA is committed to developing consensus-based standards and recommended practices in an open setting. Future Control Protocols Working Group projects will include updating this publication as changes in technology and experience warrant, as well as developing new standards and recommended practices for the benefit of the entertainment industry.
The United States Institute for Theatre Technology, Inc. (USITT) is the Association of Design, Production, and Technology Professionals in the Performing Arts and Entertainment Industry. Founded in 1960, the mission of the Institute is to advance the professions of design and technology in the performing arts by disseminating information, actively promoting the advancement of knowledge and skills and facilitating national and international communication among its members. USITT is the United States Center of OISTAT, the International Organization of Scenographers, Theatre Architects and Technicians.

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Foreword

(This foreword contains no requirements and is not part of E1.11)

This Standard describes a method of digital data transmission between controllers and controlled lighting equipment and accessories, including dimmers and related equipment. This Standard is intended to provide for interoperability at both communication and mechanical levels with controllers made by different manufacturers.

There are five normative annexes in this Standard. These address extensions of the base standard and are considered part of the Standard, which means that when an extension described in an Annex is implemented, compliance with the annex is mandatory. However, a product compliant with the Standard can be manufactured without implementing these annexes.

The original version of the DMX512 Standard was developed in 1986 by the Engineering Commission of the United States Institute for Theatre Technology, Inc. (USITT). Minor revisions were made in 1990. DMX512 has gained international acceptance throughout the entertainment industry, even though USITT is not formally accredited as a standards making body. The earlier versions of this Standard covered only data used by dimmers. In practice this Standard has been used by a wide variety of devices; this version recognizes this fact.

In 1998, it became evident that additional updates to the Standard were necessary and formal recognition through an internationally recognized standards organization was required. USITT issued a Call for Comments in order to solicit recommendations for changes to the Standard. At the same time, USITT transferred maintenance of DMX512 to ANSI Accredited Standards Committee E1, Safety and Compatibility of Entertainment Technical Equipment and Practices (more commonly known as the ESTA Technical Standards Program, or TSP).

A Task Group established under the TSP’s Control Protocols Working Group acted on the proposals received in response to the Call for Comments. The primary goal was to make editorial updates to DMX512 appropriate for current times, including the addition of technical features while maintaining a balance with backward compatibility. Many proposals, while technically innovative, could not be accepted because their implementation would not have been backward compatible and would have immediately rendered obsolete most of the installed base of equipment.

This document is a result of the actions taken on those proposals and subsequent development under the Policies and Procedures of the ESTA Technical Standards Program. Despite being an American National Standard, development has had strong international participation and support.
1 General

1.1 Scope

This Standard describes a method of digital data transmission between controllers and controlled equipment as described in Clause 1.4 and accessories, including dimmers. It covers electrical characteristics, data format, data protocol, and connector types.

This Standard is intended as a guide for:

1. Equipment manufacturers and system specifiers who wish to integrate systems of lighting equipment and accessories, including dimmers, with controllers made by different manufacturers.

2. Equipment manufacturers seeking to implement a standard digital transmission protocol in their lighting control and accessory products.

3. System specifiers and designers to gain detailed information about allowed connectors and allowed system topologies.

This standard is not intended to replace existing protocols other than USITT DMX512 and DMX512/1990. Cable requirements and premises wiring are not within the scope of this standard.

Equipment compliant with this standard will be marked DMX512-A or USITT DMX512-A in order to distinguish it from the previous (informally recognized) versions. Unless otherwise noted, references to DMX512 in this document refer to DMX512-A.

1.2 Overview and Architecture

This standard uses a simple asynchronous eight-bit serial protocol consisting of an untyped byte stream produced by standard UARTs. The physical media, not addressed in this document, is normally, but not exclusively, a two-pair cable, with each pair serving as a data link. The media is driven using ANSI/TIA/EIA-485-A-1998 (hereafter referred to as EIA-485-A in this document) balanced data transmission techniques. Physical connection at devices is via 5-pin XLR connectors or by "hard-wiring" to terminals. Restricted use of connectors other than 5-pin XLR is allowed if certain conditions apply (see clause 7).

Data on the primary data link is sent in packets of up to 513 slots. The first slot is a START Code, which defines the information in the subsequent slots in the packet. The interoperability of equipment complying with the Standard is largely due to the use of the NULL START Code by transmitting devices. Proper function is dependent upon the receiving device(s) extracting the pertinent data for processing from each transmitted packet.

Data on the secondary data link, when implemented, is used for a variety of purposes, all of which fall within the scope of EIA-485-A. Identification of the required circuit topology for any particular implementation is defined.

1.3 Appropriate uses of this Standard

Equipment designers and general users of this Standard will recognize that this Standard is intended to fill only a limited range of uses. Other standards will be more appropriate for different uses.