UNISON®

Serial Access Protocol Programming Quick Guide

Version 1.9.2

Copyright © Electronic Theatre Controls, Inc.
All Rights reserved.
Product information and specifications subject to change.
Part Number: **7080M1301-1.9.2** Rev A
Released: 04/2005

ETC®, Unison®, Light Manager™, ETCNet2™, and EDMX™ are either registered trademarks or trademarks of Electronic Theatre Controls, Inc. in the United States and other countries.

Microsoft® and Windows® are registered trademarks of Microsoft Corporation in the United States and other countries.

All other trademarks, both marked and not marked, are the property of their respective owners.

Table of Contents

Introduction

This quick guide covers the programming requirements for Unison® Serial Access Protocol (USAP). Specifically, this volume contains procedures for installation, packet structure including objects, properties and actions.

The introduction contains the following sections:

Using this Manual

This quick guide is intended for use in conjunction with the *Light Manager™ v1.8 User Guide* and the *Light Manager v1.9.1 Quick Guide*.

This manual assumes that you have basic familiarity with serial command structure. To control your Unison lighting control system with Unison Serial Access Protocol you must write the necessary serial commands. Electronic Theatre Controls will not provide any USAP programming services for you.

In order to be specific about where features and commands are found, the following naming and text conventions will be used:

- **Unison® System**: the entire Unison controls and/or dimming system including control stations and architectural processors.
- **Objects**: rooms, sections, presets, zones, walls, and macros are considered objects.
- **Command**: are the actions and responses that can be controlled by your RS-232 device.
- References to other parts of the manual are indicated in *italics*. When viewing this manual electronically, click on the reference to jump to that section of the manual.

Note: *Notes are helpful hints and information that is supplemental to the main text.*

Please email comments about this manual to: **TechComm@etcconnect.com**

Help from ETC Technical Services

If you are having difficulties, your most convenient resources are the references provided in this quick guide. To search more widely, try the ETC website at www.etcconnect.com. If none of these resources is sufficient, contact ETC Technical Services directly at one of the offices identified below. Emergency service is available from all ETC offices outside of normal business hours.

When calling for help, please have the following information handy:

- Unison operating system (EAC) software version
- Light Manager Software version
- Other components in your system (Unison, other console, etc.)

Americas

ETC International
Technical Services Department
3031 Pleasant View Road
Middleton, WI 53562
800 775-4382 (USA toll-free)
+1-608-831-4116
service@etcconnect.com

Europe

ETC Europe, Ltd.
Technical Services Department
5 Victoria Industrial Estate
Victoria Road,
London, W3 6UU England
+44 (0)20 8896 1000
service@etceurope.com

Asia

ETC Asia, Ltd.
Technical Services Department
Room 605-606
Tower III, Enterprise Square
9 Shueng Yuet Road
Kowloon Bay, Kowloon, Hong Kong
+852 2799 1220
service@etcasia.com

Chapter 1
Overview and Installation

In this section you will find overview information of Unison Serial Access Protocol, setup and connection instructions and an overview of the different functions USAP controls in a Unison system.

This chapter contains the following sections:

USAP Overview

Unison Serial Access Protocol (USAP) operates differently depending on the version of EAC operating code installed in your Unison architectural processor.

Unison operating code 1.5 through 1.9.0

For systems utilizing Unison EAC operating code 1.5 through 1.9.0 with an architectural processor (CME, CMEd, or CMEi):

- USAP is a communication protocol that allows a device capable of outputting RS-232 protocol to interface with a Unison Lighting Control System. USAP is a “polled” system, meaning that Unison **accepts** commands from a transmitter and provides status only when queried.

An example of standard USAP functionality may include:

- Preset 1 is played from your Unison control station. To determine if Preset 1 has been played, the serial device must query the Unison processor to obtain the preset status.

Unison operating code 1.9.1 and later

For systems utilizing Unison EAC operating code 1.9.1 and later with an architectural processor (CME, CMEd, CMEi):

- Standard USAP is enhanced to include *dynamic* event based serial commands and responses. Serial command and response messages are sent from the Unison architectural processor to a connected RS-232 device when status of configured objects change. Standard event messages such as record, activate, deactivate, and macro execute are output from the Unison processor to the third party serial device without the need of additional status queries from the RS-232 device.

