User's Guide To

Show Control

by Alcorn McBride Inc.

Document Revision 3.1

June 2004

Every effort has been made to assure the accuracy of the information contained in this manual, and the reliability of the hardware and software. Errors sometimes can go undetected, however. If you find one, please bring it to our attention so that we can correct it for others.

Alcorn McBride Inc. reserves the right to make changes to these products, without notice, in order to improve their design or performance.

Applications described herein are for illustrative purposes only. Alcorn McBride Inc. assumes no responsibility or liability for the use of any of these products, and makes no representation or warranty that the use of these products for specific applications will be suitable without further testing or modification.

Our Show Control equipment is not intended for use in applications where a malfunction can reasonably be expected to result in personal injury or damage to equipment. Customers using or selling Alcorn McBride Inc. products for use in such applications do so at their own risk, and agree to fully indemnify Alcorn McBride Inc. for any damages resulting from such improper use or sale.

Product Design and Documentation:
Steve Alcorn, Martin Chaney, Jim Carstensen, Jeff Long, Jason Crew, Jim Janninck, Jeremy Scheinberg, David Mayo, Chris Harden, Jonathan Henline, and Scott Harkless.

Alcorn McBride Inc.

Alcorn McBride Inc.
3300 S. Hiawassee Rd, Bldg 105
Orlando, Florida 32835
(407) 296-5800
FAX: (407) 296-5801
http://www.alcorn.com
info@alcorn.com

Contents

Welcome

Since the first V16 was introduced in 1986, Alcorn McBride Show Controllers have provided countless users with intuitive, event-driven control of their show. Our windows-based show programming software, WinScript, takes that power and versatility to new levels with Cut and Paste, English-like user-definable commands, new tools and applications, and intelligent debugging.

This **Show Control User's Guide** will guide you in designing and programming your show using our Show Control Hardware and Software. We at Alcorn McBride are pleased to provide you with these tools. Good luck, have fun, and thanks for choosing Alcorn McBride!

In this chapter, you'll find:

- WinScript installation procedures.
- Show Control documentation and technical support resource listing.
- Important product and warranty information.

Installing WinScript

WinScript is equipped with a Setup program that checks your system and asks a series of questions about how you want to install WinScript.

Important If you use a virus protection program that may interfere with software installation, turn it off or override it before running the WinScript Setup program. Virus protection may be turned back on after setup has completed.

Minimum System Requirements

Hardware/Software	Minimum Required for WinScript 2.0
Processor	Intel 386
Operating System	Microsoft Windows 95 or higher
Free Disk Space	7 MB for full installation
RAM	4 MB

Installing WinScript from CD-ROM

Every Alcorn McBride Show Controller comes with the latest version of WinScript on CD-ROM. To install WinScript, insert the CD-ROM and follow the below instructions.

1. Double click on index.html
2. Click on the Support icon
3. Scroll down to the “Click here for Software Upgrades” title
4. Select the WinScript software you prefer and follow the onscreen instructions

Installing WinScript from the Internet

The latest version of WinScript can always be downloaded from our web site at http://www.alcorn.com/support/. From time to time updates and additional features may become available at this same location. Use the following procedure to install WinScript:

1. Choose Run… from the Start menu.
2. In the Command Line box, type the name of the WinScript file you downloaded from the Alcorn McBride Home Page.
3. Choose the OK button.
4. Follow the instructions on your screen to setup or update WinScript.
5. Setup will create an Alcorn McBride heading under the Start Menu.

Technical Support

You can obtain information about specifying, installing, configuring, and programming your Alcorn McBride Show Control product from three sources:

- This *Show Control User's Guide*
- Online Help
- Alcorn McBride Technical Support

Both the *Show Control User's Guide* and the Online Help assume that you are familiar with basic Microsoft Windows techniques.

Using This Guide

This guide presents the best way to accomplish tasks found in common (and uncommon) show control situations. Basic functionality is discussed in detail in the **WinScript User's Guide**, and more interesting and complex show situations are discussed in the **Application Notes**. Finally, specific hardware information for your Show Controller may be found in the **Hardware References**.

Online Help

The **Show Control Basics Tutorial**, **WinScript User's Guide**, and **Show Control Event References** make up the WinScript Online Help system. All configuration and setup screens in WinScript have context-sensitive help buttons that provide functional information on demand. You can also access the help system from the pull-down menus, or by pressing the F1 key.

Additionally, there are hundreds of answers to frequently asked questions in our knowledge base, at http://www.alcorn.com/kb

Contacting Technical Support

Several support options are available during the business day, around the clock, and on weekends:

For…	Contact…	When?…
E-Mail Support	support@alcorn.com	Any Time
Knowledge Base	http://www.alcorn.com/kb	Any Time
Software/Firmware Updates	http://www.alcorn.com/support	Any Time
Telephone Support	(407) 296-5800	M-F 9am–6pm (EST)
Fax Support	(407) 296-5801	M-F 9am-6pm (EST)

Important Information

Congratulations! You have purchased an extremely fine Product that would give you thousands of years of trouble-free service, except that you undoubtedly will destroy it via some typical bonehead consumer maneuver. Which is why we ask you to:

Please for God's sake read this owner's manual carefully before you unpack the Product. You already unpacked it, didn't you? You unpacked it and plugged it in and turned it on and fiddled with the knobs, and now your child, the same child who once shoved a polish sausage into your video cassette recorder and set it on "fast forward", this child also is fiddling with the knobs, right? We might as well just break these Products right at the factory before we ship them out, you know that?!?

We're sorry. We just get a little crazy sometimes because we're always getting back "defective" merchandise where it turns out that the consumer inadvertently bathed the Product in acid for six days. So, in writing these instructions, we naturally tend to assume that your skull is filled with dead insects, but we mean nothing by it. OK? Now let's talk about:

Unpacking the Product

The Product is encased in foam to protect it from the Shipping People, who like nothing more than to jab spears into outgoing boxes.

Please inspect the contents carefully for gashes or Ida Mae Barker's engagement ring, which she lost last week, and she thinks that maybe it was while she was packing Products.

Warning Do not ever as long as you live throw away the box or any of the pieces of Styrofoam, even the little ones shaped like peanuts. If you attempt to return the Product to the store, and you are missing one single peanut, the store personnel will laugh in the chilling manner exhibited by Joseph Stalin just after he enslaved Eastern Europe.

Besides the Product, the box should contain:

- Eight little rectangular snippets of paper that say "WARNING"
- A little plastic packet containing four 5/17 inch pilfer grommets and two club-ended 6/93 inch boxcar prawns.

YOU WILL NEED TO SUPPLY: a matrix wrench and 60,000 feet of tram cable.

IF ANYTHING IS DAMAGED OR MISSING: You IMMEDIATELY should turn to your spouse and say "Margaret, you know why this country can't make a car that can get all the way through the drive-through at Burger King without a major transmission overhaul? Because nobody cares, that's why."

Important This is assuming your spouse's name is Margaret. And not Pete.

Plugging In the Product

The plug on this Product represents the latest thinking of the electrical industry's Plug Mutation Group, which, in a continuing effort to prevent consumers from causing hazardous electrical current to flow through their appliances, developed the Three-Pronged Plug, then the Plug Where One Prong is Bigger Than the Other. Your Product is equipped with the revolutionary new Plug Whose Prongs Consist of Six Small Religious Figurines Made of Chocolate.

DO NOT TRY TO PLUG IT IN!

Lay it gently on the floor near an outlet, but out of direct sunlight, and clean it weekly with a damp handkerchief.

Warning When you are laying the plug on the floor, do not hold a sharp object in your other hand and trip over the cord and poke your eye out, as this could void the warranty.

Operation of the Product

Warning We manufacture only the attractive designer case. The actual working central parts of the Product are manufactured in Japan. The instructions were translated by Mrs. Shirley Peltwater of accounts receivable, who has never actually been to Japan but does have most of “Shogun" on tape.

Instructions – For results that can be the finest, it is our advising that: NEVER to hold these buttons two times!! Except the battery. Next taking the (something) earth section may cause a large occurrence! However. If this is not a trouble, such rotation is a very maintenance action, as a kindly (something) from Drawing B.

Warranty

Be it hereby known that this Product, together with but not excluding all those certain parts thereunto, shall be warranted against all defects, failures and malfunctions as shall occur between now and Thursday afternoon shortly before 2:00, during which time the Manufacturer will, at no charge to the Owner, send the Product to our Service People, who will emerge from their caves and engage in rituals designed to cleanse it of evil spirits. This warranty does not cover the attractive designer case.

Warning It may be a violation of some law that Mrs. Shirley Peltwater has "Shogun" on tape.

(Now that we have your attention, for our real warranty, please visit our website.)

Show Control Overview

If you are designing your first ride, attraction, or themed venue, you may have heard the phrase “Show Control” bounced around in design meetings. While the actual definition of “Show Control” may vary among the industries that use it, the phrase is almost always used to describe an intelligent unit (or group of units) used to control audio, video and lighting equipment, doors, buttons and lights in an automated show environment. Show Controllers provide a central processing point for all show status to minimize the cost of operations and maintenance. Since 1986 Alcorn McBride show controllers have been providing these functions and more, all over the world.

In this section, you’ll find:

- The Alcorn McBride Show Control Philosophy.
- Descriptions of Alcorn McBride Show Control products.

What Is Alcorn McBride Show Control?

Alcorn McBride Inc. designs and manufactures a full-featured line of Show Controllers. These products are designed to work simply, powerfully, and flawlessly in almost any show environment.

Show Control Hardware

Our Show Controllers provide seamless control over almost any serial or discrete device, while accepting and processing serial and discrete input from control panels and other equipment. They also work seamlessly with each other: any Show Controller can control resources (Inputs, Outputs, Serial Ports, etc.) in any other Show Controller through a simple RS-232 serial cable.

While there are differences in the features and capabilities of each Show Controller, there are also striking similarities. Each and every Serial Port, discrete Input or Output works exactly the same on every product, so controlling a LaserDisc or Automatic Door with an InterActivator or V2+ is as easy as controlling it with a V16+ or IO64. In fact, the operating systems are so similar that reconfiguring a show to run on a different Alcorn McBride Show Controller may be just a few mouse clicks away.

Show Control Software

Your show is “scripted” using WinScript, a Microsoft Windows-based program. This powerful programming tool provides menu and window systems for controller and serial port configuration, as well as powerful sequence and event programming. Online and context-sensitive help systems are also included to provide instant access to command syntax, sample applications, and hardware configurations.

Each "script" consists of up to 256 "sequences". Many sequences may be running, all at the same time. Sequences may be started initially on power-up, by push-button, by another sequence, or even by another Show Controller. Each sequence is comprised of up to 32,767 "events” (depending on available show memory) which are executed in chronological order. Events may send serial messages, turn on outputs, control the execution of sequences, and much more.

Remember – sequences are “multi-tasking”; they execute independently, and all may run simultaneously.

Show Control Firmware

The operating system that resides in the Show Controller is called ScriptOS. ScriptOS takes the downloaded script and executes the sequences and events in the specified order while synchronizing itself to the internal frame clock or external video sync. The downloaded show data is stored it in non-volatile EEPROM memory, so the Show Controller retains its show data indefinitely, with no battery backup required.

Alcorn McBride Show Controllers

Each Alcorn McBride Show Controller provides a diverse set of standard features to assist you in controlling your show, so one Show Controller may be all you need to command your entire attraction. Plus, our Show Controllers work together seamlessly, providing almost unlimited show control possibilities.

Here are the basic features of each Show Controller in our product line. For more detailed information on a particular controller, contact our Sales Department at (407) 296-5800 or check out our web site at http://www.alcorn.com/products/showcontrol.

➢ V16+

16 Channel Video Disc and Show Controller

Features:

- 16 RS-232 Serial Ports
- 4 Ports may be RS-485
- One Port may be MIDI
- 16 Optically Isolated Inputs
- 16 Discrete Outputs
- NTSC Video Sync
- 80 Character LCD Display

➢ V4+

4 Channel Video Disc and Show Controller

Features:

- 4 RS-232 Serial Ports
- 4 Ports may be RS-485
- 1 MIDI Port
- 16 Optically Isolated Inputs
- 16 Discrete Outputs
- NTSC Video Sync
- 80 Character LCD Display

➢ V2+

2 Channel Video Disc and Show Controller

Features:

- 2 RS-232 Serial Ports
- One Port may be MIDI
- 8 Optically Isolated Inputs
  (plus 8 Front Panel Button Inputs)
- 8 Lamp Driver Outputs
- NTSC Video Sync
- 32 Character LCD Display

➢ InterActivator

Interactive Video Disc Controller

Features:

- 2 RS-232 Serial Ports
- 8 Optically Isolated Inputs
  (plus 8 Front Panel Button Inputs)
- 8 Lamp Driver Outputs
- NTSC Video Sync Input

➢ IO64

Intelligent I/O Expander

Features:

- 1 RS-232 Serial Port
- 1 Port may be MIDI
- 32 Optically Isolated Inputs
- 32 Discrete Outputs

➢ DMX Machine

Scripted Lighting Controller

Features:

- 1 RS-232 Serial Port
- 16 TTL Inputs
- Transmits 512 DMX Channels

➢ SMPTE Machine

SMPTE Reader and Generator

Features:

- Reads and Generates SMPTE & EBU
- Supports all common frame rates
- Triggers Show Control Sequences

Other Alcorn McBride Products

Alcorn McBride also makes a complete line of audio, video and lighting control products that may be used by themselves, or with any of our show controllers. These include:

➢ LightCue

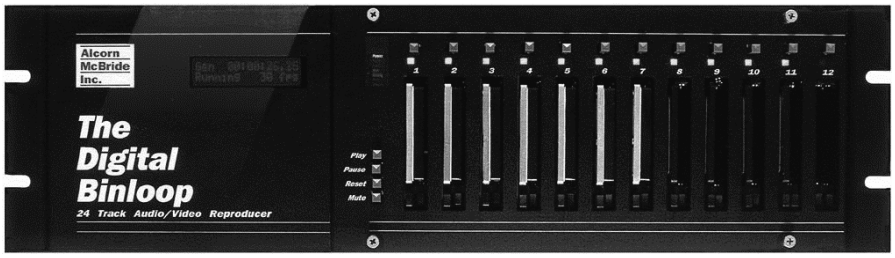
512 Channel DMX Lighting Recorder

Features:

- Records and Plays DMX 512
- RS-232 and Discrete Control
- Stores up to 511 Recordings – over 5 hours!
- Chases SMPTE or EBU timecode

➢ Digital Binloop

12 Tracks of Video And 24 Of Audio In A Single Cage



Features:

- Like 12 LDPs in a Single Cage
- Fast Playback; Perfect Digital Stills
- Reads and Generates SMPTE or EBU
- RS-232, MIDI and Discrete Control
- Stores over 6000 Clips

➢ MP3 Audio Machine

Digital Audio Player

Features:

- Hours of CD-quality Stereo Audio
- RS-232 and Discrete Control
- Stores up to 511 Clips
- 10-Watt Stereo Amplifier

➢ 8TraXX

Advanced MPEG-2 Digital Audio/Video Player

Features:

- 8 Independent stereo channels of CD-quality Audio
- RS-232 and Discrete Control
- Stores up to 511 Clips

➢ Digital Video Machine 2

Advanced MPEG-2 Digital Audio/Video Player

Features:

- Over 1.5 hours of Better-than-DVD quality Video + CD-quality Stereo Audio
- RGB, YUV, Composite and S-Video Outputs
- Generates and locks to Composite Sync
- Unbalanced, Balanced and Digital Audio Outputs
- RS-232, RS-422/485 and Discrete Control
- Remote Update of Clips via Ethernet
- Remote Configuration via Web Page Interface
- Stores Thousands of Recordings
- Supports both NTSC and PAL

➢ Digital Video Machine HD

High-Definition Digital Audio/Video Player

Features:

- Over an Hour of HDTV quality Video + Multichannel Audio
- RGB Component Video Outputs
- Unbalanced, Balanced and Digital Audio Outputs
- RS-232 Control
- Remote Update of Clips via Ethernet
- Remote Configuration via Web Page Interface
- Stores Thousands of Recordings
- Supports full MP@HL MPEG-2 Specifications + all ATSC DTV formats including 1080i and 720p

WinScript Tutorial

This tutorial will lead you through the creation, configuration, compilation and download of a simple show to an Alcorn McBride Show Controller. You will learn how to:

- Create, Save, Open, and Configure a Script.
- Rename Show Controller I/O, Flags, Ports, etc.
- Insert and organize sequences
- Edit sequences.
- Use branching instructions.
- Use the LCD Display
- Configure sequence triggers.
- Play video from a LaserDisc player.
- Create Day and Night Modes for prolonging equipment life.
- Compile and Download your script.
- Run your show!

