

DX-10tm Digital Interface User's Guide

Serial Communications

Revision C

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Forward

The advent of digital cinema presents new challenges and opportunities to theatre owners and operators. Digital cinema provides an unprecedented movie-going experience while offering new revenue opportunities and potential for reduced operating expenses.

The migration to digital cinema requires the installation of new equipment. For some screens, a digital projector and cinema server are added to an existing film projector and automation, establishing dual film/digital or hybrid capability. For other screens, film projectors are removed and replaced with digital projectors and cinema servers. For new screens, installation options now include digital only, hybrid, or film only configurations.

During digital presentations, the automated control of house functions can no longer be performed using traditional film-based cueing systems. Instead, cinema automations are controlled using digital communications including serial, General Purpose Input/Output (GPIO), and Ethernet protocols.

The DX-10 Digital Interface provides digital communications between the Component Engineering TA-10 Theatre Automation and digital cinema servers.

Introduction

What's in the Box

<i>Item</i>	<i>Description</i>
DX-10 Circuit Board	Installs into TA-10 Theatre Automation
User's Guide – Serial	Installation and operation manual for digital cinema

What it Does

The DX-10 Digital Interface allows a digital cinema server to control theatre house functions wired into a Component Engineering TA-10 Theatre Automation.

The DX-10 fires cue relays, event lines, and auxiliary relays in response to commands issued by a cinema server.

The DX-10 allows an operator to start and stop digital presentations with the TA-10's Start and Stop buttons.

The DX-10 allows Panic Stop or Fire Alarm to control the digital system.

The DX-10 allows for the control and monitoring of multiple digital systems through a remote control box. The DX-10 responds to remote control start and stop buttons and manages remote control box status LED indicators during both digital and film presentations.

The DX-10 allows a single TA-10 to control house functions for both a film projector and a digital system supporting film and digital on a single screen in a hybrid configuration.

The DX-10 can be used to upgrade a TA-10 Theatre Automation that is currently installed in the field without re-wiring. The DX-10 can also be ordered pre-installed in a new TA-10.

Whether ordered as part of a new TA-10 or installed later as a field upgrade, the combination of a TA-10 Theatre Automation and a DX-10 Digital Interface is called a TA-10 Digital Theatre Automation.

How It Works

The DX-10 acts as a communications interface between the digital cinema server and a TA-10 Theatre Automation. The DX-10 is connected by cable to the serial port of the cinema server. When the DX-10 receives a serial command from the server, the DX-10 fires a Macro Cue that instructs the TA-10 Theatre Automation to perform a series of actions. These actions include pulsing cue relays, pulsing event lines, turning the alarm on or off, controlling the auxiliary relay, and turning the Show Run, remote control box, and front panel LEDs on or off.

As noted above, a Macro Cue is a group of actions performed together in response to a serial command from the server (or some other trigger). Macro cues are programmed into the DX-10 using Cue Manager™ software. A trigger causes a Macro Cue to fire. When a Macro Cue is fired, the associated actions are performed.

Available Triggers

Serial Command
GPIO Command
Automation and Remote Start Buttons
Automation and Remote Stop Buttons
Panic Stop
Film Run-Out

Available Actions

Show Run On
Show Run Off
Dolby Digital Show Start
Dolby Digital Show Pause
Dolby Digital Show Stop
Pulse Cue 1 Relay
Pulse Cue 2 Relay
Pulse Cue 3 Relay
Pulse Cue 4 Relay
Pulse Cue 5 Relay
Pulse Cue 6 Relay
Pulse Cue 7 Relay
Pulse Event 1 Relay
Pulse Event 2 Relay
Pulse Event 3 Relay
Pulse Event 4 Relay
Pulse Event 5 Relay
Motor Off Pulse
Automation Alarm On
Automation Alarm Off
Pulse TTL Output 1
Pulse TTL Output 2

Major Features

- Performs all TA-10 legacy and film functions
- Serial port for connection to a digital cinema server
- On-Board Macro Cue storage
- Dedicated Digital Sound Select feature for use in a hybrid environment
- Dedicated Pulse On Panic Stop relay
- Programmable TTL outputs

Setup

Installation Strategy

We recommend installing the DX-10 Digital Interface for use with a digital cinema server as follows:

1. Install the DX-10 circuit board into the TA-10 Theatre Automation.
2. Set the automation address DIP switches if applicable.
3. Set the intermission delay time DIP switches if applicable (hybrid installations only).
4. Set the interlock zone jumper if applicable (hybrid installations only).
5. Program the DX-10 with Macro Cues that have serial command triggers using Cue Manager software.
6. Connect the cinema server's serial interface to the DX-10.
7. Program the cinema server with serial automation cues that have names and serial outputs matching the DX-10 Macro Cues.
8. Build a show and place serial automation cues into the timeline.