An example of bi-directional USAP functionality may include:

- Preset 1 is played from your Unison control station. The Unison processor sends a message to the serial device advising that preset 1 has been played.

CAUTION: *USAP is a non-guaranteed protocol relying on best effort delivery of serial data. Excessive run lengths, high data transmission rates (baud rates), or poorly terminated wire may result in frequent data loss.*

USAP Functions

Unison Serial Access Protocol will allow you to perform the following functions in a Unison system:

- Activate a preset
- Deactivate a preset
- Record a preset
- Get status of a preset
- Get priority status of a preset
- Set a fade time for a preset
- Run a macro
- Stop a macro
- Open a wall
- Close a wall
- Toggle a wall state
- Get status of a wall
- Set intensity for a zone
- Get intensity value for a zone
- Set section Master level
- Get section Master level

Wire Specification

ETC specifies the following wire for proper USAP operation:

- RS-232 / EIA-232, 3-wire
- Belden 9729 or equivalent

RS-232 standards recommend a maximum length of 50’ with this wire type.

Connector Specification

One way to connect to a RS-232 transmitting device, such as a computer, is via a **DB9 connector**.

Connection to the architectural processor in any revision and to any board is made via a 3-**pin Mascon connector** (ETC part # J6132 and its cover ETC part # J6129).

ETC manufactures a USAP cable (ETC part # 7080B7007) that is Mascon female to DB9 female. This cable is also included in the UPSAC kit (ETC part # 7080S1001).

Note: *If you are building your own cable please note the following:*

Mascon Connectors require a special crimping tool.

Specific pinouts are detailed in the next section. The ER4 signal distribution board revision number installed will determine the pinout of the connector.

Connection

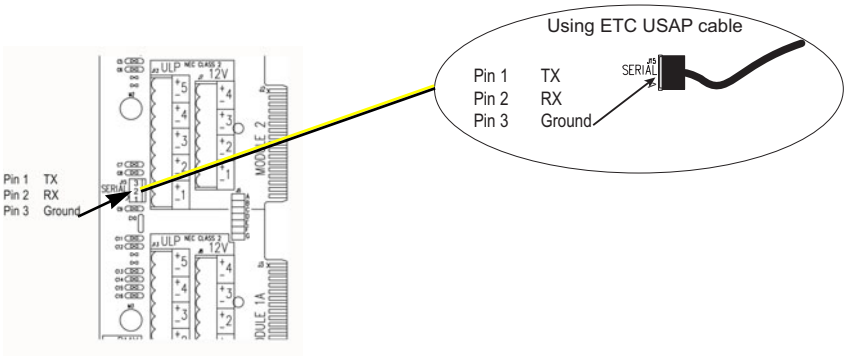
Serial connection to the Unison system is made via the serial connector on the architectural option board (ARCH) in a Unison DR dimming rack, and the serial connector on the signal distribution board in an ER4 rack.

Pinout for Connection to the ER4 Rack

Pinout in the ER4 rack varies based on the revision of the signal distribution board in the ER4 rack.This number and letter combination is screened onto the board. While the revision numbers are hard to read when an architectural processor is installed, an easy way to determine the significant revision is that all signal distribution boards REV E and higher have two serial connectors and all REV D and lower have only one.

Pinout for Signal Distribution Board, Rev A - D in an ER4 Rack

Notice for connection to a signal distribution board, rev D or lower, TX and Ground are swapped. You will be required to plug the connector into the serial connection upside down.