A Little About Our Show

The show we are going to create will control the basic functions of a digital video player. We will Search and Play a Digital Video Machine 2, as well as add some front-panel pushbutton and LCD Display capabilities.

Note If you don't feel like typing all of this in, a copy of the completed script, **TUTORIAL.AMW**, was installed in your \WinScript\Scripts\Examples\ directory.

The idea behind this tutorial is to get you oriented with your Show Controller and WinScript. After you've mastered the basics, check out *Advanced WinScript Programming* and the *Application Notes* chapters, later in this book. Then, when you're ready to start scripting your show, refer to the *WinScript User's Guide* for a screen-by-screen reference of WinScript features.

➢ *I Have a Digital Video Machine 2. Is It Right For This Tutorial?*

Sure! The video player used throughout this tutorial is an Alcorn McBride Digital Video Machine 2, but since WinScript transparently supports all common video player commands, your sequences will look exactly the same as the ones in the book, no matter what player you use.

➢ *Whoa Nellie! I Don't Have a Digital Video Machine 2…*

That's OK. A copy of VIDEM (an LDP emulator for MS-DOS) was included in your copy of WinScript. When it comes time to test your show, you can use VIDEM as your DVM2 player by running it on your PC!

With slight modifications, the tutorial script may also be used with our own Digital Video Machine Refer to the Application Note on Digital Video Machine programming for more information.

➢ *What About My Show Controller?*

We'll be using an Alcorn McBride V16+ Show Controller for this tutorial, but all Alcorn McBride Show Controllers are programmed exactly the same, so you'll be able to follow along with *your* Show Controller. In fact, you don't need a show controller at all to learn WinScript. You can still enter and compile your script, and then skip the downloading step.

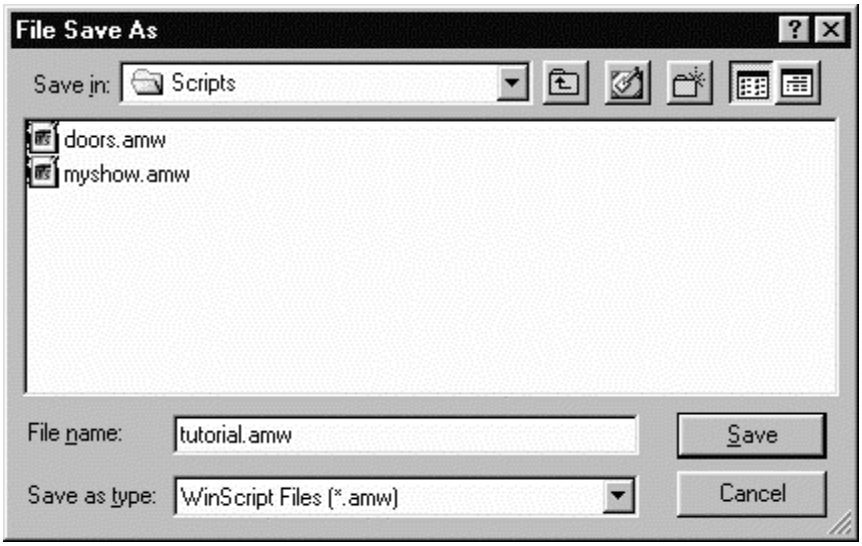
Note If your Show Controller does not include an LCD Display, you may skip any steps that deal with displaying information on the LCD.

Opening WinScript and Creating a Blank Script

The first thing you should do when scripting any show is to create a new script and save it to a file.

1. Run WinScript from the Program Manager (or the Start Menu if you're running Windows 95).
2. Close any blank scripts that may have been created when WinScript started. The default script may not contain the same settings that our tutorial will use. Now choose **File | New** from the main menu.
3. Choose your Show Controller from the list in the **File New** dialog box and click OK.

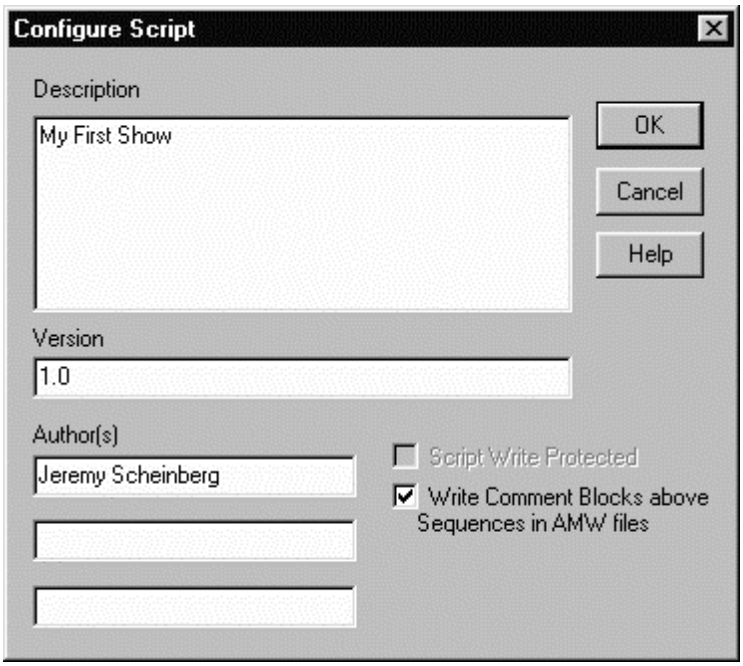
4. Choose **File | Save As…** from the main menu and save your newly created blank script as **tutorial.amw**



Customizing the Script

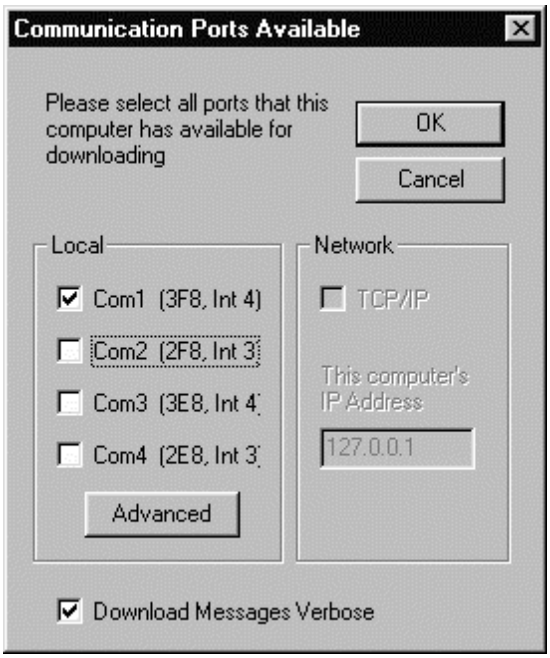
Now, let's enter some basic information about our script.

1 Choose **Configuration | Script…** from the main menu and enter title, author, and revision information into your script. Then, enter your name in the first **Author** field. Click OK.



2 If you've got a show controller, connect a COM Port of your PC to the Programmer Port of your Show Controller via a straight-thru RS-232 serial cable (the cable that came with your Show Controller).

3 Choose **Tools | Options | Communications…** from the main menu and only select the COM Port number that you just connected the cable to. If you just want to practice scripting without downloading, deselect all ports.



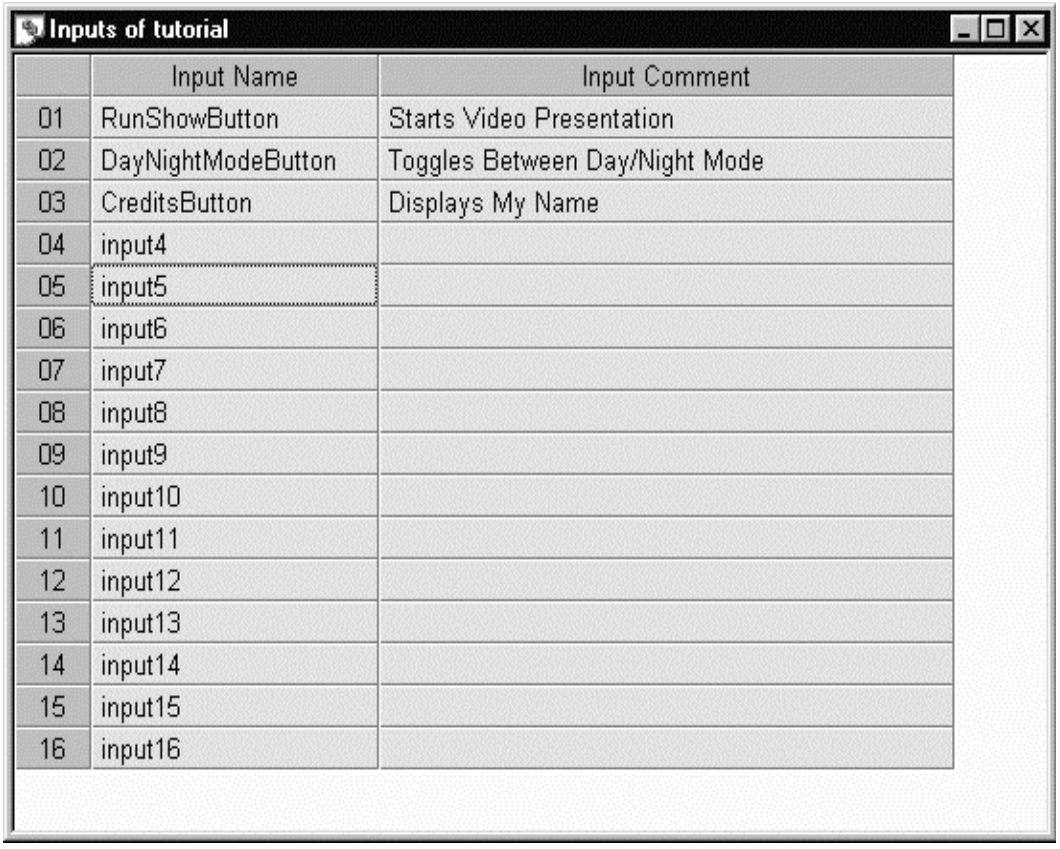
Naming Resources

One of the most powerful tools you can utilize in a script is the ability to assign English-like names to your Show Controller's resources (Inputs, Outputs, Serial Ports, Flags, Variables, and Strings). Before we begin creating sequences for TUTORIAL, let's assign some names to the Inputs, Flags, and Serial Ports we'll be using. While we're in the configuration menu, we will also create and name all of our LCD Display messages.

➢ *Inputs*

Our show will use the first three front panel buttons of your Show Controller to perform various functions. Button 1 (we will call it RunShowButton) will start a two minute video presentation. Button 2 (we will call it DayNightModeButton) will toggle between…guess what…That's right, Day Mode and Night Mode! Finally, Button 3 (we will call it CreditsButton) will display your name on the LCD when it is pressed and return the LCD to its previous state when you let it go.

1. Choose **Resources | Inputs …** from the main menu.
2. When the **Inputs of TUTORIAL** window appears, double-click on the cell labeled input1 and change its name to *RunShowButton*. Repeat the process for input2 (naming it *DayNightModeButton*) and input3 (naming it *CreditsButton*). You can also enter some descriptive comments if you wish.

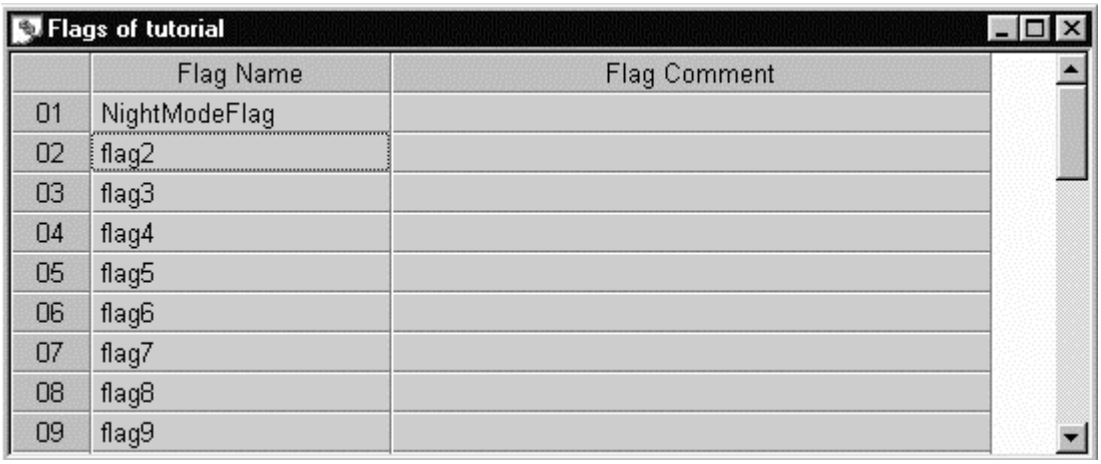


3. Close the **Inputs of TUTORIAL** window.

➢ *Flags*

We will use one of the 32 available flags to tell when we are in Night Mode so DayNightModeButton can accurately toggle between the two.

4. Choose **Resources | Flags …** from the main menu.
5. When the **Flags of TUTORIAL** window appears, double-click on flag1 and change its name to NightModeFlag.

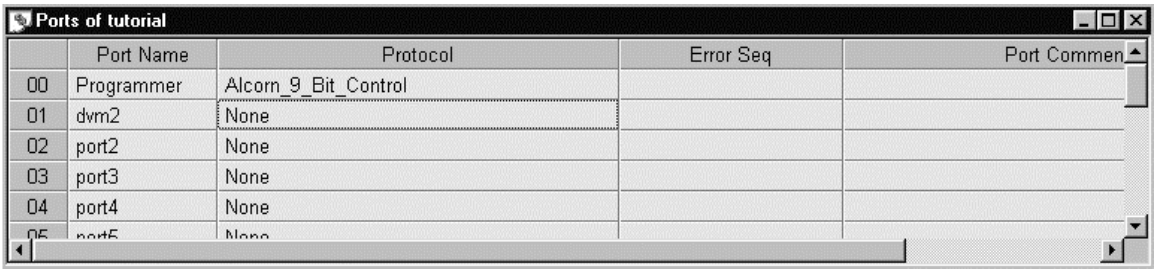


6. Close the **Flags of TUTORIAL** window.

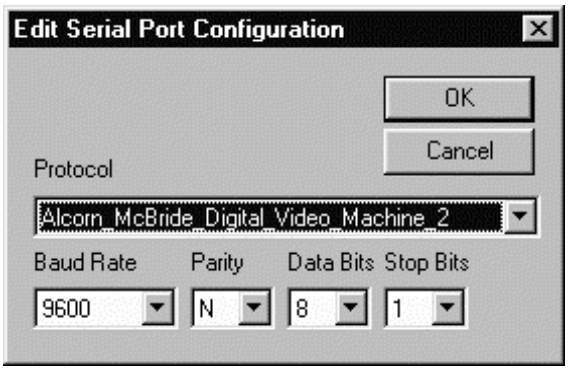
➢ *Serial Port*

Next, we'll configure one of the Serial Ports of your Show Controller for a Digital Video Machine 2.

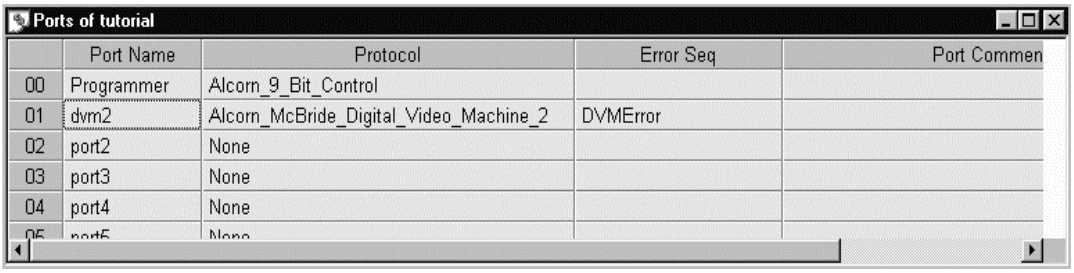
7. Choose **Resources | Ports …** from the main menu.
8. When the **Ports of TUTORIAL** window appears, double-click on port1 and change its name to *dvm2*.



9. Right-click on the "Protocol" field of dvm2 and choose **Protocol Wizard**.
10. When the **Edit Serial Port Configuration** window appears, click on the down arrow and choose **Alcorn McBride Digital Video Machine 2** from the protocol list (or if you are using a different player, choose it from the list). Click OK.