System Requirements

Component Engineering TA-10 Theatre Automation System

Component Engineering DX-10 Digital Interface

Component Engineering Cue Manager Macro Cue Programming Software

PC-Compatible Computer with serial port (or USB-to-serial-port converter)

Programming Serial Cable (supplied by Component Engineering with Cue Manager Software)

Server Serial Cable (supplied by Component Engineering)

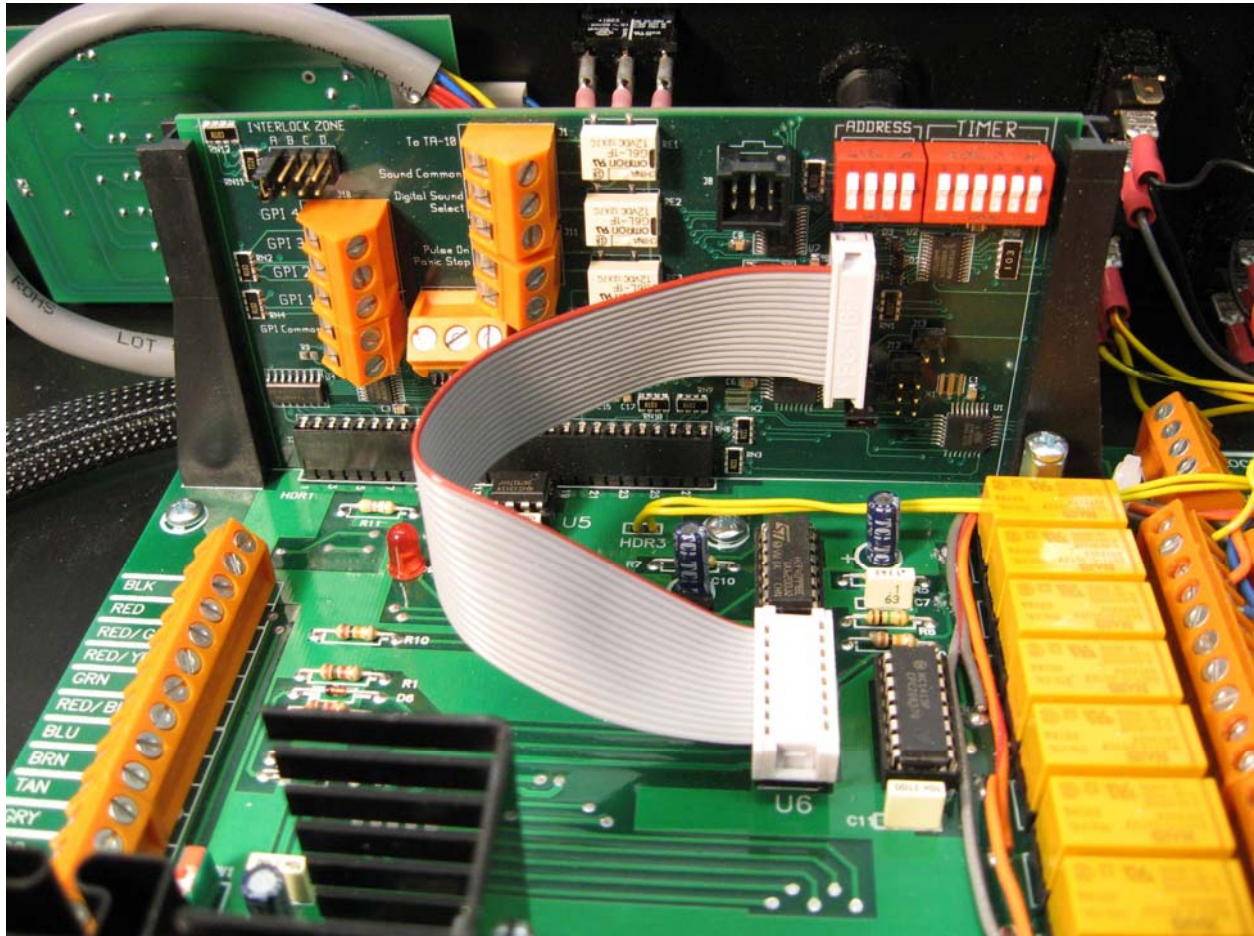
Digital Cinema Server with Serial Interface