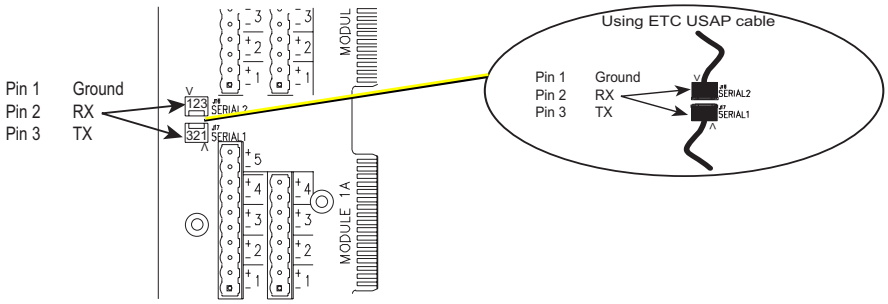


If you are building your own serial cable the 9-pin female DB9 connector to Mascon connector pinout is as follows:

DB9 (female)	Mascon (female)	Type
Pin 2	Pin 1	Unison TX
Pin 3	Pin 2	Unison RX
Pin 5	Pin 3	Ground

Pinout for Signal Distribution Board, Rev E and Higher in an ER4 Rack

Serial connection is made to the connector closest to the architectural processor.



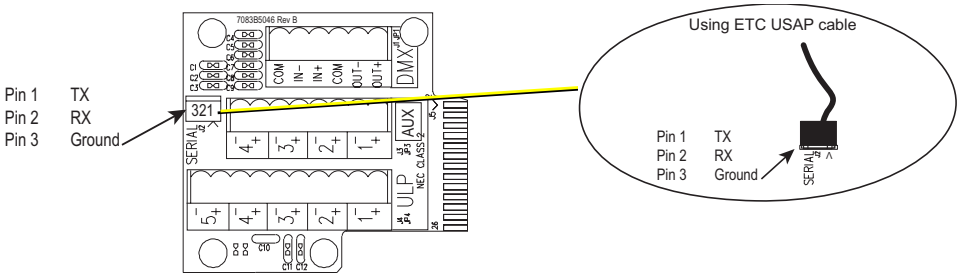
If you are building your own serial cable, the 9-pin female DB9 to Mascon connector pinout is as follows:

DB9 (female)	Mascon (female)	Type
Pin 5	Pin 1	Ground
Pin 3	Pin 2	Unison RX
Pin 2	Pin 3	Unison TX

Pinout for Connection to a DR Dimming Rack

Pinout for the architectural option board in a DR Rack is similar to that found in the signal distribution board (rev D or lower) in the ER4 rack. If you are attaching the Serial Access Protocol cable to the ARCH board in a DR Rack, note that TX and Ground are swapped. You will be required to plug the connector into the serial connection upside down.

Pinout for Arch Option board in a DR Dimming Rack



If you are building your own serial cable, the 9-pin female DB9 to Mascon connector pinout is as follows:

DB9 (female)	Mascon (female)	Type
Pin 2	Pin 1	Unison TX
Pin 3	Pin 2	Unison RX
Pin 5	Pin 3	Ground

RS232 Serial Port Settings

There are several versions of processor code. You can determine which version of code you have by accessing the [Arch] Menu in your Unison Processor. Please locate your code version and consult the below sections for correct communications information.

Note: *USAP is not supported in processors containing code version 1.4 or lower.*

For 1.5 and 1.55 Code Systems:

In order for Unison Serial Access Protocol to successfully communicate between devices, communication parameters must be set in the connected device to the following:

- 9600 bits per second
- 8 data bits
- 1 stop bit
- No parity
- “Break” not used.

For 1.65 through 1.9.0 Code Systems:

In order for Unison Serial Access Protocol to successfully communicate between devices, communication parameters must be set in the connected device to the following:

- Any one of the following baud rates may be used 4800,9600,19200, or 38400 bits per second.
- 8 data bits
- 1 stop bit
- No parity
- “Break” not used.

Note: *Unison systems version 1.65 and higher default to 9600 baud rate. Rates can be changed in Light Manager prior to use if warranted.*

For 1.9.1 and Higher Code Systems:

In order for Unison Serial Access Protocol to successfully communicate bi-directional, the specific presets, zones and macro properties must be **Bi-Directional USAP Enabled** within Light Manager software. Reference the *Light Manager v1.9.1 Quick Guide* for details.