11 We will create an "Error Sequence" later that will automatically run if the DVM2 stops sending acknowledgement messages to the Show Controller. Enter the name DVM*Error* in the **Error Seq** field.



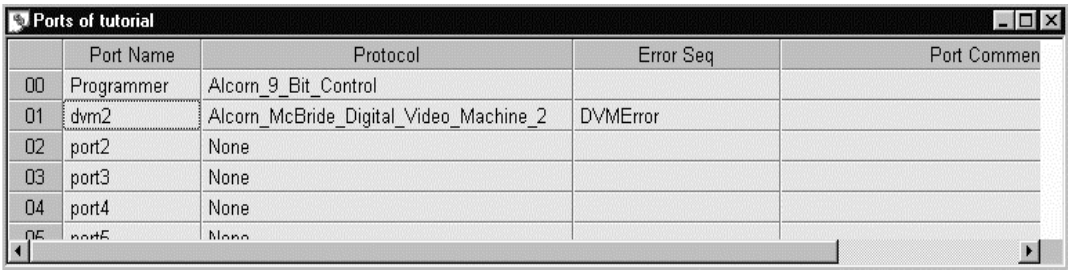
12 Close the **Ports of TUTORIAL** window.

➢ *LCD Messages*

Our show will make good use of the LCD by displaying the show's name and current mode in the first line of the LCD and progress information in the second line. First, though, we need to create our messages using LCD Wizard.

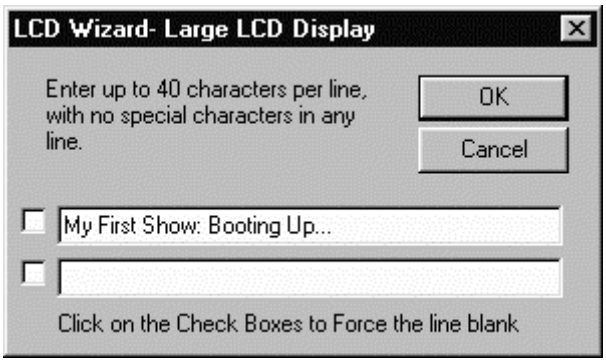
13 Choose **Resources | LCD Strings …** from the main menu.

14 Enter the name *BootUpMsg* in the first **String Name** field.



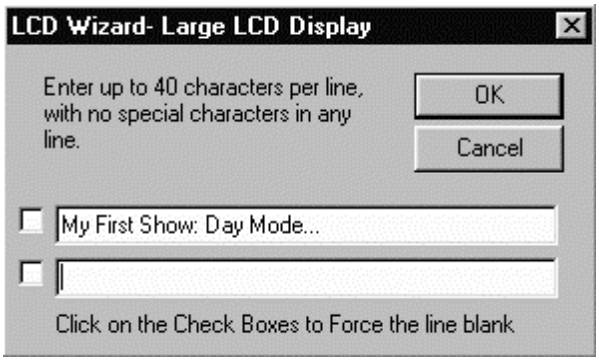
15 Right-click on the **String Data** field of BootUpMsg and choose **LCD Wizard**.

16 In the first line of the LCD Wizard, put: **My First Show: Booting Up…**. Click OK.

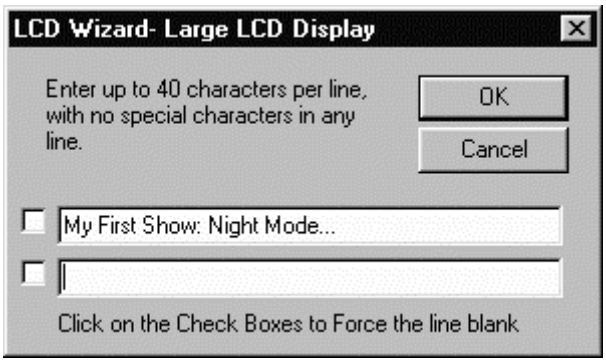


17 Repeat steps 14-16 for the next eight messages:

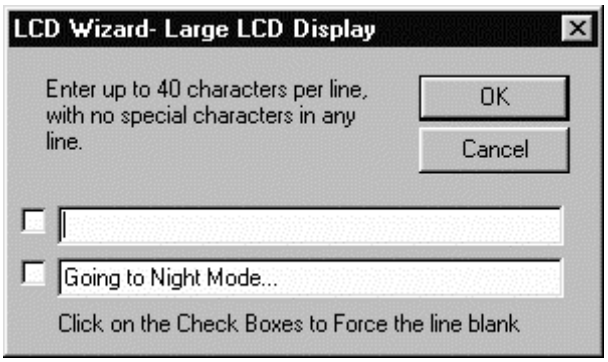
DayModeMsg



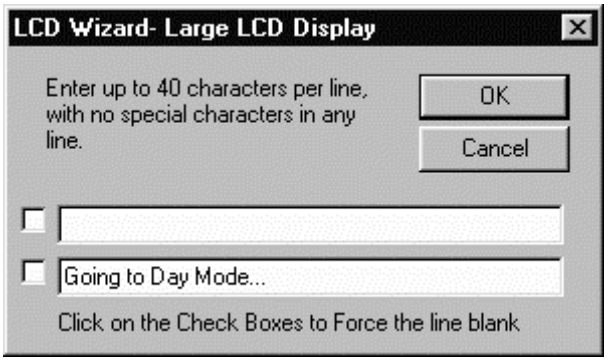
NightModeMsg



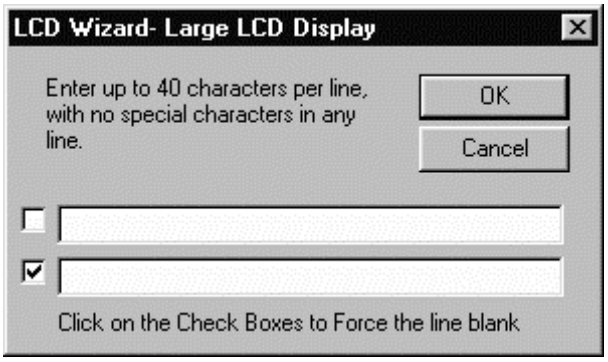
GoingToNightModeMsg



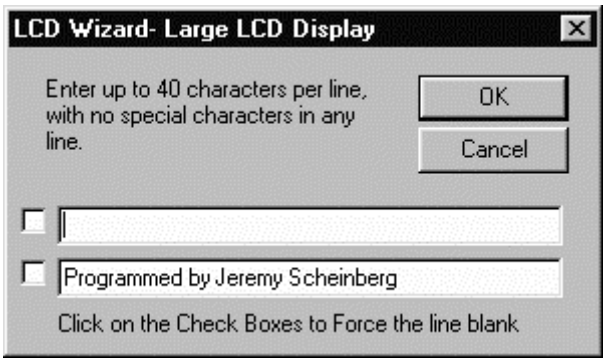
GoingToDayModeMsg



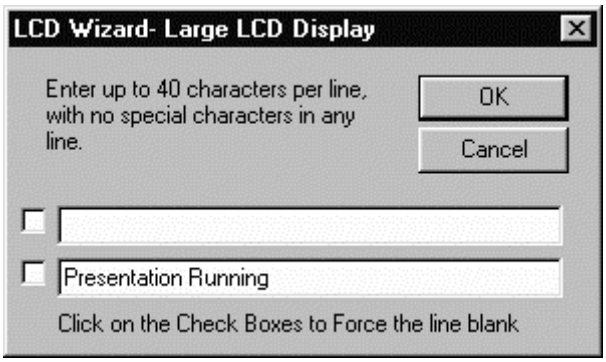
ClearLine2Msg



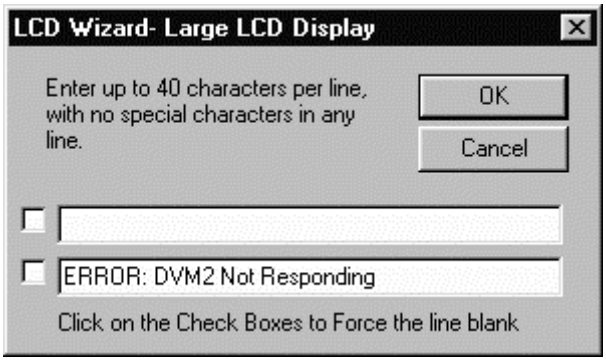
CreditMsg *(Enter your name after "Programmed by")*



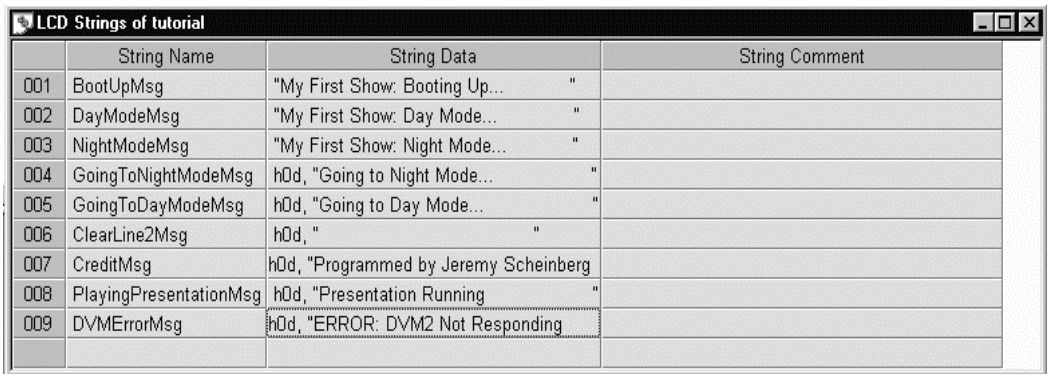
PlayingPresentationMsg



LDPErrorMsg



Whew…now, your **LCD Strings of TUTORIAL** window should look like this:



Close the **LCD Strings of TUTORIAL** window.

Save your progress by choosing **File | Save** from the main menu or by clicking the toolbar button.

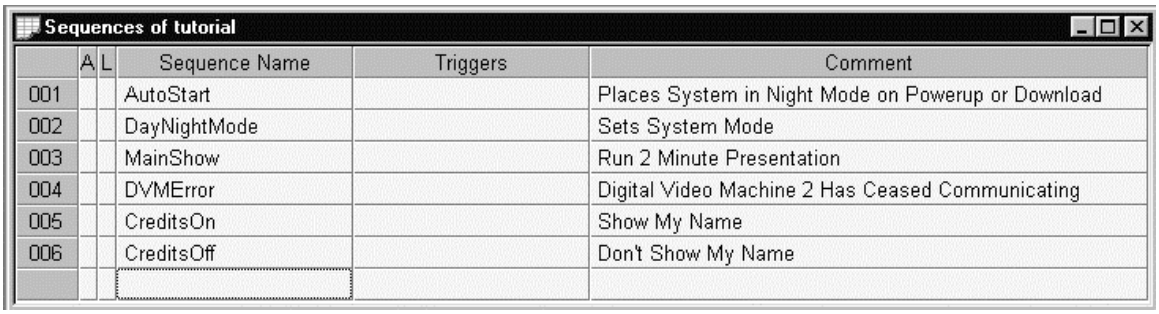
Inserting and Organizing Sequences

We'll continue setting up our script by creating sequences that will perform the various show functions that we've designed. Let's see…what is required of this script?:

- One sequence that starts on power up and places the system in Night Mode.
- One sequence that toggles Day or Night Mode when DayNightModeButton is pressed.
- One sequence that plays the video presentation when RunShowButton is pressed.
- One sequence that displays your name when CreditsButton is pressed.
- One sequence that recovers the LCD when CreditsButton is let go.

From this list of requirements, let's insert our sequences:

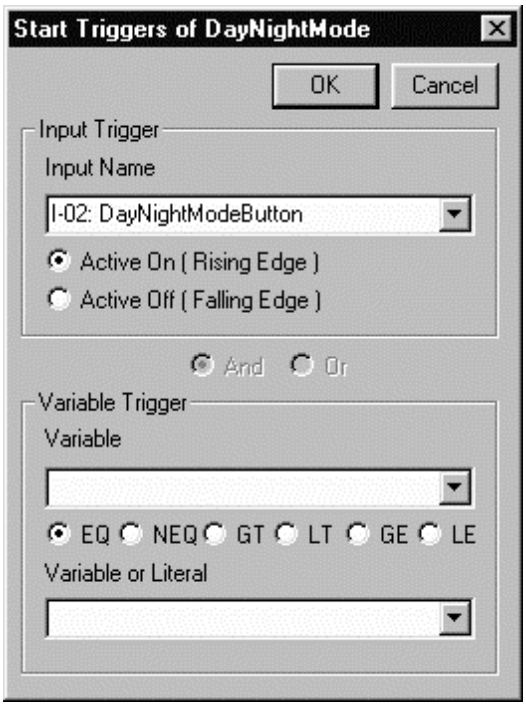
1. Highlight the **Sequences of TUTORIAL** window, click on the Default sequence's name cell and rename it by typing *Autostart*. We want this sequence to run on powerup and automatically place the system in Night Mode. We'll be configuring it to do that in a few moments, but first…
2. Insert the other five sequences as shown in the picture below by simply typing the information in each consecutive cell and pressing Enter.



	A	L	Sequence Name	Triggers	Comment
001			AutoStart		Places System in Night Mode on Powerup or Download
002			DayNightMode		Sets System Mode
003			MainShow		Run 2 Minute Presentation
004			DVMError		Digital Video Machine 2 Has Ceased Communicating
005			CreditsOn		Show My Name
006			CreditsOff		Don't Show My Name

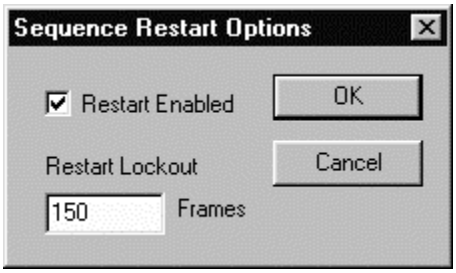
Now, let's configure the trigger properties of these sequences:

3. We know that we want Autostart to start on power up, so right-click on Autostart and choose Autostart Disabled. This will toggle the sequence to be Autostart *Enabled*.
4. DayNightMode should be started every time the operator presses DayNightModeButton, so right-click on DayNightMode and choose **Start:**
5. Select **DayNightModeButton** and **Active On** from the **Edit Start Trigger** dialog box and click OK.



6. MainShow should be started when the operator presses RunShowButton, so right-click on MainShow and choose **Start:**
7. Select **RunShowButton** and **Active On** from the **Edit Start Trigger** dialog box and click OK.

8. It would probably be nice if we could restart the presentation after a short delay, so right-click on MainShow and choose Restart Disabled…
9. Check the Restart Enabled checkbox and enter **150** into the Restart Lockout box. This will give us a 5-second delay (since our frame rate is 30 fps) before anyone can press RunShowButton to restart the show. Click OK.



10. Now, let's setup our Credits sequences. CreditsOn should be started when the operator presses CreditsButton, so right-click on CreditsOn and choose **Start:**
11. Select **CreditsButton** and **Active On** from the **Edit Start Trigger** dialog box and click OK.
12. Right-click on CreditsOff and choose **Start:**
13. Select **CreditsButton** and **Active Off** from the Edit Start Trigger dialog box and click OK.

Adding Events

Let's digress for a moment and talk about how Sequences and Events really work inside a Show Controller. Alcorn McBride Show Controllers scan their Sequences once every frame. Any Sequences that are considered "running" are checked for events that should be executed.

Events are executed when the amount of time that has elapsed since the Sequence was started is equal to or greater than the time entered in the **Time** field of the Event. When a sequence is started, its timer is set to frame 1, and it immediately executes any events with a time of 00:00.00 or 00:00.01. On each successive frame, all running sequences are checked to see if they have any events scheduled to run. For example, an event with a 00:02.15 execution time will occur two seconds and fifteen frames after its Sequence was started.