Installing the Circuit Board

1. Disconnect the TA-10 Theatre Automation from power.
2. Open the chassis of the TA-10.
3. Locate the legacy MCU circuit board. This board is mounted vertically in two brackets on the TA-10 motherboard and has two sets of DIP switches.
4. Remove the legacy MCU circuit board by pulling it firmly straight up. Set the legacy MCU circuit board aside. Do not change the Address or Timer DIP switches or Interlock Zone jumper settings. These settings will be referenced later when configuring the DX-10.
5. Remove chip U6 from its socket on the TA-10 motherboard. Place it into the foam supplied on the end of the ribbon connector and store it with the legacy MCU circuit board.
6. Install the DX-10 board into the two vertical brackets, pressing down firmly until the board is fully seated.

Installing the Ribbon Cable

Insert the male end of the ribbon cable into the empty U6 socket on the motherboard. It is important that the orientation of the ribbon cable is correct. The red wire must be installed in pin 1 of the socket. Pin 1 is close to U7, near the notch in the socket. Make sure all pins are properly seated into their corresponding socket holes.



DX-10 properly installed in the TA-10 Theatre Automation

Setting the Automation Address

If installing the DX-10 into an existing TA-10 installation, set the DX-10's four-position Address DIP rocker switches so that they match the settings of the legacy MCU board. If you are establishing automation addresses for the first time, set the DIP rocker switches according to the table below. For a detailed description of automation addressing, refer to the TA-10 Theatre Automation Operator's Manual.

<i>Automation Address</i>	<i>Switch Positions</i>			
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>
1	Open	Open	Open	Open
2	Open	Open	Open	Closed
3	Open	Open	Closed	Open
4	Open	Open	Closed	Closed
5	Open	Closed	Open	Open
6	Open	Closed	Open	Closed
7	Open	Closed	Closed	Open
8	Open	Closed	Closed	Closed
9	Closed	Open	Open	Open
10	Closed	Open	Open	Closed
11	Closed	Open	Closed	Open
12	Closed	Open	Closed	Closed
13	Closed	Closed	Open	Open
14	Closed	Closed	Open	Closed
15	Closed	Closed	Closed	Open
16	Closed	Closed	Closed	Closed

Setting the Intermission Delay Time

The Intermission Delay Timer DIP switches on the DX-10 perform the same function as those on the legacy MCU board. Accordingly, set the DX-10's six-position Delay Time DIP switches so that they match the settings of the legacy MCU board. The Intermission Delay Timer is in effect only during film presentations and does not affect digital presentations. For a detailed description of how to set the intermission delay time, refer to the TA-10 Theatre Automation Operator's Manual.

Setting the Interlock Zone

The Interlock Zone jumper on the DX-10 performs the same function as the jumper on the legacy MCU board. Accordingly, set the DX-10's Interlock Zone jumper to the same position as the jumper on the legacy MCU board. The Interlock Zone setting is in effect only during film presentations and does not affect digital presentations. For a detailed description of how to set the interlock zone, refer to the TA-10 Theatre Automation Operator's Manual.

If your TA-10 is equipped with an interlock zone switch installed into its front panel, the switch must be disconnected from the interlock zone connector on the legacy MCU board and reconnected to the DX-10's interlock zone connector.