- Any one of the following baud rates may be used 4800,9600,19200, or 38400 bits per second. System default is 9600 baud. Rates can be changed in Light Manager software prior to use.
- 8 data bits
- 1 stop bit
- No parity
- “Break” not used.

Chapter 2
Structure

In this section you will find details for successful USAP commands using defined serial packet structure.

This chapter contains the following sections:

Packet Information

All information necessary to define each command is supported. For example, a preset is defined by what section of a room it is in, what priority it has, and what fade time it has. Only necessary information needs to be provided over the communications link. If no fade time and priority are sent, the preset will run using the default priority and fade time.

Commands return an acknowledgment that the command was activated. Commands that are not recognized return an error message. All commands are case-sensitive.

USAP Frame Format

USAP frame segments are always represented by hexidecimal values. The graphic below indicates which frame segments are predefined and which frame segments require user defined information.

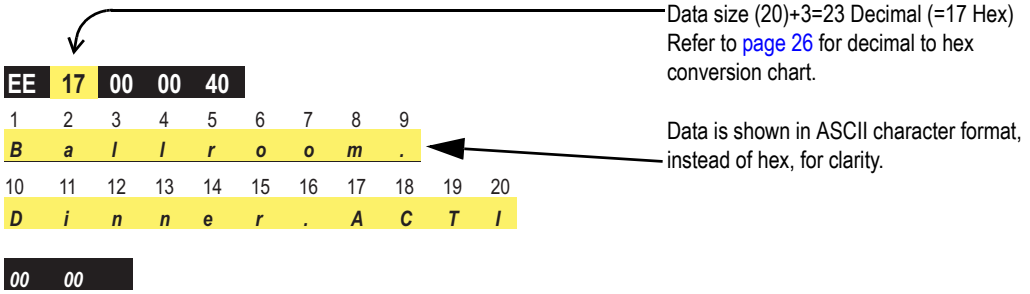
- *Length is the number of bytes until CRC, or size of data plus 3. Again, this value, as well as the others must be represented in hexidecimal. See *Decimal to Hex Conversion Chart, page 26*.
- **Data is the command to be sent in ASCII (see *Data Structure, page 13*). The data portion of the packet should be less than 200 bytes long.

Start code	Length	Command	ID	Protocol	Data	CRC
0xEE	*(*varies)*	0x00	0x00	0x40	*(**varies)*	0x0000

All frames should be formatted as indicated in the graphic above. Start code, Command, ID, Protocol, and CRC segments always have the values indicated.

Sample USAP Frame Format

In the following USAP packet example, the preset named "Dinner" in the room "Ballroom" will be activated.



In comparison same example as above, a packet in hexidecimal format is:

ee1700004062616c6c726f6f6d2e64696e6e65722e616374690000

Note: *RS-232 devices or systems interfacing with the Unison system may require additional characters before a hex value. Know your system requirements prior to programming.*

Format of Commands and Responses

Unison Serial Access Protocol uses the same format for commands and responses. Commands refer to a Unison object, and can set properties, get properties, or initiate actions on that object. Responses refer to the same Unison object, return property settings, confirm the property set, and actions that were carried out. All object names are case sensitive.

Data: [Name].[Property or Action].[Property or Action]

Name: Unison object reference, using "." as a separator. Unison objects include Rooms, Presets, Walls, Sections, Zones and Macros. All names are mixed-case printable ASCII and may contain spaces. Names must match the case and spacing of objects in the Unison configuration.

- To determine names, consult a current copy of your Unison configuration or contact your Authorized ETC dealer or ETC Technical Services at 800-775-4382. Be prepared to give your facility name and/or ETC Job Number. Job Information can be found in the Unison Processor. Reference your *ER & DR Dimming Rack Owner's Manual* for further instructions.

Note: *Names may not include the following invalid characters:". ; + - , / ". in versions newer than 1.65.*

Property: Unison object property. All properties begin with a lowercase letter, and are 4 or less characters.

- Properties may be followed by "=" and a value for setting properties (unless they are read-only).

Action: Unison object action. All actions begin with an uppercase letter, and are 4 or less characters.

Property value encoding

Properties have values, and these values are of certain types. The first character of the Property name indicates the Type. The encoding for these types is defined here.