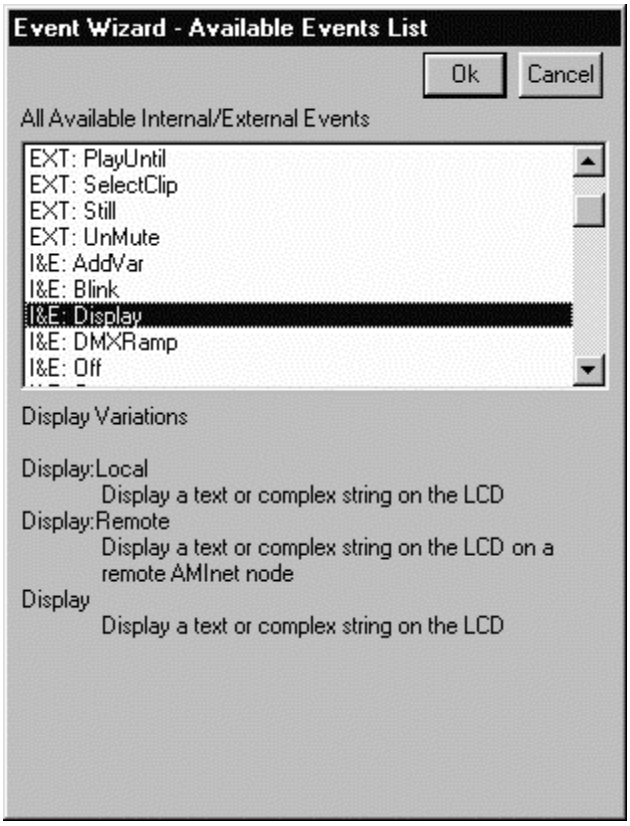
Now, back to our sequences…

Autostart

Autostart will display our "Boot Up" message, as well as clear the second line of the. Then, it will turn off NightModeFlag so that our DayNightMode sequence will place the system in Night Mode when it is started.

1. Select Autostart in **Sequences of TUTORIAL** then press Enter.

2. Select the **Event** field of the first event and type “D”. This will bring up the **Available Events List** and select the first event starting with a *D*.



3. Choose **Display** and press Enter.
4. Enter “BootUpMsg” (without the quotation marks) in the **Data1** field.

Congratulations, you’ve just entered your first Event! This event will display the text in BootUpMsg when Autostart runs.

5. Enter the rest of the events as follows:

[AutoStart] of tutorial

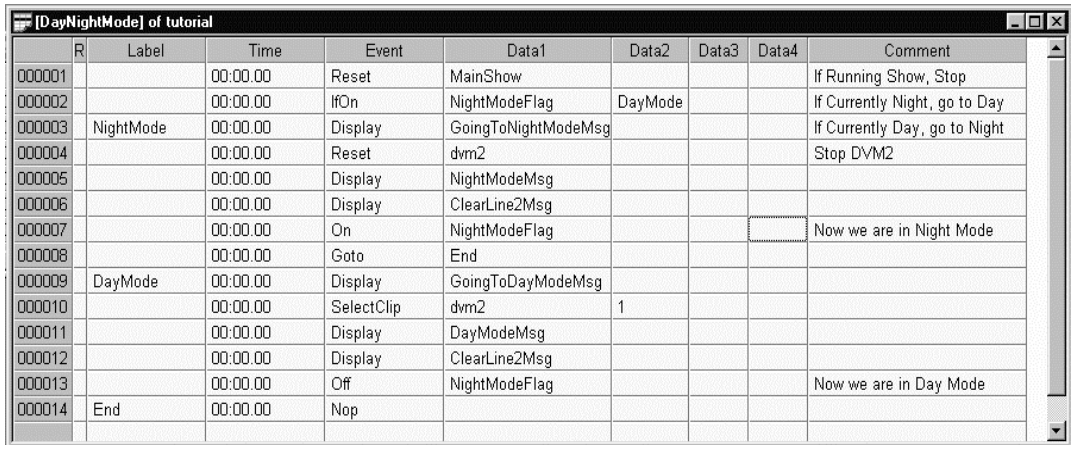
	Label	Time	Event	Data1	Data2	Data3	Data4	Comment
000001		00:00.00	Display	BootUpMsg				
000002		00:00.00	Display	ClearLine2Msg				
000003		00:00.00	Off	NightModeFlag				Assume we're in Day Mode
000004		00:00.00	Start	DayNightMode				Go to Night Mode

6. Close the **[Autostart] of TUTORIAL** window.

DayNightMode

DayNightMode will check the status of NightModeFlag and then either put the system in Day Mode or Night Mode. You've probably been wondering "just what are Day Mode and Night Mode?" We will Stop our video player in Night Mode and Search our video player in Day Mode. We will search the video player to the start of our presentation so we will have almost instantaneous access to video playback when the operator pushes RunShowButton.

1. Select DayNightMode in **Sequences of TUTORIAL** then press Enter.
2. Enter the Events as follows:



[DayNightMode] of tutorial

	R	Label	Time	Event	Data1	Data2	Data3	Data4	Comment
000001			00:00.00	Reset	MainShow				If Running Show, Stop
000002			00:00.00	IfOn	NightModeFlag	DayMode			If Currently Night, go to Day
000003		NightMode	00:00.00	Display	GoingToNightModeMsg				If Currently Day, go to Night
000004			00:00.00	Reset	dvm2				Stop DVM2
000005			00:00.00	Display	NightModeMsg				
000006			00:00.00	Display	ClearLine2Msg				
000007			00:00.00	On	NightModeFlag				Now we are in Night Mode
000008			00:00.00	Goto	End				
000009		DayMode	00:00.00	Display	GoingToDayModeMsg				
000010			00:00.00	SelectClip	dvm2	1			
000011			00:00.00	Display	DayModeMsg				
000012			00:00.00	Display	ClearLine2Msg				
000013			00:00.00	Off	NightModeFlag				Now we are in Day Mode
000014		End	00:00.00	Nop					

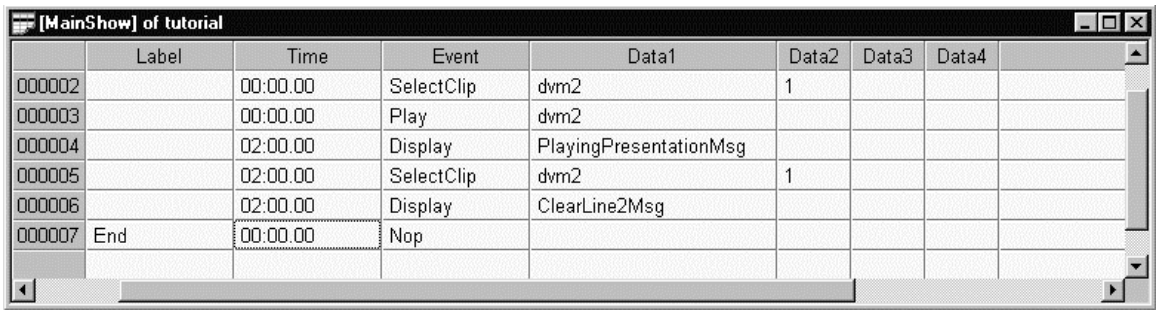
3. Close the **[DayNightMode] of TUTORIAL** window.

MainShow

MainShow will play a two-minute presentation from our video player, starting at the beginning of clip 1. If this were a real show, we would probably connect an external sync cable between the video player and the Show Controller to provide frame synchronization, but since this show is less than five minutes, clock drift won't cause more than a frame of inaccuracy, so we won't use that feature.

At the end of our presentation, we'll search back to the start and wait on the next press of the button.

1. Select MainShow in **Sequences of TUTORIAL** then press Enter.
2. Enter the Events as follows:


[MainShow] of tutorial

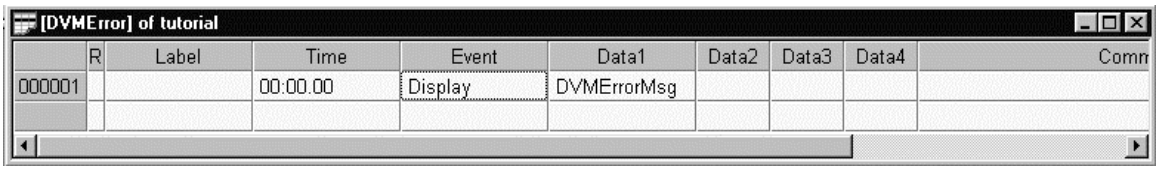
	Label	Time	Event	Data1	Data2	Data3	Data4	
000002		00:00.00	SelectClip	dvm2	1			
000003		00:00.00	Play	dvm2				
000004		02:00.00	Display	PlayingPresentationMsg				
000005		02:00.00	SelectClip	dvm2	1			
000006		02:00.00	Display	ClearLine2Msg				
000007	End	00:00.00	Nop					

3. Close the **[MainShow] of TUTORIAL** window.

DVMError

This simple sequence will display DVMErrorMsg if the video Player is not connected to the Show Controller or is not responding to commands.

1. Select DVMError in **Sequences of TUTORIAL** then press Enter.
2. Enter the following Event:


[DVMError] of tutorial

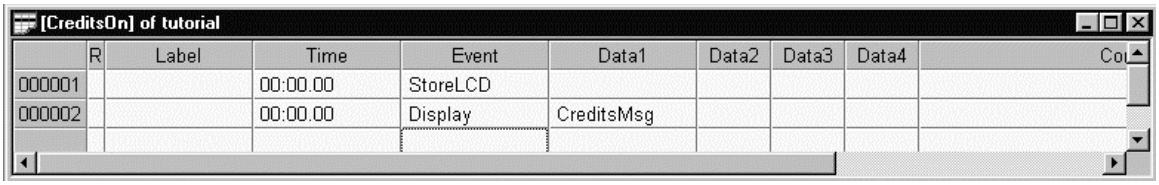
	R	Label	Time	Event	Data1	Data2	Data3	Data4	Comm
000001			00:00.00	Display	DVMErrorMsg				

3. Close the **[DVMError] of TUTORIAL** window.

CreditsOn

Our credits sequences will let you show the world who programmed this incredible show! CreditsOn will use the **StoreLCD** event to save what is currently displayed on the LCD. Then, it will display your name on the bottom line of the LCD.

1. Select CreditsOn in **Sequences of TUTORIAL** then press Enter.
2. Enter the Events as follows:


[CreditsOn] of tutorial

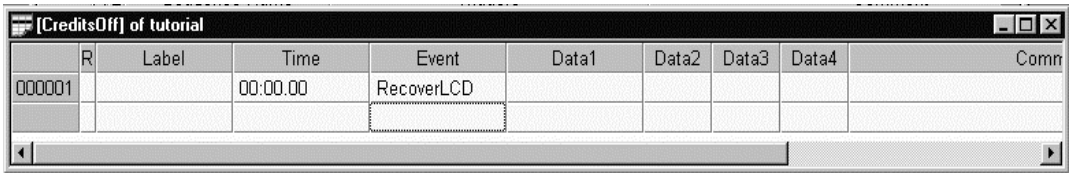
	R	Label	Time	Event	Data1	Data2	Data3	Data4	Co
000001			00:00.00	StoreLCD					
000002			00:00.00	Display	CreditsMsg				

3. Close the **[CreditsOn] of TUTORIAL** window.

CreditsOff

Our final sequence, CreditsOff will use the **RecoverLCD** event to "remember" what was displayed on the LCD when the last StoreLCD Event was executed (remember, we stored the LCD in CreditsOn) and put it back on the display.

1. Select CreditsOff in **Sequences of TUTORIAL** then press Enter.
2. Enter the following event:



3. Close the **[CreditsOff] of TUTORIAL** window.

Compiling and Downloading

We're done! Now its time to compile and download our script into the Show Controller. Before we start, make sure you have connected the programming cable between your PC and the Show Controller.

Also, connect the correct video player cable between Port 1 of your Show Controller and the DVM2's RS-232 control port. Finally, make sure that the DVM2 is powered and there is a file 1 on the drive.

1. Save your progress by choosing **File | Save** from the main menu or by clicking the toolbar button.
2. Choose **File | Compile Script and Download** from the main menu or click the toolbar button.
3. When WinScript finishes compiling your show, you may see some errors listed. Double-click on each of the errors and refer back to the earlier steps in this tutorial to verify that you have entered the events correctly.
4. When the script compiles correctly and you are prompted to download the show data to the Show Controller, click OK.

Running the Show

The show runs immediately after download is complete and goes into Night Mode. After the DVM2 has stopped and the system is in Night Mode, try out your new show by pressing the second button (DayNightModeButton) to bring the system into Day Mode. Then, press the first button (RunShowButton) to start your video presentation.

Notice that you can restart the show by pressing the first button after five seconds, you cannot start the show when the system is in Night Mode, and you can display your credits screen at any time.

Summary

Congratulations on writing your first script. We hope you enjoy exploring the many possibilities that a multi-tasking show environment can bring. If you feel adventurous, we recommend experimenting with the script you've just created by adding events and changing display messages. You might even try assigning more buttons to play different presentations from the disc. More advanced scripting techniques can be found in the *Advanced Scripting* and *Application Notes* sections of this manual.

Thanks for taking this tutorial and good luck with your show!

WinScript User's Guide

This section describes all of the features of WinScript. WinScript's easy-to-use Windows interface allows you to configure your script quickly and efficiently via popup menu items and dialog boxes. Most common operations may be done with keystrokes for those who prefer DOS-like speed. New "Wizards" are available at every turn to offer advice and assistance in creating complicated script components. In this User's Guide you will find:

- Menu choices, toolbar buttons, and shortcut keys to accomplish common scripting tasks.
- How to configure ports to communicate with any serial device, including other Show Controllers.
- Instructions on using new WinScript tools such as Time Calculator, Protocol Viewer, and Script Wizard
- How to integrate SMPTE triggering and chasing into your show by using an Alcorn McBride SMPTE Machine in tandem with your Show Controller.

Getting Help

To access online WinScript help about a particular programming subject, choose **Help | Show Control Help** from the main menu (or click the  toolbar button and then click on the object you wish to get help on).

To access online hardware help, pinouts, and connection tips about your Show Controller, choose **Help | Show Control Help** from the main menu.

To learn version and author information about your copy of WinScript, choose **Help | About WINSCRIPT** from the main menu (or click the  toolbar button).

Creating, Opening, Closing, and Saving Scripts

To create a new script press **CTRL+N**, click the  toolbar button, or choose **File | New** from the main menu. When the File New dialog box appears, choose the Show Controller you wish to create a script for and click OK.

To open an existing script press **CTRL+O**, click the  toolbar button, or choose **File | Open** from the main menu. When the File Open dialog box appears, choose the script you wish to open and click OK.

Tip To open a recently edited script, choose **File** from the main menu and click on the name of the script you wish to open, visible at the bottom of the pulldown menu.

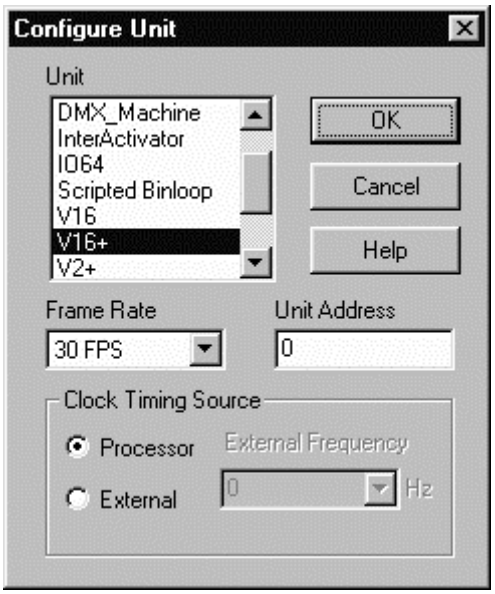
To close the currently selected script choose **File | Close** from the main menu.

To save a script under its current file name press **CTRL+S**, click the  toolbar button, or choose **File | Save** from the main menu.

To save a script under a new file name choose **File | Save As…** from the main menu. When the File Save As dialog box appears, type in a new filename or choose a script you wish to overwrite.

Configuring the Show Controller

To set the unit type, unit address, sync source & frequency, choose **Configuration | Unit…** from the main menu.



Unit Type

Select the type of Show Controller you will be scripting from the unit list box. Changing the unit type redefines the number of inputs, outputs and serial ports available to your script.

Frame Rate

Select the frame rate at which the Show Controller is to operate. We normally choose a rate that matches our external equipment, although this is purely for programming convenience unless you are using external sync – then it is critical that they match. The frame rate affects certain timed events such as **Blink** and **Pulse.**

Unit Address

If your Show Control system includes several Show Controllers or other devices on the same serial line (RS-485/422 or MIDI), your Show Controller must have a unique "Address" to distinguish it from any other device on the line.