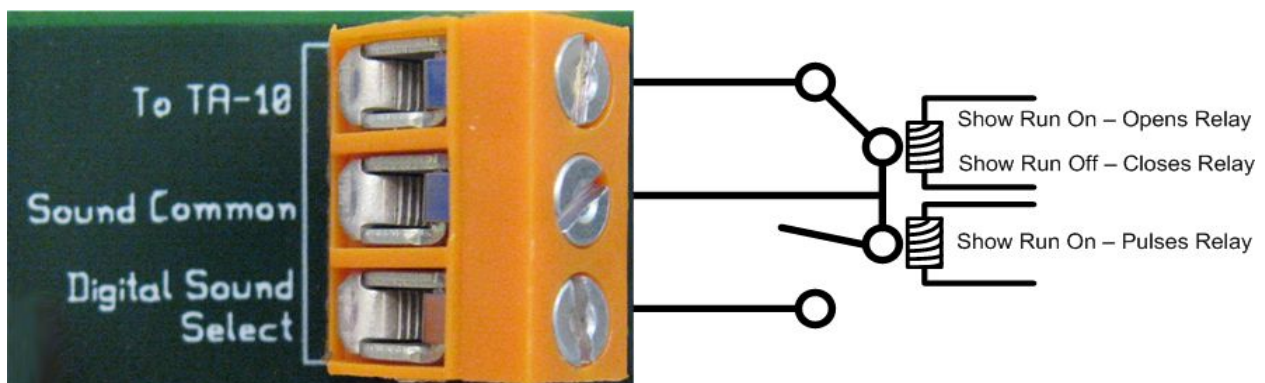
Digital Sound Selection for a Hybrid Theatre

Description

The DX-10 includes an auxiliary Digital Sound Select feature. This feature is used when the installation is a hybrid configuration containing both film and digital projectors tied to a single TA-10. Do not use this feature if your installation is either film-only or digital-only.

The auxiliary digital sound select is activated with the Show Run On automation action. The Show Run On automation action is programmed into the DX-10 using Cue Manager software. Reference the Cue Manager User's Guide for programming instructions. When the auxiliary Digital Sound Select is activated, digital server sound input is selected on the sound processor and all other TA-10 sound select connections are disabled. This allows for switching house functions connected to any sound select line without changing the sound format during the digital presentation. The Show Run Off automation action re-enables all TA-10 sound select connections.

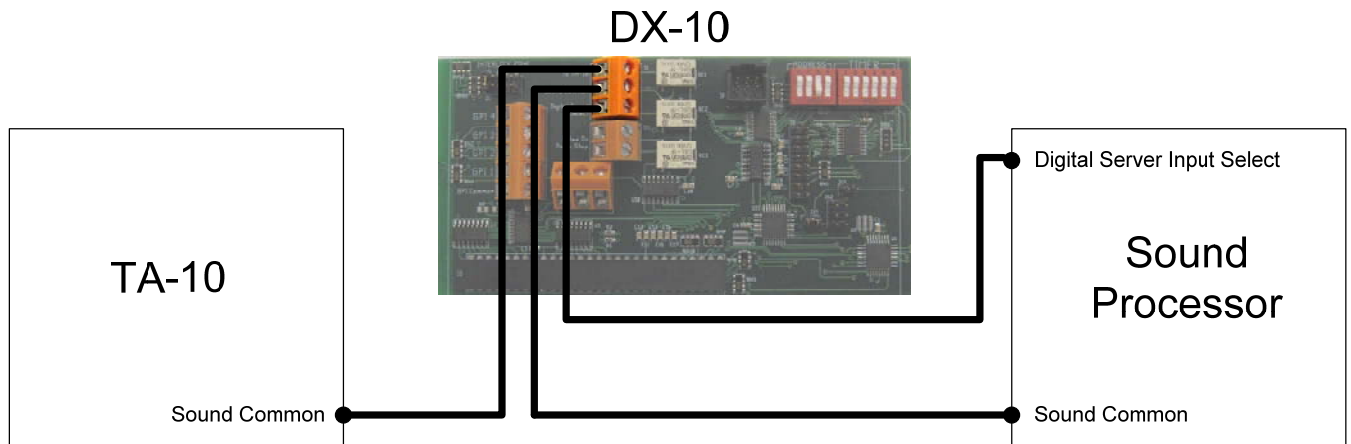
This feature is comprised of two relays, the first of which pulses closed for 500 milliseconds connecting the Digital Sound Select line to Sound Common whenever the Show Run On automation action is processed. The second relay latches open disconnecting the TA-10 sound common and thus disabling the selection of other sound inputs whenever the Show Run On automation action is processed. Whenever the Show Run Off automation action is processed, the second relay latches closed reconnecting the TA-10 sound common and re-enabling the selection of other sound inputs.