Type	Prefix	Encoding
Boolean	b	0 = False
Boolean	b	1 = True
Unsigned Integer	n	Decimal (e.g., "0" "123"

Chapter 3
Command String

In this section you will find details on the allowable commands within the data structure. In addition you will find information regarding error messages and how to determine the error within the packet.

This chapter contains the following sections:

Objects, Properties and Actions

Unison Serial Access Protocol command strings must match the case and spacing of objects in the Unison configuration.

Note: *To determine names, contact your authorized ETC dealer or ETC Technical Services at 800-775-4382. Be prepared to give your facility name and/or ETC Job number.*

Commands are case-sensitive and need to be phrased accurately. The example below is shown as a Command (from the external device to a Unison Processor) and a Response (from Unison Processor to the external device).

Example:

- Command: [Ballroom.Hall A.Dinner.ACTI]
- Response: [?Ballroom.]

Error:

A room named “BALLROOM” must be referred to in all capital letters in a command. Commands referring to the room as “Ballroom” will return as invalid.

Rooms

In USAP, Room objects have no properties or actions, but are used when referencing the objects contained in them such as Presets, Walls, Sections, and Zones.

Sections

In USAP, section objects have no properties or actions but are used when referencing Zones contained in them, when obtaining the status of a Preset action, or section Master values.

Presets

Preset objects are referenced by Room and Section objects.

- To send commands which will affect a Preset, first reference the Room and then the Preset. Example: [BALLROOM.Dinner].
- To access properties or actions specific to a section in a divided room, you must reference the Room, the Section, and then the Preset. Example: [BALLROOM.Hall A.Dinner].

Preset Command Format:

You can place multiple commands for the same object on a single command line, provided they are each separated by a period.

Example: [ROOM NAME].[SECTION NAME].[PRESET NAME].**COMMAND**

Preset Commands:

- Activate a preset: **ACTI**
- Deactivate a Preset: **DACT**
- Record a Preset: **RECO**
- Set a fade time for a Preset: **nDFT=** (time is entered in milliseconds)
- Get status of a Preset: **bACT**

- (Unison will respond with Preset name and 1=active, or 0=not active)

- Get Priority status of a Preset: **bAAP**
  - (Unison will respond with preset name and priority level)

Property	Description	Value
bACT	Active (read only)	False = Preset is not active True = Preset is active
bAAP	Active at Priority (read only)	False = Preset is not active at it's current priority True = Preset is active at it's current priority
nDFT	Fade Time	milliseconds from 0 to 4294967295 (approximately 50 days)

Action	Description	Function
ACTI	Activate	Activates the Preset at the current priority and with the current fade time
DACT	Deactivate	Deactivates the Preset at the current priority and with the current fade time
RECO	Record	Record the Preset

Preset Examples:

Examples of preset commands:

Activate a Preset

- Command - [BALLROOM.Hall A.Dinner.ACTI]
- Response - [BALLROOM.Hall A.Dinner.ACTI]

Activate a Preset including Fade Time

- Command - [BALLROOM.Dinner.nDFT=5000]
- Response - [BALLROOM.Dinner.nDFT=5000]
  - *(5000 milliseconds = 5 second fade)

Get the Active state of a Preset in a Section

- Command - [BALLROOM.Hall A.Dinner.bACT.BAAP]
- Response - [BALLROOM.Hall A.Dinner.bACT.BAAP=0]
  - =0 means the preset is not active / =1 means the preset is active

Walls

Wall objects are contained in Room objects. To send commands which will effect a Wall, first reference the Room and then the Wall. Example: [BALLROOM.East Wall].

Wall Command Format:

[ROOM NAME].[WALL NAME].**COMMAND**

Wall Commands:

- Open a Wall: **OPEN**

- Close a Wall: **CLOS**
- Toggle a Wall State: **TOGL**
- Get status of a Wall: **bOPN**
    - (Unison Processor will respond with Wall name and 1=open or 0=closed

Property	Description	Value
bOPN	Open	If false (=0), Wall is closed and related sections are not combined. If true (=1), Wall is open and related sections are combined.