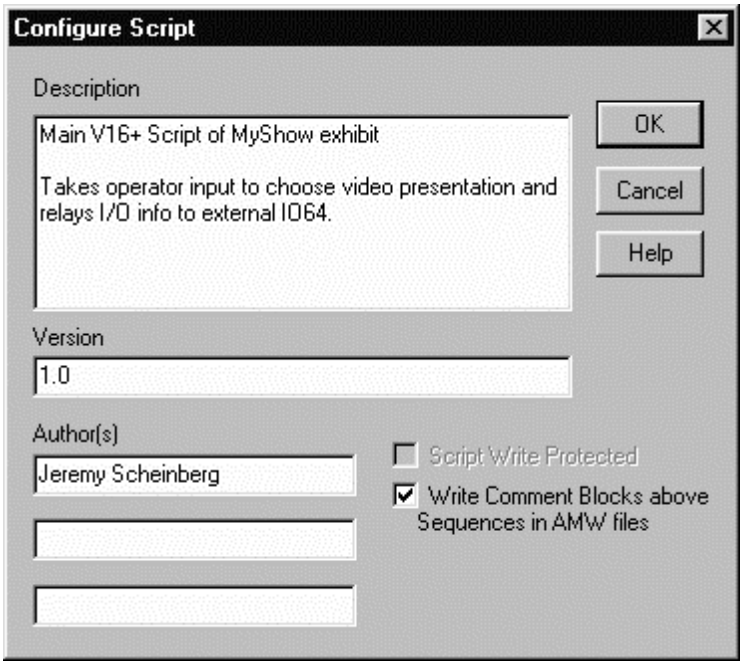
Clock Timing Source

The Show Controller can either synchronize itself to its own internal processor clock (**Processor**) or to an external Composite Sync source (**External**).

If External sync is used, choose the frequency of the sync signal from the External Frequency combo box. This clock must be an integral multiple of the frame rate. The maximum clock frequency is 600Hz. High clock rates may degrade performance in large, complex scripts.

Version, Author, and Show Description

To record version, author, and show description information for future reference, choose **Configuration | Script…** from the main menu.



Inputs, Outputs, Variables, Ports, and Strings

Show Controller Resources can be named and configured for use throughout your script by using the Resources menu.

Naming Show Controller Resources

Inputs, Outputs, Flags, Variables, Ports, and Strings can be given English names for easy readability and debugging. To rename a resource, simply double-click on its name in resource configuration screen (e.g. **Resources | Inputs**, **Resources | Outputs**, etc.). Resource names may be up to 25 characters in length. Spaces may be used, and are automatically replaced by underscores.

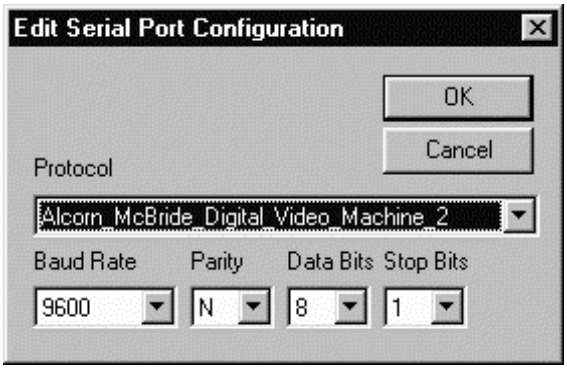
Inputs of myshow

	Input Name	Input Comment
01	FrontPanelStart	Front Panel Button 1 "Wakes Up" the show at the beginning of day
02	OCCStart	Theatre OCC "Start" button starts first show if the day
03	OCCPause	Pauses show at rollover
04	OCCStop	Stops show immediately - "E-Stop"
05	OCCMute	Mute audio for announcements, trouble, etc.
06	RCCReady	Seats are ready to move
07	ProjectorReady	Projector is ready to start film
08	input8	
09	input9	
10	input10	
11	input11	
12	input12	
13	input13	
14	input14	
15	input15	
16	input16	

Port Configuration and Protocol

Each Serial Port on your Alcorn McBride Show Controller may be configured to communicate with any serial device by choosing a protocol. New Events associated with the protocol are automatically added to Event Wizard.

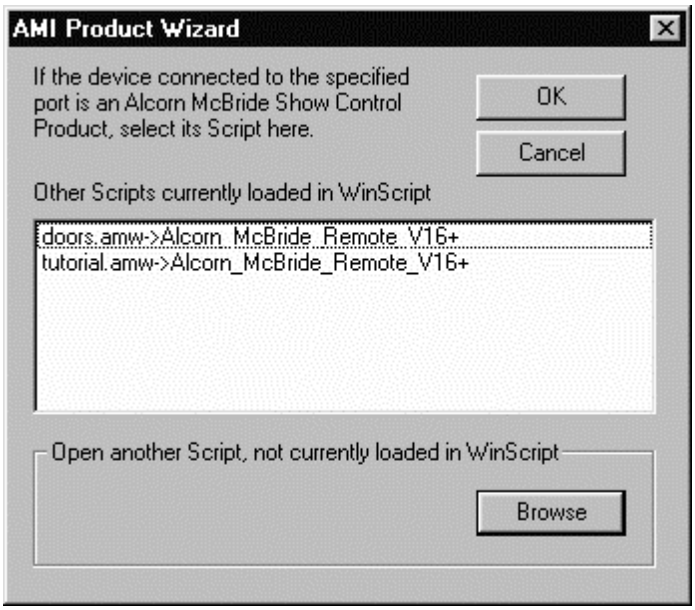
To configure a port for an external serial device, choose **Resources | Ports…**, right-click on the desired port, and choose **Protocol Wizard**. You can change Baud Rates, Parity, Data Bits, and Stop Bits from the defaults by clicking on them.



Communicating with Alcorn McBride Show Controllers

When configuring ports to communicate with other Alcorn McBride Show Controllers, you can use AMI Product Wizard to gain access to resource names in the external unit. Alternatively, you can access external resources by their index number. See the *Event Reference* later in this manual for more information on events you can execute in a remote unit.

To configure a port to communicate with another Alcorn McBride Show Controller, choose **Resources | Ports…**, right-click on the desired port, and choose **AMI Product Wizard**. Then, choose the script for the desired external Show Controller from currently open scripts or choose another one by clicking on **Browse…**



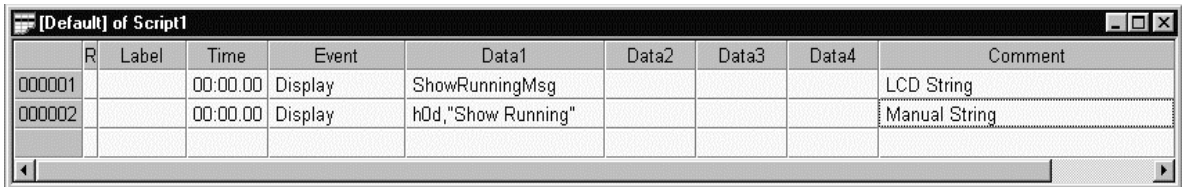
Entering LCD Strings

Strings of text that can be displayed on the LCD Display of your Show Controller can either be entered manually in the appropriate Data column of a **Display** event or as an "LCD String". An LCD String can be addressed by its name in a **Display** event, but a manually entered string must be retyped in a Data column every time you wish to use it. For more information on manually entering strings into an Event, see S*equence Editing*.

To delete a desired string, press **F5**, or **CTRL+D**.

To insert a desired string, press **F6**, **CTRL+Y**, or select the **Insert** key.

To move from cell to cell, press the **Tab** key or **Enter**, or the arrow keys.



To enter an LCD String, choose **Resources | LCD Strings…**select a blank line and type a name for your string in the **String Name** field and enter the string data into the **String Data** field.

➢ *To Enter A Simple Message As String Data*

String Data can consist of ASCII characters formatted as either single characters or entered in quotes. Single characters and quoted text may be used in the same LCD String, but must be separated by a comma:

```
"Running Show #",h30,h33
```

Displays:

```
Running Show #03
```

➢ *To Display A Message On The LCD's Second Line*

Use a Carriage Return (h0D) as a character between the two lines of text:

```
"My Show: Day Mode",h0D,"Show Running"
```

Displays:

```
My Show: Day Mode
Show Running
```

➢ *To Display The Current Value Of A State Variable*

In addition to ASCII characters, you can display the current value of a State Variable with either Left or Right Justification by typing h0E (for Left Justification) or h0F (for Right Justification in a 3 character wide field), a comma, and then the State Variable's Index Number:

```
"My Show: Day Mode",h0D,h0F,5," Errors Detected"
```

Displays:

```
My Show: Day Mode
0 Errors Detected
```

(Where "0" is the current value of Var5)

```
"My Show: Day Mode",h0D,"Running Show #",h0F,1
```

Displays:

```
My Show: Day Mode
Running Special Birthday Show #  3
```

(Where "3" is the current value of Var1)

Note A Right Justified Variable includes leading spaces to act as placeholders for all possible characters, so it will always be 3 characters in length. A Left Justified Variable will not include any leading spaces as placeholders.

➢ *To Display A Message At A Specific Row and/or Column*

In many show situations, the LCD is called upon to continually update show status or display certain numbers or values at certain positions on the screen. In these cases, the string may be preceded by **Row** and **Column** values (separated by a comma or space):

```
0,20,"My Show"
```

Displays:

```
                    My Show
```

If no Row or Column information is present, the LCD defaults to Row 0, Column 0:

```
"My Show"
```

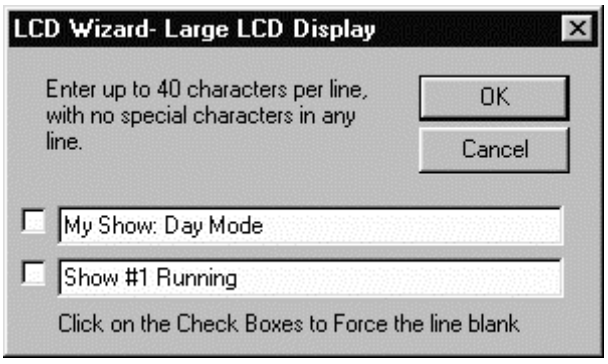
Displays:

```
My Show
```

➢ *To Display Two-Line Messages Using LCD Wizard*

LCD Wizard allows you to enter multi-line text-only messages quickly and easily. Right click on the desired LCD String and choose **LCD Wizard**.

Enter text as you want it displayed in the two edit boxes. The top box corresponds to the top line of the display and the bottom box corresponds to the bottom line. LCD Wizard enters the Carriage Return for you. Also, you can force a line to be completely blank by clicking on the checkbox next to it.



Displays:

```
My Show: Day Mode
Show #1 Running
```

Note You cannot display single characters or State Variable values using LCD Wizard. These values must be manually entered into the resulting String Data.

Entering Data Strings

Data Strings to be sent out a serial port via the MessageOut event can either be entered manually in the appropriate Data column of the **MessageOut** event or as a "Data String". A Data String can be addressed by its name in a **MessageOut** event, but a manually entered string must be retyped in a Data column every time you wish to use it. For more information on manually entering strings into an Event, see S*equence Editing*.

➢ *To Enter A Simple Serial Message As String Data*

String Data can consist of single bytes or quoted text. Single bytes and quoted text can be included in the same string, but must be separated by a comma or space:

```
h00 h00 h01,"PL",h0D
```

Sends the message:

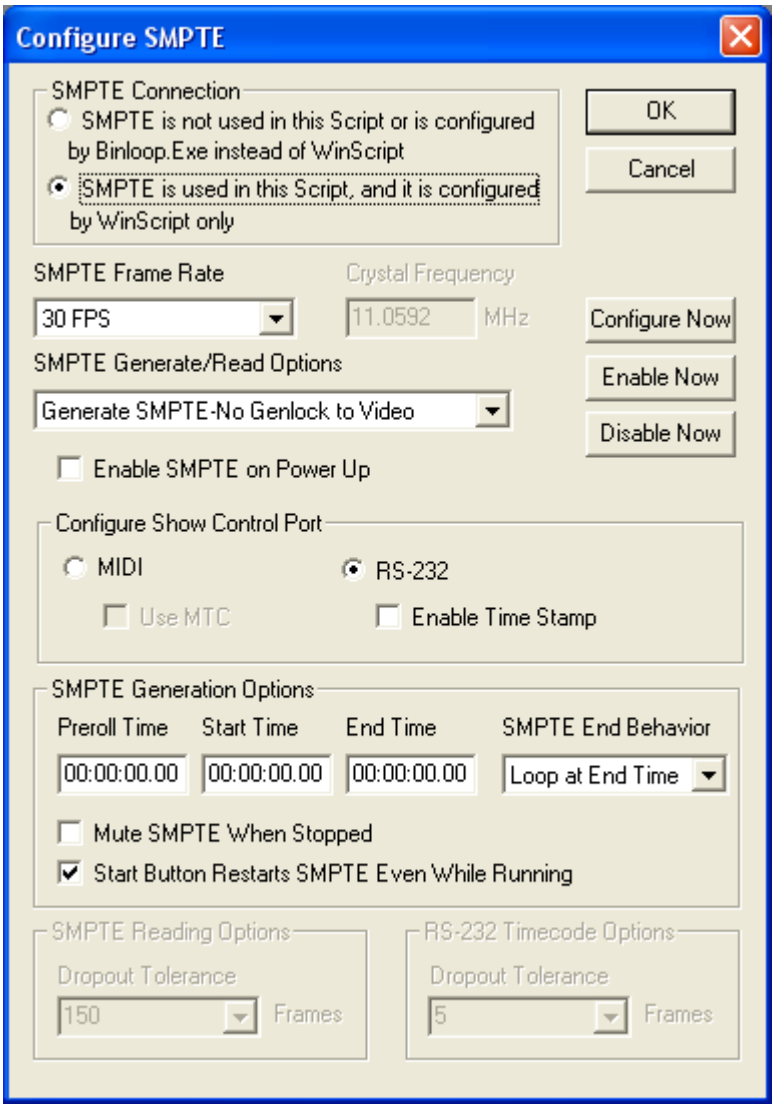
```
h00 h00 h01 h50 h4C h0D
```

SMPTE Triggering

Every sequence that resides in a Show Controller may be SMPTE triggered using an Alcorn McBride SMPTE Machine. To use a SMPTE Machine in this manner configure the SMPTE Machine using WinScript, set SMPTE triggers in the desired sequences (see *Configuring Sequence Properties*), and download the compiled script through the SMPTE Machine to your Show Controller (see *Compiling and Downloading* later in this chapter).

Note If you're using an Alcorn McBride show controller with our Digital Binloop, you don't need a separate SMPTE Machine. All of the same capabilities exist in the Binloop's controller card. Just plug your show controller into the Binloop's show control port

To configure the SMPTE Machine using WinScript choose **Configuration | SMPTE…**, and enter the desired operating parameters in the **Configuration SMPTE** dialog box. Then, connect the SMPTE Machine to a COM Port of your PC and click **Configure Now**.



SMPTE Frame Rate

The SMPTE Machine can be configured to generate SMPTE at 23.976, 24, 25, 29.97 Drop, 29.97 Non-Drop, and 30 frames per second (FPS). When configured to Read SMPTE, the SMPTE Machine locks to the frame rate of the incoming SMPTE timecode.

SMPTE Generate/Read Options

To set SMPTE Generate/Read Options, choose the desired function from the combo box. You can choose one of three options:

- **Generate SMPTE-No Genlock to Video** – Generates SMPTE timecode at the specified Frame Rate based on an internal clock.
- **Generate SMPTE-Genlock to Video** – Generates SMPTE timecode at the specified Frame Rate based on an external Composite Sync signal.
- **Read External SMPTE** – Reads SMPTE from an external source and echoes the incoming SMPTE to the **SMPTE Out** port.

Enable SMPTE on Power Up

If the SMPTE Machine is configured to generate SMPTE, checking this box will enable SMPTE generation upon power up. SMPTE timecode will begin at the **Start Time** (or **Preroll Time**, if applicable) given in the **SMPTE Generation Options**.

If the SMPTE Machine is configured to read SMPTE, checking this box will cause the SMPTE Machine to immediately look for and lock to incoming SMPTE and begin sending sequence triggers, without requiring a start command.

Configure Show Control Port

- **MIDI** – You can control the SMPTE Machine's operation using MIDI show control messages by checking this button. This configuration may require a hardware jumper setting change (see the SMPTE Machine Hardware Reference later in this manual for more information on configuring the unit for MIDI).
    - ✓ **Use MTC** – If this option is checked, the SMPTE machine will generate and decode MIDI Timecode. This option is useful for converting SMPTE Time to MTC, and vice-versa.
- **RS-232** – This selection means that port 1 of your SMPTE machine will be connected to one of the Show Controller's RS-232 ports.
    - ✓ **Enable Timestamp** – If this option is checked, the SMPTE machine will send a 9-bit message containing the current HH:MM:SS.FF data out of port 1. An Alcorn McBride Show Controller can then read this data, and use it for internal timecode features.

Important: If you wish to use either the MTC or RS-232 Timestamp features, you will need SMPTE Machine Firmware V1.63 or newer. Also, the Show Controllers require Firmware V6.42 or greater to decode an RS-232 Timestamp.