DX-10 On-Board Digital Sound Select Relays

Wiring

1. Disconnect the TA-10 Theatre Automation from power.
2. Disconnect the sound processor from power.
3. Open the chassis of the TA-10.
4. Move the sound processor's common line from the TA-10 motherboard to the DX-10.
 - a. Disconnect the sound processor's common line from the common side of the TA-10 sound select relays.
 - b. Connect the sound processor's common line to the "Sound Common" terminal on the DX-10.
5. Install a new wire lead from the common side of the TA-10 sound select relays to the DX-10 terminal that is labeled "To TA-10".
6. Install a new wire lead from the DX-10 "Digital Sound Select" terminal to the sound processor's Digital Server Input Select terminal or pin.
7. Reference the following wiring diagram.



Wiring the Auxiliary Digital Sound Select for a Hybrid Theatre

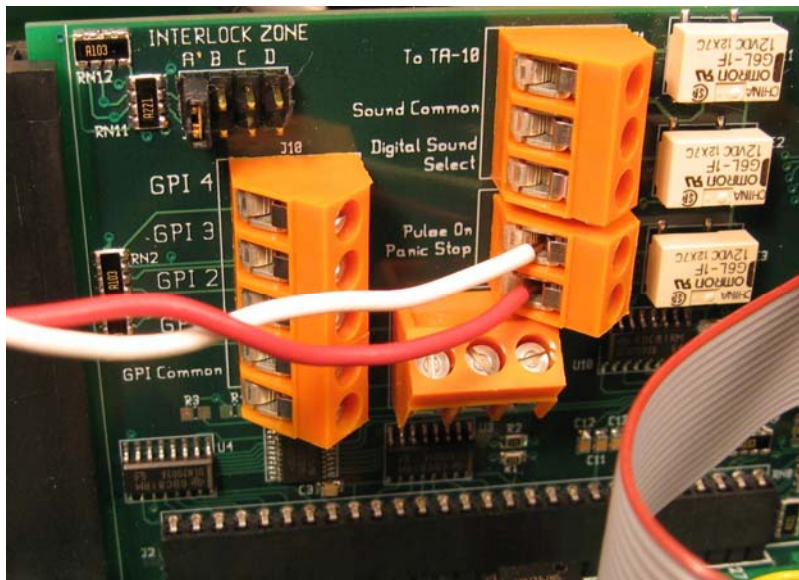
Pulse On Panic Stop Relay

Description

When the DX-10 receives a panic stop signal over the automation bus, the DX-10's Pulse On Panic Stop relay automatically pulses closed for 500 milliseconds. This relay may be connected to any external device that can utilize a low voltage relay contact closure input.

Wiring

The DX-10 Pulse On Panic Stop relay may be connected to any external device that can process a low voltage relay contact closure. For example, you could wire an external alarm into this relay. Typically one side of the relay is wired to the external device control line and the other side is wired to the device common. See the figure that follows.



External device properly wired into the DX-10 Pulse On Panic Stop Relay

Connecting to a Computer for Programming

Description

A PC-compatible computer and Component Engineering Cue Managertm software are used to create, name, and test Macro Cues and to store the Macro Cues into the TA-10 Digital Theatre Automation. A Macro Cue is a group of actions performed in response to a trigger from a digital cinema server.