Action	Description	Function
OPEN	Open	Wall state is set to Open (same as bOPN=1)
CLOS	Close	Wall state is set to Close (same as bOPN =0)
TOGL	Toggle	Wall state is toggled (open to closed, or closed to open)

Wall Examples

Get the open/close state of a wall

- Command - [BALLROOM.East Wall.bOPN]
- Response - [BALLROOM.East Wall.bOPN=0]
    - =0 means the wall is closed / =1 means the wall is open

Set the open/close state of a Wall

- Command - [BALLROOM.East Wall.bOPN=1]
- Response - [BALLROOM.East Wall.bOPN=1]

OR

- Command - [BALLROOM.East Wall.OPEN]
- Response - [BALLROOM.East Wall.OPEN]

Toggle the open/close state of a Wall and get its new open/close state

- Command - [BALLROOM.East Wall.bOPN]
- Response - [BALLROOM.East Wall.BOPN=0]
    - =0 means the wall is closed / =1 means the wall is open

Zones

Zones are contained in Rooms or Sections and can be controlled by Presets. To send commands which will affect a Zone in a Room, first reference the Room and then the Zone. Example: [BALLROOM.Downlights].

If the Room is divided (or uses the Unison room combine feature), reference the Room and Section, and then the Zone. Example: [BALLROOM.Hall A.Downlights].

Zone Command Format:

[ROOM NAME].[SECTION NAME].[ZONE NAME].**COMMAND**

Zone Commands:

- **Set** intensity value for a Zone: **nINT**=[Intensity value]
  - Intensity values are displayed and transmitted in 16-bits. In this system 0=off and builds to full =65535. Intensity values **must** be input in this numerical system. Reference *Level Percentages to 16-bit Zone Value Chart, page 27*.
- **Get** intensity value for a Zone: **nINT**
  - (Unison Processor will respond with Zone name and 16-bit value)

Property	Description	Value
nINT	Intensity	0 = Off
nINT	Intensity	65535 = Full On (100%)

Determining 16-bit Zone values

To determine 16-bit values for Zone levels, multiply the desired percentage by 65535. See also *Level Percentages to 16-bit Zone Value Chart, page 27*.

Zone Examples

Get the intensity of a zone

- Command - [BALLROOM.Downlights.nINT]
- Response - [BALLROOM.Downlights.nINT=0]
  - =0 indicates that the zone is off

Set the intensity of a zone

- Command - [BALLROOM.Hall A.Downlights.nINT=65535]
- Response - [BALLROOM.Hall A.Downlights.nINT=65535]
  - In 16 bit values, 65535 indicates the zone is at full

Macros

A Macro is a series of pre-stored commands that can be carried out by the Unison processor.

Macro Command Format:

[MACRO NAME].[COMMAND]

Macro Commands

Action	Description	Function
EXEC	Execute	Run the macro
STOP	Stop	Stop the macro

Macro Examples

Run a Macro called Lockout

- Command - [Lockout.EXEC]
- Response - [Lockout.EXEC]

Stop a Macro called Lockout

- Command - [Lockout.STOP]
- Response - [Lockout.STOP]

Master

Sections of a room, including Section Zero, may be mastered by using the master value command. This command yields the same functionality as a station fader configured as Master for a serially connected device. This command may also be useful in monitoring the master value of a section if a station alters it.

Master Command Format:

[ROOM NAME].[SECTION NAME].Master.COMMAND

Master Commands

Set the Master level value for a specified section: nVAL=[Level value]

- Level values are displayed and transmitted in 16-bits. In this system 0-off and builds to full -65535. Like Zone intensity, Master level values must be input in this numerical system. *See "Level Percentages to 16-bit Zone Value Chart" on page 27.*

Get the Master level value for a specified section: nVAL

- Unison processor will respond with the active 16-bit Master level for the specified Section.