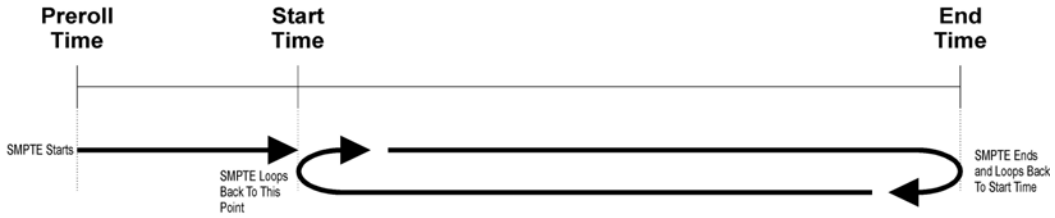
SMPTE Generation Options

- **Preroll Time** – Sometimes when SMPTE will be looping throughout a show, it is useful to have a SMPTE Preroll of a small length to allow other show equipment time to lock to the SMPTE signal. When SMPTE loops, timecode is set back to the Start Time, not the Preroll Time.

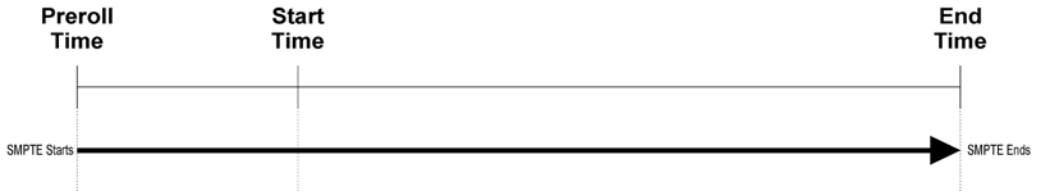
Note If you don't wish to use a SMPTE Preroll, make the Preroll Time equal to the Start Time.

- **Start Time** – When SMPTE is enabled, the SMPTE Machine defaults timecode to the Preroll Time (unless it has been modified by a **SetSMPTETime** event). If SMPTE is configured to loop at the End Time, however, it will be set back at the Start Time, not the Preroll Time.
- **End Time** – The SMPTE Machine stops generating SMPTE timecode at this time if it is configured to **Stop at End Time**.
- **SMPTE End Behavior** – When SMPTE is started, it is set to the Preroll Time. When SMPTE reaches the End Time, it can either stop or loop. If the SMPTE Machine is configured to **Loop at End Time**, SMPTE will be set back to the Start Time every time it reaches the End Time. If the SMPTE Machine is configured to **Stop at End Time**, SMPTE will stop immediately at the End Time.

Loop at End Time:



Stop at End Time:



- **Mute SMPTE When Stopped** – Configures the SMPTE Machine to mute its SMPTE output when it has stopped generating timecode.
- **Start Button Restarts SMPTE Even While Running** – Configures the SMPTE Machine to restart SMPTE from the Preroll Time when the Start button is pushed.

RS-232 Timecode Options

- **Dropout Tolerance** – This setting specifies the number of frames the Show Controller can miss before it takes action. The 'action' that is taken depends on what timecode mode each sequence is in.

Note - See **Chasing Timecode with Sequences** for more details about the different timecode modes.

Configure Now

Sends the current configuration indicated in the **Configure SMPTE** dialog box to a SMPTE Machine connected to the currently selected COM port on your PC.

Enable Now

Sends an EnableSMPTE command to a SMPTE Machine connected to the currently selected COM port on your PC. An EnableSMPTE command enables SMPTE Generation or SMPTE Reading.

Disable Now

Sends a DisableSMPTE command to a SMPTE Machine connected to the currently selected COM port on your PC. A DisableSMPTE command disables SMPTE Generation and SMPTE Reading.

Using The "Spreadsheet"

WinScript's interface works just like a spreadsheet. You can traverse the fields by pressing the arrow keys and open a field for editing by double-clicking it you can enter new data by simply selecting a field and string to type. You can also cut, paste, and copy entire sequences or events or strings.

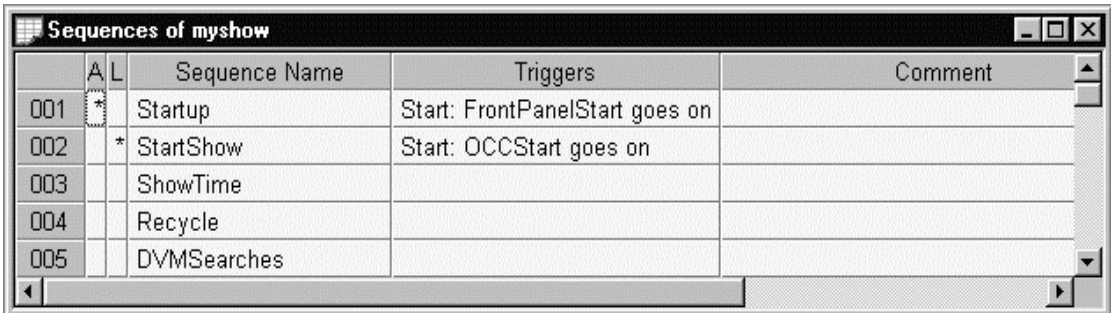
Working with Sequences

Your Show Controller can hold 256 independent sequences containing up to 32,767 events (depending on available show memory). These sequences may be copied, cut, and pasted between different scripts, or within the same script, using simple menu and hotkey commands from within the **Sequence List**.

Your **Tab** button and arrows key will move you from cell to cell throughout your designated sequences.

The Sequence List

The sequence list displays three types of information for each sequence:



Index Number – Sequence Index Numbers run sequentially from 1 up to 256. Locally, the sequence number is for reference only – we always refer to the sequences by name – but the index number can be used when starting, stopping, pausing, or resetting the sequence from within *another* Show Controller.

Autostart Enable checkbox – The Autostart Enable checkbox indicates if the sequence is set to execute if the Show Controller is powered-up or receives a download. If there is an asterisk in the box, the sequence is Autostart Enabled. You can toggle between Autostart and Loop Enable checkbox's by simply using your mouse and clicking between the two.

Loop Enable checkbox – The Loop Enable checkbox indicates if the sequence is set to loop. If there is an asterisk in the box, the sequence is Loop Enabled. You can toggle between Autostart and Loop Enable checkbox's by simply using your mouse and clicking between the two.

Sequence Name – The Sequence Name is used to differentiate sequences from each other. No two sequences in the same script should have the same name.

Triggers – The Triggers field indicates which resources, if any, will trigger or affect the sequence in question. A sequence can be triggered by an Input, Variable or Timecode.

Sequence Comment – A Sequence Comment can hold any relevant information for future reference.

To open the sequence of your choice select which sequence you would like, then press **Enter**.

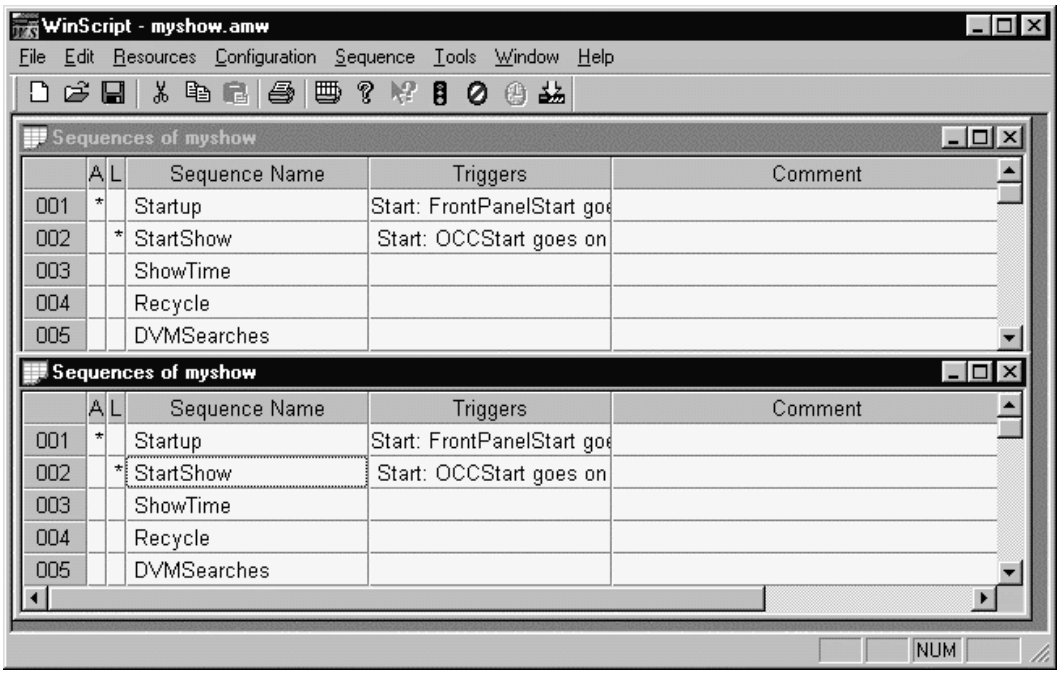
Inserting and Deleting Sequences

To insert a new sequence into a script, highlight the **Sequence List** of your script and press the **Insert** key, **F6**,or choose **Edit | Insert Sequence** from the main menu. Then, type in a name for the sequence in the **Sequence Name** field. To delete a sequence, highlight the sequence you wish to delete in the **Sequence List** of your script and press the **F5** key or choose **Edit | Delete Sequence** from the main menu.

Copying, Cutting, and Pasting Sequences

To copy a sequence (or group of sequences) from one script to another or to duplicate a sequence (or group of sequences) within a script, select the desired sequence(s) and press **CTRL+C**, click the  toolbar button, or select **Edit | Copy** from the main menu to copy the sequence(s) to the clipboard. Now, select the **Sequence List** of the script you wish to paste to and press **CTRL+V**, click the  toolbar button, or select **Edit | Paste** from the main menu to paste the sequence(s).

To cut a sequence (or group of sequences) to be pasted into another script, select the desired sequences(s) then press **CTRL+X**, click the  toolbar button, or select **Edit | Cut** from the main menu to move the sequence(s) to the clipboard. Now, select the **Sequence List** of the script you wish to paste to and press **CTRL+V**, click the  toolbar button, or select **Edit | Paste** from the main menu to paste the sequences(s).

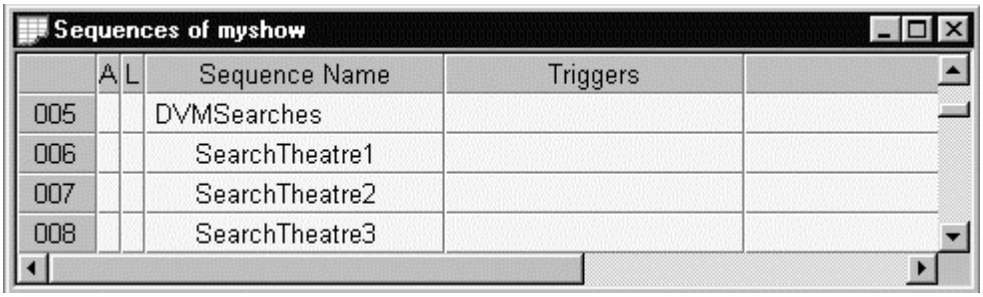


Configuring Sequence Properties

Individual sequences have several different properties: Indentation, Autostart action, Loop action, Restart action, SMPTE trigger, SMPTE Chase, and Start, Stop, Pause, and Reset triggers. To view or change sequence properties, right-click on the desired sequence in the **Sequence List** and choose the appropriate sequence property:

- ***Indentation***

  Sequences may be indented for organizational purposes. The usual way to utilize this feature is to insert a blank sequence as a "heading" for a group of sequences and then indent each sequence one level.



  To indent a sequence, right-click on the sequence name (or choose **Edit | Sequence Properties** from the main menu) and choose a new indention level from the popup list.

➢ *Autostart Enabled/Disabled*

Sequences can be enabled to start on power up (or after you download the show) by right-clicking on the sequence name (or by choosing **Edit | Sequence Properties** from the main menu). Then, click on the **Autostart** menu item to toggle between Autostart Enabled and Disabled.

➢ *Looping Enabled/Disabled*

Sequences can be enabled to loop after they finish executing all events by right-clicking on the sequence name (or by choosing **Edit | Sequence Properties** from the main menu). Then, click on the **Loop** menu item to toggle between Loop Enabled and Disabled.

Note If a sequence is Loop Enabled and has finished executing all events, the sequence will wait a full frame before restarting. However, if the sequence is in a SMPTE Chase mode, this setting has no effect.

➢ *Restart Enabled/Disabled*

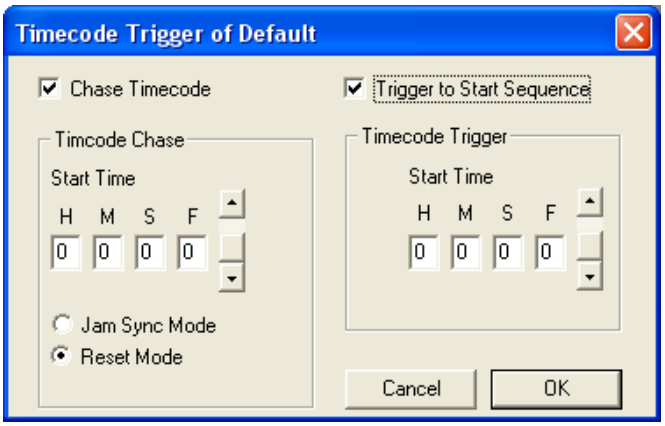
Normally a sequence cannot be started again until it has finished executing. You can allow restarts by right-clicking on the sequence name (or by choosing **Edit | Sequence Properties** from the main menu), and then clicking on the **Restart** menu item. When the **Sequence Restart Options** dialog box appears, check the **Restart Enabled** checkbox.

A "Restart Lockout" may be entered in the **Restart Lockout** field of the **Sequence Restart Options** dialog box. During this number of frames at the beginning of the sequence, it will not restart. After Restart Lockout has expired, the sequence may be restarted at any time.

Note Just like looping, this setting has no effect if the sequence is configured to chase timecode.

➢ *Timecode Trigger/Chase*

A sequence can be configured to either chase or be started by timecode from an Alcorn McBride SMPTE Machine. This can be done by right-clicking on the sequence name (or by choosing **Edit | Sequence Properties** from the main menu), and then clicking on the **SMPTE** menu item.



- **Chase Timecode** – Checking this box will cause this sequence to base its time on incoming timecode rather than the controller's internal clock.
  - **Start Time** – This time signifies the beginning of the sequence.
  - **Jam Sync Mode** – This timecode chasing mode causes the sequence to adjust its location (or scrub) in the event that the timecode skips backwards or forwards.
  - **Reset Mode** – If timecode skips backwards or forwards in this chase mode, the sequence will stop and reset.

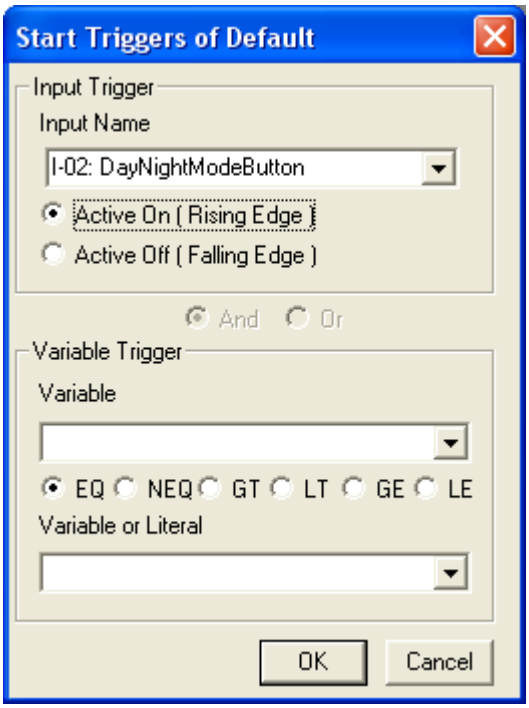
Note See **Chasing Timecode with Sequences** section for more detailed information about these modes.

- **Trigger to Start Sequence –** If this option is selected, the SMPTE Machine will cause this sequence to start at the time specified in the **Start Time** section.

Tip To quickly select a value for either **Start Time** field, click in the field and then move the scroll bar up and down until the desired value has been selected. Repeat for other fields as needed.