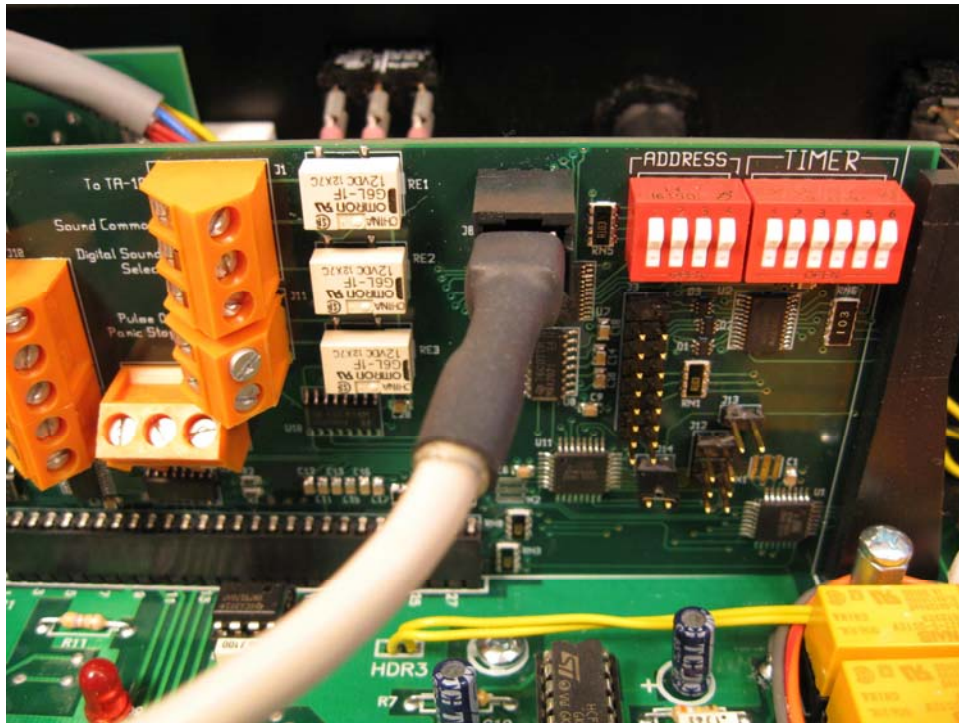
Wiring

In order to program Macro Cues into the DX-10, you will need a computer with a serial port, Cue Manager software installed on the computer, and a programming cable. The programming cable is included with the Cue Manager software. The programming cable is 10 feet in length and is terminated by a female DB-9 connector and a 6-position female plug. Connect the 6-position female plug to the 6-pin header J8 on the DX-10 board. Connect the DB-9 connector to a serial port on the computer. Note: If your computer does not have a serial port you must first install a USB-to-serial-port converter on your computer which will provide the necessary serial port.

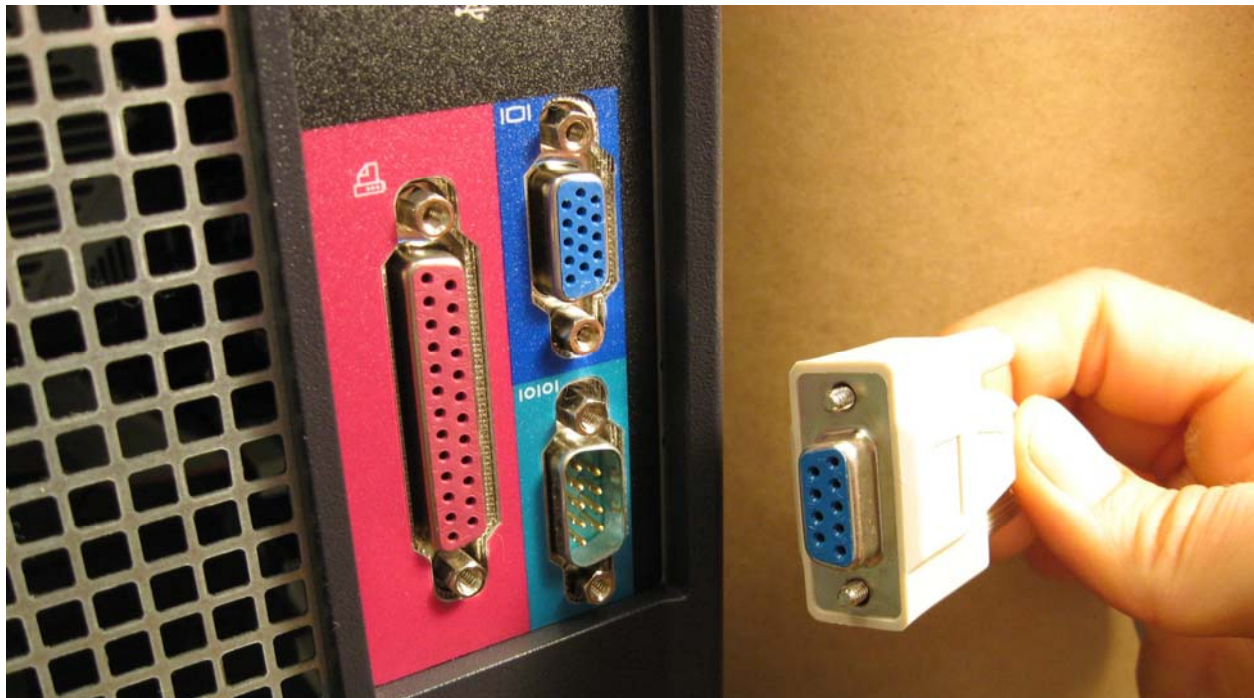
Serial Port Configuration

Confirm that the serial port parameters are configured as follows:

Data Rate:	9600
Data Bits:	8
Parity:	Even
Stop Bits:	1
Flow Control:	Hardware Flow Control



Programming cable properly connected to the DX-10 at connector J8



Connecting the programming cable to the PC serial port

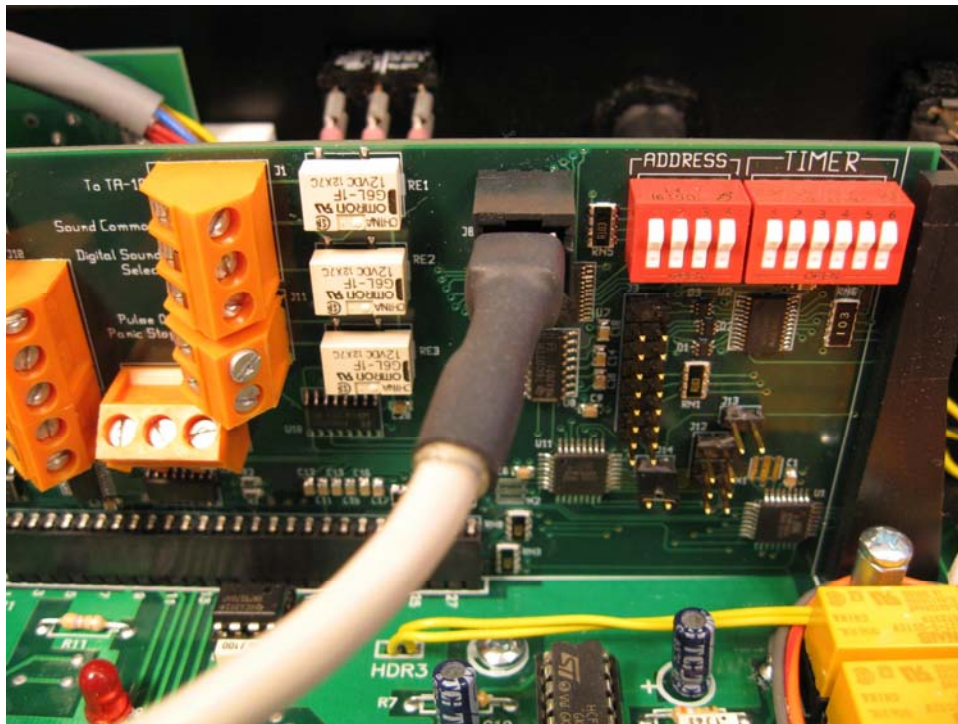
Connecting to a Digital Cinema Server for Running a Show

Description

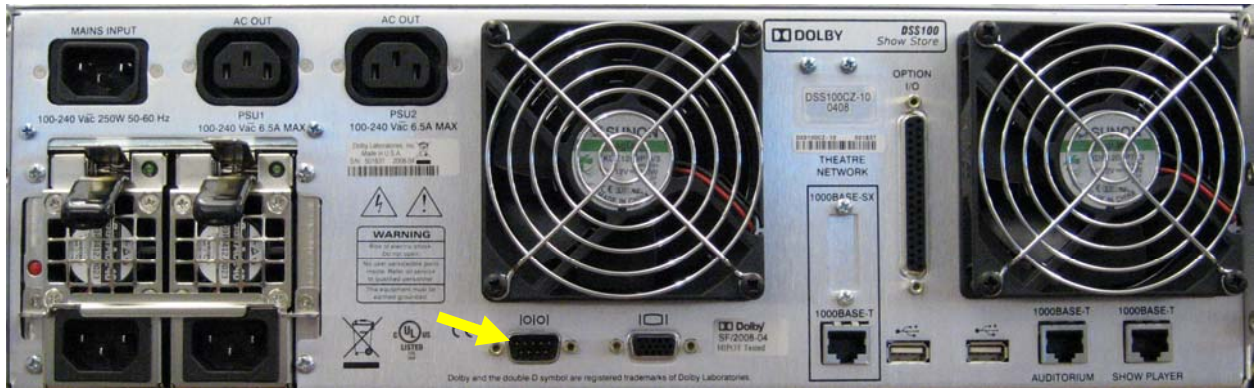
A show running on the cinema server is managed through a playlist timeline. The timeline consists of film clips and server serial automation cues. DX-10 Macro Cues corresponding to the server serial automation cues are programmed into the TA-10 Digital Automation. When the show is running and a server serial automation cue is encountered in the playlist timeline, the server issues a command through its serial interface instructing the TA-10 Digital Automation to fire the corresponding Macro Cue.