Zone Set and Get Command

Property	Description	Value
nVAL	level value	0 = off 65535 = Full On (100%)

Master Responses

Action	Description	Response Message
nVAL	level value	Section Master level value

Master Examples

Get the Master level value for a Section of a Room

- Command - [BALLROOM.Hall A.Master.nVAL]
- Response - [BALLROOM.Hall A.Master.nVAL=65535]
  - = 32767 indicates that the Master value of Hall A is at 50%
  - = 0 indicates that the Master value of Hall A is at 0%

Set the Master level value for a Section of a Room

- Command - [BALLROOM.Section Zero.Master.nVAL=65535]
- Response - [BALLROOM.Section Zero.Master.nVAL=65535]
  - In 16-bit values, 65535 indicates the Master level value is at full 100%
  - Use of Section Zero here implies that all Sections within a Room will be simultaneously affected.

Note: *The Set Master value command behaves as a station Master fader does. The nVAL value either has to be larger than other active Master faders or at full to attain Master control of the space. This also implies that like faders, changes in Preset and Zone states will affect the Master's behavior.*

Errors

If an object, property, or action is not understood by the Unison processor or an object is not named in proper case sensitive format, it will insert an error indicator (“?”) before the problematic object in the response string.

Unknown Object Error

- Command - [Ballroom.Downlights.nINT=0]
- Response - [?Ballroom.]
    - The error generated is indication that Ballroom is not a known object. In this case check the capitalization of the name. Names must match case. Reference the Light Manager configuration file for proper object names.

Unknown Property Error

- Command - [BALLROOM.Dinner.nUnk=0]
- Response - [BALLROOM.Dinner.?nUNK]
    - The error generated is indication that “nUNK” is a unknown command property. Reference *Frame Format and Command Quick Reference, page 25* to verify the correct command property.

Unknown Action Error

- Command - [BALLROOM.Dinner.bOPN]
- Response - [BALLROOM.Dinner.?bOPN]
    - The error generated is indication that ‘bOPN” is a incorrect command. As per the previous example, reference the *Frame Format and Command Quick Reference, page 25* for confirmation of the action type entered. Specifically in this example, “Dinner” is a Preset object and “bOPN” is a Wall command. Ensure the objects are compatible with the actions specified.

Appendix A
Reference

This appendix contains the following sections:

Frame Format and Command Quick Reference

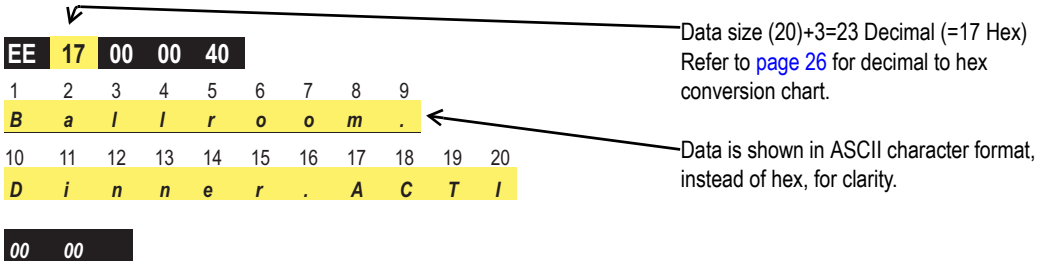
Frame Format

To complete a successful Unison serial command, use the following frame format as a guide. User defined information is required for Length and Data only. All other frames are as indicated.

- *Length is the number of bytes until CRC, or size of data plus 3, This value, as well as the others must be represented in hex. *See "Decimal to Hex Conversion Chart" on page 26.*
- **Data is the command to be sent in ASCII. *See "Data Structure" on page 13.* The data portion of the packet should be less than 200 bytes long.

Start code	Length	Command	ID	Protocol	Data	CRC
0xEE	*(*varies)*	0x00	0x00	0x40	*(**varies)*	0x0000

Example of a USAP packet:



In comparison, this same packet in hexidecimal format is:

ee1700004062616c6c726f6f6d2e64696e6e65722e616374690000

Command String

Commands are case sensitive and need to be phrased accurately and in the proper type case.