➢ *Start Trigger*

A sequence can be started by an Input and/or State Variable trigger. To set a Start Trigger, right-click on the sequence name (or choose **Edit | Sequence Properties** from the main menu), and then click on the **Start:** menu item. When the **Edit Start Trigger** dialog box appears, choose an Input trigger, State Variable trigger, or both:



- **Input** – The sequence is started when an Input turns on or off (i.e. on the rising or falling edge).
- **State Variable** – The sequence is started when a State Variable is =, ≠, >, <, ≥, or ≤ a value or another State Variable.
- **Both** – The sequence is started when an Input and/or a State Variable meet the desired trigger requirements.

Note Select the "And" radio button if you require both the input and state variable conditions to be true for the sequence to start. Select "Or" if either of them individually should start the sequence.

➢ *Stop Trigger*

A sequence's execution can be temporarily stopped by an Input and/or State Variable trigger.

Note "Stop" is not the same thing as "Reset". Stop leaves the event pointer where it was, and simply stops the sequence's timer. A "Start" will pick up where it left off. To stop a sequence and put its event pointer back at the top, use "Reset" instead.

To set a Stop Trigger, right-click on the sequence name (or choose **Edit | Sequence Properties** from the main menu), and then click on the **Stop:** menu item. When the **Edit Stop Trigger** dialog box appears, choose an Input

trigger, State Variable trigger, or both (for menu descriptions see the Start Trigger section).

- ***Pause Trigger***

  A looping sequence can be paused by an Input and/or State Variable trigger if it is **Loop Enabled** (the Pause Trigger has no effect on sequences that are not **Loop Enabled**). If the Pause Trigger is actuated, when the sequence reaches the end it stops looping.

  To set a Pause Trigger, right-click on the sequence name (or choose **Edit | Sequence Properties** from the main menu), and then click on the **Pause:** menu item. When the **Edit Pause Trigger** dialog box appears, choose an Input trigger, State Variable trigger, or both (for menu descriptions see the Start Trigger section).

- ***Reset Trigger***

  A sequence can be reset by an Input and/or State Variable trigger. Sequence execution stops immediately and the event pointer is reset to the first event.

  To set a Reset Trigger, right-click on the sequence name (or choose **Edit | Sequence Properties** from the main menu), and then click on the **Reset:** menu item. When the **Edit Reset Trigger** dialog box appears, choose an Input trigger, State Variable trigger, or both (for menu descriptions see the Start Trigger section).

Testing a Sequence

You can test how your Show Controller will handle a sequence by "single-stepping", or immediately starting, the sequence. Verify that the correct COM port of your PC is connected to the Programmer Port of your Show Controller. Then, download the script to the Show Controller (see *Compiling and Downloading* later in this chapter). Next, select the sequence you want to test and press **F7**, click the  (green light) toolbar button, or choose **Tools | Online | Start Sequence Now**.

To reset the sequence while it is running, select the sequence and press **F8**, click the  (red light) toolbar button, or choose **Tools | Online | Reset Sequence Now**.

Editing Sequences

Sequences can consist of up to 32,767 events (depending on available show memory) that occur at specific times after the sequence is started.

Opening a Sequence

To open a sequence for editing, double-click the desired sequence's index number in the **Sequence List** or select it and press Enter (or choose **Edit | Sequence Events** from the main menu).

To move from cell to cell throughout your desired sequence you press the **Tab** button or use the arrow keys.

To stop an edit in progress, press **Esc**.

Inserting and Deleting Events

To insert a new event into a sequence, highlight the existing event below where you want to insert the new event and press the **Insert** key, **F6**, **CTRL+Y** (or choose **Edit | Insert Event** from the main menu).

To delete the current cell out of the sequence, press **F5**, or **CTRL+D**.

Indenting a Sequence

To Indent a sequence in your scrip press **CTRL+T**.

Copying, Cutting, and Pasting Events

To copy an event (or group of events) from one sequence to another, one script to another, or to duplicate an event (or group of events) within a sequence, select the desired events(s) and press **CTRL+C**, click the  toolbar button, or select **Edit | Copy** from the main menu to copy the event(s) to the clipboard. Now, open the sequence you wish to paste to and press **CTRL+V**, click the  toolbar button, or select **Edit | Paste** from the main menu to paste the event(s).

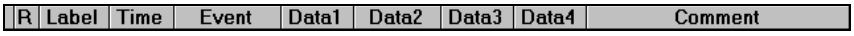
To cut an event (or group of events) from one sequence to be pasted into another sequence within the same script (or into a sequence in another script), select the desired events(s) and press **CTRL+X**, click the  toolbar button, or select **Edit | Cut** from the main menu to move the event(s) to the clipboard. Now, open the sequence you wish to paste to and press **CTRL+V**, click the  toolbar button, or select **Edit | Paste** from the main menu to paste the event(s).

Viewing Event Execution Times in Frames or MM:SS.FF

To choose whether to view Event Execution Times in either Frames or MM:SS.FF format, click on the  toolbar button.

Using Event List Information

The event list displays five types of information about each event:



Index Number – Event Index Numbers run sequentially from 1 up to 32767. These numbers show the order in which events will be executed based upon their Execution Time.

Compilation Status – Events may be commented out, or "REMed", to prevent them from being compiled by clicking in the **R** column on the event you wish to REM. An asterisk will appear in the **R** cell if the event is REMed.

Label – Each event can have a unique label. Labels are used as destinations for program control "branching" instructions (see *Event Reference*). Labels may contain letters, numbers punctuation and spaces, but must start with a letter.

Execution Time – Each event is executed at a specific time. "Sequence Time" starts at 00:00.01 when the sequence starts and increments once per frame. The Execution Time is the Sequence Time when the event should execute. If an event is encountered which is scheduled at or before the sequence's current time, it will be executed immediately.

Data Fields – Each of the four data fields can hold parameters for events. If an event does not require any parameters, the data fields are ignored.

Comment – An Event Comment can hold any relevant information for future reference.

Editing an Event

When a new event is inserted into a sequence, the event becomes a **Nop** event by default. To change the event and/or its properties and parameters double-click on the desired cell and change the text.

➢ *Editing the Time using Event Wizard*

You can perform advanced editing on the Execution Time of one or multiple events using the **Event Wizard**. To select multiple events you can drag the mouse over them or click on the first event, scroll down, press the shift key and click on the last event. Then click the right mouse button in the **Time** field of one of the selected events to bring up the **Event Wizard**.

To add time or to subtract time from a single event or group of events, choose **Add Time to Event** or **Subtract Time from Event** and then put the amount of time you wish to add or subtract in the **Time to Add** or **Time to Subtract** field.

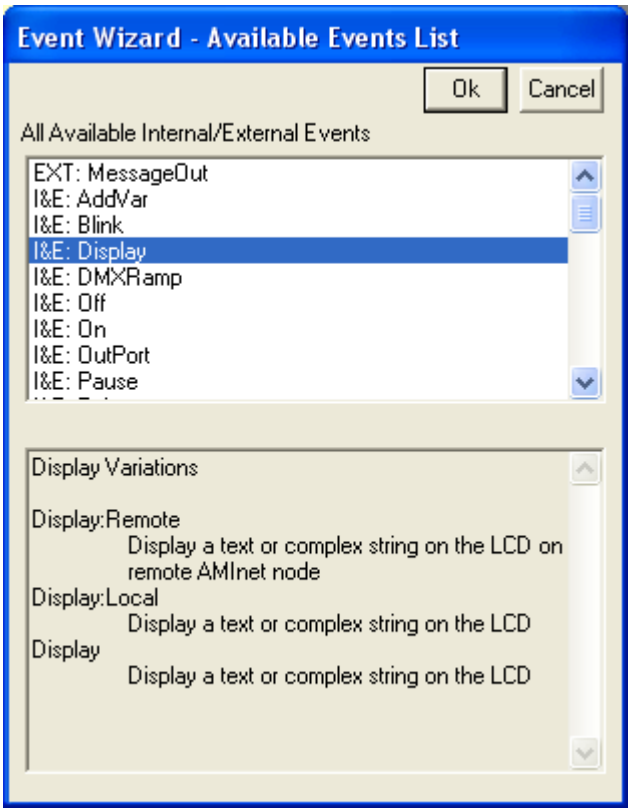
You can also select multiple event lines and use **Incrementally Fill** to automatically enter incremental times for a series of events.

To add or subtract from the total sequence length by proportionally changing the Execution Time of each event, choose **Expand or Compress Overall Sequence Length Spacing All Event Times Proportionally** and then put a new overall sequence length in the **New Overall** field.

➢ *Editing an Event using Event Wizard*

To change the event name, select the **Event** cell of the desired event and start typing the first few letters of the new event name. Event Wizard will automatically pop up the Available Events List and select an event that corresponds with those letters. If the correct event is not highlighted, keep typing the event name (or select the correct event with your mouse). When the correct event is displayed, click OK.

Note To configure Event Wizard to not automatically pop up the Available Events List, see *WinScript Options* later in this chapter.

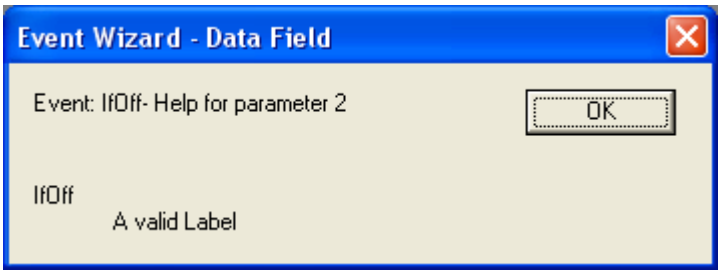


Each event listed in the Available Events List has a prefix that designates its type:

- **INT:** -- Internal event; Used only for controlling resources in this Show Controller.
- **EXT:** -- External or Serial Event; Used for controlling remote Show Controllers and other serial devices.
- **I&E:** -- Internal or External Event; Used for controlling resources in a local or remote Show Controller, or other serial device.

➢ *Getting Help on Event Parameters using Event Wizard*

Event parameters are entered into the **Data1**-**Data4** cells. To get help regarding required parameters, right-click in a Data cell and choose **Event Wizard**.

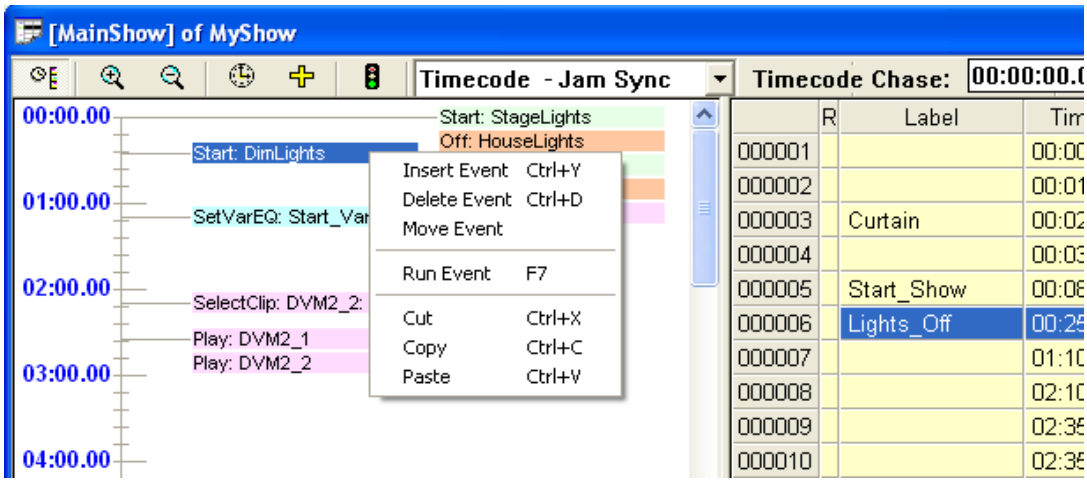


Testing An Event

You can test how your Show Controller will handle a single event by "single-stepping". Verify that the correct COM port of your PC is connected to the Programmer Port of your Show Controller. Then, select the event you want to test and press **F7**, click the (green light) toolbar button, or choose **Tools | Online | Execute Event Now**.

Viewing Events as a Timeline

To view events in a time based arrangement, **click on the button**. If the sequence is not time linear, a notification will appear requesting permission to sort the events. Event times, that are less than their preceding event times, will be changed to the preceding time.



➢ *Modifying Events in Timeline*

Right click on an event to insert events, delete events, cut, copy, paste, or run the single event. Click the to run selected events immediately when connected to the show controller. **Drag an event with the mouse** to change an event's time. Drag multiple events by holding down the Ctrl or the Shift keys.

- ***Changing the Timeline View***

  Change the amount of time displayed by clicking on the zoom in or zoom out buttons.  When in Timecode Chase Mode, clicking on the  button will alter the times to reflect the true time of the events. Click the  button to view the timeline in frames.

Chasing Timecode with Sequences

When used in conjunction with an Alcorn McBride SMPTE Machine, sequences have the ability to chase SMPTE or EBU timecode. Since this is a completely different approach to using sequences, their behavior differs from the default time behavior. Let's go over these differences, and learn how to use these methods to control sequences.

In the default mode of operation (meaning no timecode chasing), a sequence begins incrementing its frame clock and executing events the instant that it is started. However, with timecode chasing, starting a sequence does not necessarily mean that it will begin executing. Instead, initiating a Start sequence event is more like 'arming' or 'activating' the sequence. No events will actually be processed until the timecode has exceeded the sequence's **Start Time**. Once this point has been reached, the timecode will control the rate at which the frame counter increments. In fact, the current frame is calculated just like this:

(Timecode) – (Sequence Start Time) = (Current Frame to Execute)

Example: 1:00:01.16 – 1:00:00.00 = 00:01.16

Now, what happens if the timecode doesn't increment normally? What if it skips backwards or forwards? How will the sequence react? Well, that's the tricky part! For that reason, we've added a few options to give you control of these situations.

Dropout Tolerance

The SMPTE Configuration box, which can be found in the menu by clicking **Configuration | SMPTE,** contains the setting RS-232 Dropout Tolerance. This setting specifies the number of frames that can be skipped, missed, or lost in a black hole before the show controller determines that a timecode jump has taken place. Detecting a jump in the timecode is the first step in determining when to take action.

Jam Sync Mode

If a sequence is in this mode, and a timecode jump is detected, the sequence will 'scrub' to the location that matches the new time. This is done by rewinding the sequence to the first event, and then scrolling through the event list until one with an equal or higher timestamp is found.

PROS – The timecode can scrub back and forth, and the sequence will find the proper position. This drastically reduces the development effort in timing out events in long sequences, and makes it easier to skip or redo things during a show.

CONS – Since events are not actually executed while the sequence is scrubbing, conditional jumps (ie. goto, ifon, etc.) should not be used in this mode.

Note - Once a sequence in Jam Sync Mode has been started, it will never stop on its own. A Reset command must be issued by the script or external command.

Reset Mode

Unlike Jam Sync Mode, there are a couple of circumstances that can cause a sequence in Reset Mode to stop executing. They are the following:

- When the last event in the sequence is processed.
- When a timecode jump is detected.

Once either of these conditions occurs, the sequence can only be started again if the timecode is below the start time AND a start sequence event is executed.

PROS - This mode is very useful for sequences that must execute from start to finish without the possibility of skipping any events. It is also good for critical sequences that are not expecting the timecode to drop or jump.

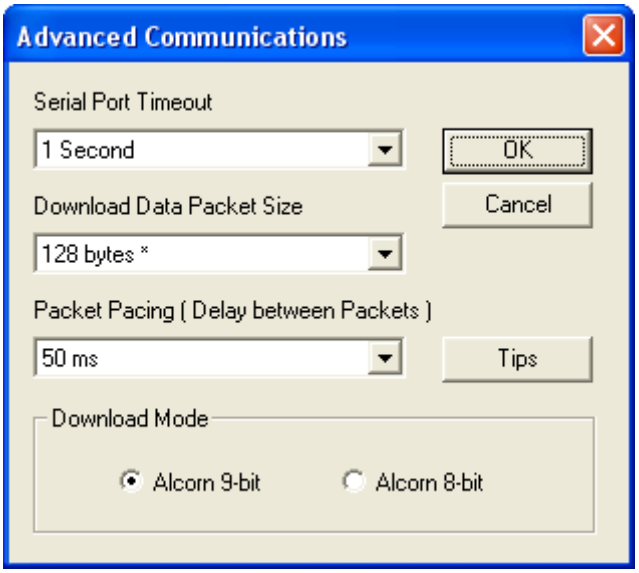
CONS – Although this mode causes the sequence to precisely chase timecode, this type of sequence cannot be scrubbed.

Note – Since they do not apply to chasing timecode, both of these modes ignore the Loop and Restart options. If you enable these options, the compiler will issue a warning and then disable these settings.

Compiling and Downloading

When you've finished scripting your show, it's time to compile and download the script into "show data" to be stored in the "Show Memory" of the Show Controller.