Wiring

In order to run a digital show you will need a digital cinema server with a serial connector, a DX-10 installed in a TA-10 Theatre Automation, and a communications cable. The communications cable is available from Component Engineering and is terminated on one end by a female DB-9 connector and on the other end by a 6-position female plug. Connect the 6-position female plug to the 6-pin header J8 on the DX-10 board. Connect the DB-9 connector to the serial port on the cinema server.



Server communications cable properly connected to the DX-10 at connector J8



Serial communications port on a Dolby Digital Cinema Server

Operation

TA-10 Legacy Functions

When installed into a TA-10 Theatre Automation, the DX-10 performs all legacy TA-10 MCU functions and includes support for the following:

Legacy Functions

- FM-35 cue monitoring system
- Film cues
- Event lines
- Start and Stop buttons
- Panic stop
- Motor, lamp, douser, and auxiliary relays
- Show run and other front panel LEDs
- Remote control
- Film interlock mode
- Intermission delay timer
- Automation address selection
- Interlock zone selection
- Fault alarms

During a film presentation, a TA-10 with a DX-10 board installed operates exactly as it did with a legacy MCU board installed.

Programming the DX-10

To program the DX-10 to respond to commands from a cinema server, connect the programming cable between your computer and the DX-10. Install Cue Manager software on your computer using the Cue Manager CD. Follow the programming instructions in the Cue Manager User's Guide. With Cue Manager, you will create Macro Cues which include triggers and automation actions.

Configuring the Digital Cinema Server

Serial Port Configuration

Confirm that the serial port parameters are configured as follows:

Data Rate:	9600
Data Bits:	8
Parity:	Even
Stop Bits:	1
Flow Control:	Hardware Flow Control

Serial Automation Cues

Use Cue Manager software to create Macro Cues and save them into the TA-10 Digital Theatre Automation. Once the automation is programmed, use the digital cinema server's show management software to enter all the Macro Cues with server serial commands into the server's list of serial automation cues. Make certain that the name and serial command *exactly* match the "Macro Cue Name" and "Serial" Command fields respectively. Create a show by organizing clips and cues into the show timeline using drag and drop features and/or commands of the server's show management software.

If you are using a Dolby Digital Cinema Presentation System, first configure the auditorium to use a serial automation by selecting and saving the "this auditorium uses serial automation" option. This will add the "serial automation" tab to the system menu and allow for the creating of serial automation cues.

Running a Digital Show

When a digital show is running, clips and features are played in the order they appear in the show timeline. When the presentation encounters a cue in the timeline, the server issues a serial command through its serial port. The DX-10 receives this serial command and fires the Macro Cue performing all the Macro Cue's automation actions.

Troubleshooting

Digital Cinema Server and DX-10 are Not Communicating

Confirm that the cinema server and the TA-10 Digital Automation are powered on. Confirm that the communication cable is properly connected between the DX-10 and the server. Confirm that the server's serial port parameters are properly configured as follows:

Data Rate: 9600
Data Bits: 8
Parity: Even
Stop Bits: 1
Flow Control: Hardware Flow Control

The DX-10 serial port settings are fixed and cannot be modified.

Programmed Cues are Not Firing

Use Cue Manager software to confirm that the serial command strings for cues defined in the cinema server *exactly* match the serial command strings assigned to macro cues stored in the automation. Command strings are case-sensitive. Use Cue Manager software to confirm that the Macro Cues that the server is to control are actually stored in the automation and programmed correctly. Use the cinema server's show management software to confirm that serial automation cues are actually programmed correctly into the server's presentation timeline.

Use Cue Manager software to test individual relays with the "Test Relays" command. Test macro cues with Cue Manager's "Test Macro Cues" command.