PRESET COMMANDS	Activate a Preset:	ACTI
	Deactivate a Preset:	DACT
	Record a Preset:	RECO
	Set a fade time for a Preset:	nDFT=(time is entered in milliseconds)
	Get status of a Preset	bACT
	Get priority status of a Preset:	bAAP
WALL COMMANDS	Open a Wall:	OPEN
	Close a Wall:	CLOS
	Toggle a Wall state:	TOGL
	Get status of a Wall:	bOPN
ZONE COMMANDS	Set intensity for a Zone:	nINT=(entered in 16-bit value - see *Decimal to Hex Conversion Chart, page 26* for conversion chart)
	Get intensity value for a Zone:	nINT
MACRO COMMAND	Run a Macro:	EXEC
	Stop a Macro:	STOP
MASTER COMMAND	Set a Master level	nVAL=[Level Value]
	Get a Master level	nVAL

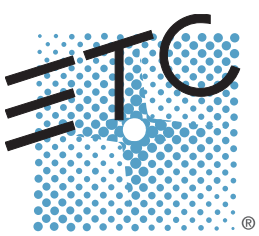
Decimal to Hex Conversion Chart

Decimal	Hex	Decimal	Hex	Decimal	Hex
0	00	32	20	64	40
1	01	33	21	65	41
2	02	34	22	66	42
3	03	35	23	67	43
4	04	36	24	68	44
5	05	37	25	69	45
6	06	38	26	70	46
7	07	39	27	71	47
8	08	40	28	72	48
9	09	41	29	73	49
10	0A	42	2A	74	4A
11	0B	43	2B	75	4B
12	0C	44	2C	76	4C
13	0D	45	2D	77	4D
14	0E	46	2E	78	4E
15	0F	47	2F	79	4F
16	10	48	30	80	50
17	11	49	31	81	51
18	12	50	32	82	52
19	13	51	33	83	53
20	14	52	34	84	54
21	15	53	35	85	55
22	16	54	36	86	56
23	17	55	37	87	57
24	18	56	38	88	58
25	19	57	39	89	59
26	1A	58	3A	90	5A
27	1B	59	3B	91	5B
28	1C	60	3C	92	5C
29	1D	61	3D	93	5D
30	1E	62	3E	94	5E
31	1F	63	3F	95	5F

Level Percentages to 16-bit Zone Value Chart

Intensity values are displayed and transmitted in 16-bits. To calculate 16-bit value for a Zone level, multiply the desired percentage by 65535, or reference this chart for convenience.

Level Percentages	16-bit Zone Value
0%	0
5%	3277
10%	6554
15%	9830
20%	13107
25%	16384
30%	19661
35%	22937
40%	26214
45%	29491
50%	32768
55%	36044
60%	39321
65%	42598
70%	45875
75%	49151
80%	52428
85%	55705
90%	58982
95%	62258
100%	65535



Corporate Headquarters ■ 3031 Pleasant View Road, P.O. Box 620979, Middleton, Wisconsin 53562-0979 USA ■ Tel +608 831 4116 ■ Fax +608 836 1736
London, UK ■ Unit 5, Victoria Industrial Estate, Victoria Road, London W3 6UU, UK ■ Tel +44 (0)20 8896 1000 ■ Fax +44 (0)20 8896 2000
Rome, IT ■ Via Ennio Quirino Visconti, 11, 00193 Rome, Italy ■ Tel +39 (06) 32 111 683 ■ Fax +39 (06) 32 656 990
Holzkirchen, DE ■ Ohmstrasse 3, 83607 Holzkirchen, Germany ■ Tel +49 (80 24) 47 00-0 ■ Fax +49 (80 24) 47 00-3 00
Hong Kong ■ Room 605-606, Tower III Enterprise Square, 9 Sheung Yuet Road, Kowloon Bay, Kowloon, Hong Kong ■ Tel +852 2799 1220 ■ Fax +852 2799 9325
Service: (Americas) service@etcconnect.com ■ (UK) service@etceurope.com ■ (DE) techserv-hoki@etcconnect.com ■ (Asia) service@etcasia.com
Web: www.etcconnect.com ■ Copyright © 2005 ETC. All Rights Reserved. ■ Product information and specifications subject to change.
7080M1301-1.9.2 ■ Rev A ■ Released 04/2005