When WinScript downloads your show data, it uses the settings defined in the **Advanced Communications** dialog box to configure how often it sends bytes of show data, how many bytes are sent at one time, and how long to wait for a response from the Show Controller before timing out. To change the **Advanced Communication** settings, click the **Advanced** button in the **Communications Ports** dialog box.



Serial Port Timeout – WinScript waits this amount of time for a response from the Show Controller before aborting the download and displaying an error.

Download Packet Size – WinScript sends this number of bytes at a time when downloading show data.

Packet Spacing – This defines the amount of time WinScript waits between sending individual show data packets to the Show Controller.

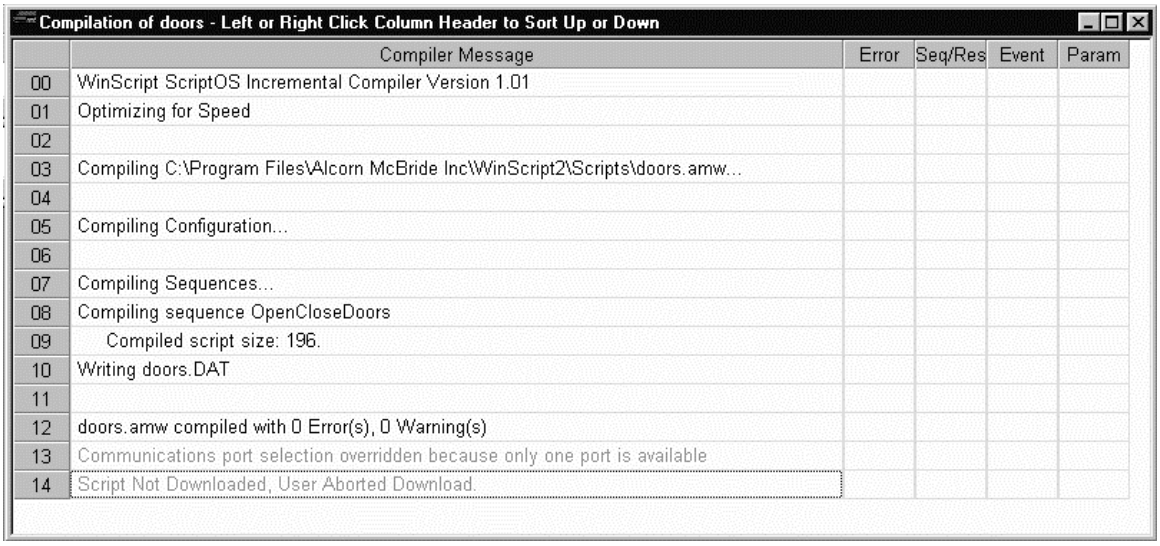
Alcorn 9-bit – Default download mode. Every Alcorn McBride Show Controller is compatible with this mode.

Alcorn 8-bit – Unfortunately, not all serial ports can handle 9-bit communications (ie. USB→ RS-232 adapters). If this is the case, you may need to use the Alcorn 8-bit method. **IMPORTANT:** This feature has not always been available, so make sure you have firmware version V6.41 or later in your Show Controller.

Compiling and Downloading the Script

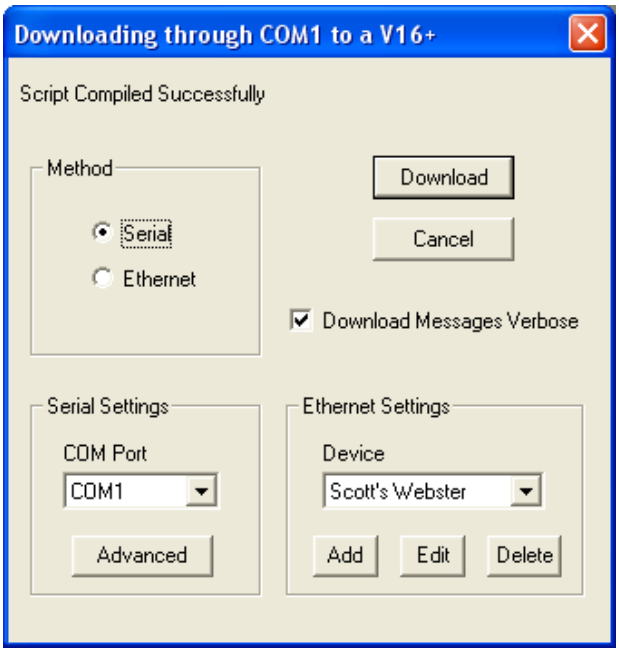
To Compile and Download your script, click the  toolbar button or choose **File | Compile Script and Download** from the main menu. WinScript will proceed to compile your script and (if it is free of errors) prompt you to download the resulting show data to your Show Controller.

Note If you are downloading through a SMPTE Machine, see *Downloading Through A SMPTE Machine* later in this chapter.



	Compiler Message	Error	Seq/Res	Event	Param
00	WinScript ScriptOS Incremental Compiler Version 1.01				
01	Optimizing for Speed				
02					
03	Compiling C:\Program Files\Alcorn McBride Inc\WinScript2\Scripts\doors.amw...				
04					
05	Compiling Configuration...				
06					
07	Compiling Sequences...				
08	Compiling sequence OpenCloseDoors				
09	Compiled script size: 196.				
10	Writing doors.DAT				
11					
12	doors.amw compiled with 0 Error(s), 0 Warning(s)				
13	Communications port selection overridden because only one port is available				
14	Script Not Downloaded, User Aborted Download.				

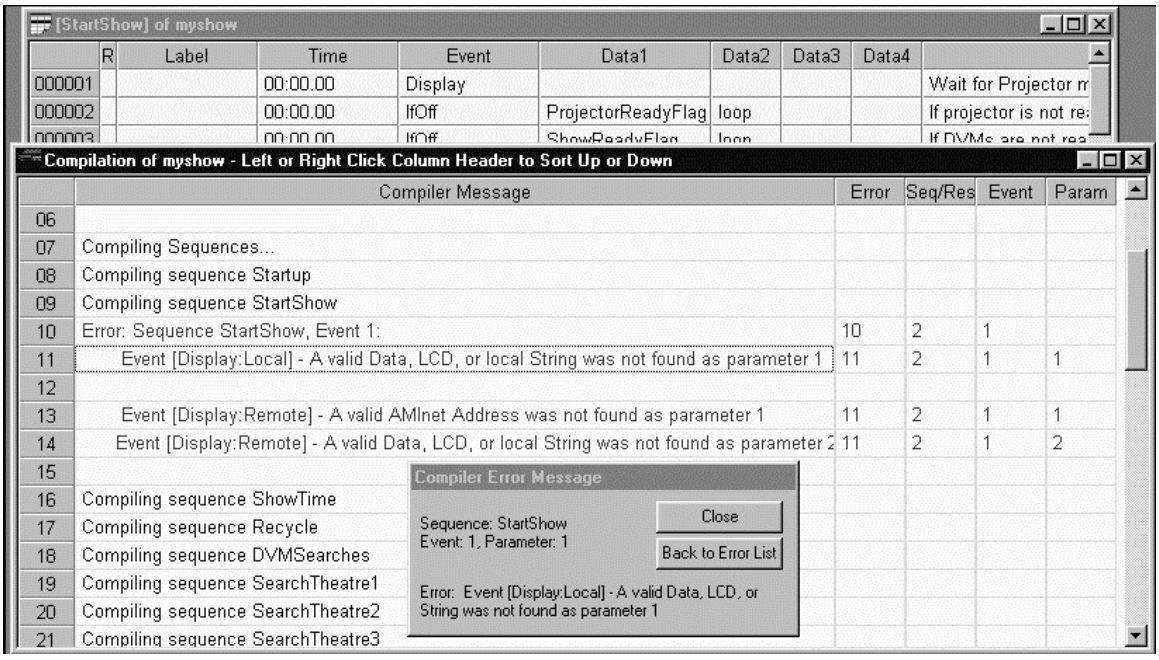
If you have selected one or more COM ports that are available for download, you will be prompted to download the show when it compiles correctly. WinScript will check which COM ports are available and allow you to select the COM port to which your Show Controller is connected. You may then download the show by clicking **Download**.



Identifying and Correcting Scripting Errors

If WinScript detects an **Error** in your script when it is compiling, you must correct the error in order to be able to download your show. To correct an error, double-click on the error and WinScript will open the correct sequence and select the suspect event.

If WinScript warns you of a possible problem with a **Warning**, you may also double-click on the warning and be taken to the suspect resource screen or event.



The Compiler Window provides detailed information about any warnings or errors in the following columns:

Compiler Message – This column details the compiling and provides a listing of any errors. It also shows the progress of the compile process.

Error – This column indicates the number of this error.

Seq/Res – This defines which sequence number the error is located in.

Event – This defines which event number in the above sequence that the error is located in.

Param – This defines which parameter in the event contains the error.

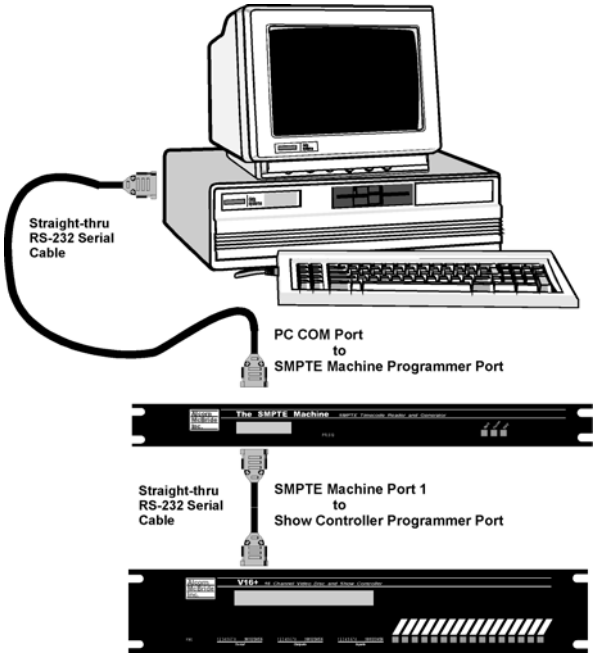
Troubleshooting Download Problems

If WinScript is timing out or having trouble downloading the compiled show data to the Show Controller, press the Tips button in the Advanced Communications dialog box for help.

Downloading Through A SMPTE Machine

If you're using an Alcorn McBride SMPTE Machine to provide SMPTE triggers to your Show Controller, you must download your show data to the Show Controller through the SMPTE Machine. WinScript first sends the SMPTE

trigger information to the SMPTE Machine, then downloads the show data to the SMPTE Machine which in turn passes the data to the Show Controller. When you run the show, the Show Controller can send SMPTE commands back through its Programmer Port. Here is the correct cabling for a Show Controller/SMPTE Machine system:



WinScript Tools

WinScript includes several very useful tools to increase your scripting productivity.

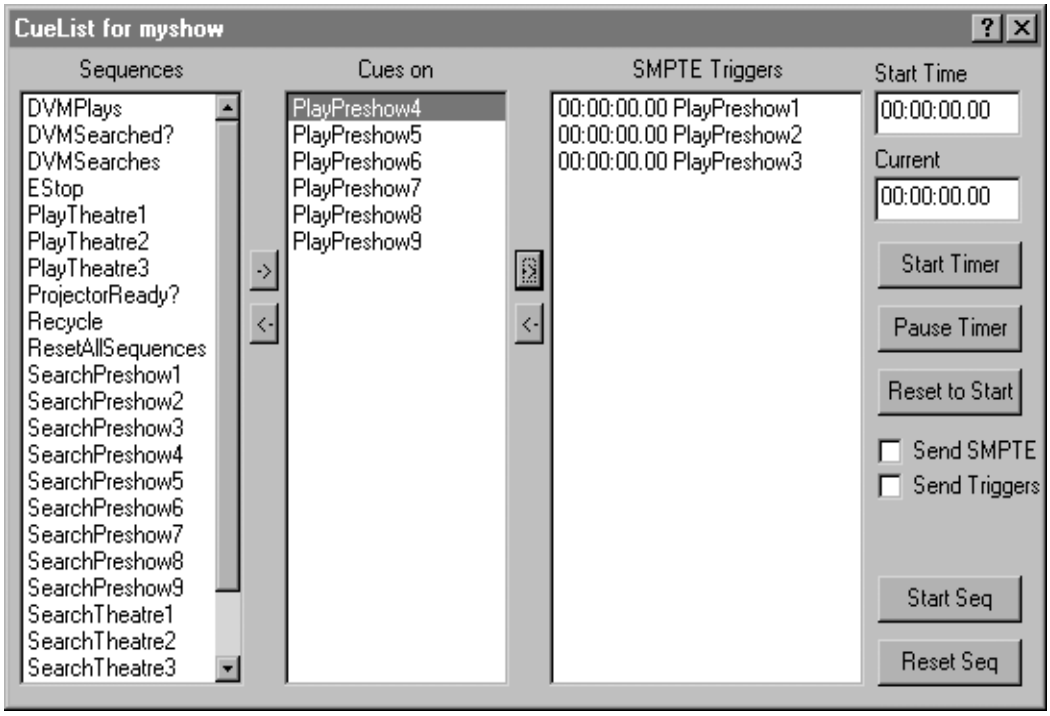
Protocol Viewer

Protocol Viewer provides an easy way for you to view available events and configurations for an available serial port protocol. Choose **Tools | Protocol Viewer…** from the main menu. When the Protocol Viewer window appears, choose the protocol file you wish to view.

Cue List

The Cue List function provides a convenient way to assign SMPTE triggers to many sequences in succession. This is particularly useful for programming live shows. This section describes the controls available in the Cue List dialog box.

This information is also available by clicking on the context help question mark in the title bar of the dialog box.



Current Time

This edit box displays the Current Time. When running, it is updated at the **Frame Rate**, as determined by the **Unit Configuration Dialog**. When stopped, the value in this edit box may be changed to alter the time at which the timer will begin when the **Start Timer** button is pressed. The **Reset to Start** button copies the value from the **Start Time** edit box into this box. Time values should be entered in HH:MM:SS.FF format.

Edit Start Time

This edit box displays the proposed Start Time. The **Reset to Start** button copies the value from the **Start Time** edit box into this box. Usually this will be the beginning timecode for the show. Note that the timer may be started and stopped without affecting (or using) this time. Time values should be entered in HH:MM:SS.FF format.

Start Timer

Use this button to start the timer. The timer will begin at the value in the **Current Time** edit box, and will increment at the **Frame Rate**, as determined by the **Unit Configuration Dialog**. If **Send SMPTE** is enabled, this button also sets the SMPTE generator to the current time and enables it to run.

Reset to Start

Use this button to stop the timer and copy the value from the **Start Time** edit box into the **Current Time** edit box. If **Send SMPTE** is enabled, this button also stops the SMPTE generator.

Pause Timer

Use this button to pause the timer. The time value in the **Current Time** edit box will stop changing. If **Send SMPTE** is enabled, the SMPTE generator will also be paused. While paused, the value in the **Current Time** edit box may be changed to alter the time at which the timer will resume when the **Start Timer** button is pressed again.

Source Sequence List

This is a list of all sequences that don't already have a SMPTE trigger associated with them (except for those already in the Cues on Deck List). Select sequences from this list and click the Add Cue button to move them to the Cues On Deck List, in preparation for dynamically assigning them a SMPTE trigger. Sequences in this list are sorted in alphabetical order

Cues On Deck List

The sequences in this list have been placed "On Deck", ready to have their SMPTE trigger assigned. To assign a trigger, start the timer, and at the desired trigger time press the **Add SMPTE Trigger** button. The sequence will be tagged with the current time and moved to the **SMPTE Trigger List**. Sequences may be removed from this list using the **Remove Cue** button. Sequences in this list are not sorted, but are placed in the order in which they were added. They may be **dragged** to any desired position in the list.

SMPTE Trigger List

This is a list of all sequences that already have a SMPTE trigger associated with them. To remove a SMPTE trigger, select sequences from this list and click the Remove Trigger button to move them to the Cues On Deck List. Sequences in this list are sorted in time order

Add Trigger

Use this button to move a sequence from the **Cues On Deck List** to the **SMPTE Trigger List**. The sequence will be tagged with the current time as a start trigger. If the **Send Triggers** box is checked, the sequence will also be started. If you accidentally move a sequence to the **SMPTE Trigger List**, you can move it back to the **Cues On Deck List** with the **Remove Trigger** button. Note that the sequence will not automatically trigger the next time this SMPTE timecode is encountered unless the script is downloaded to the unit. The optimum procedure for using the Cuelist is to rough in all the cues on a single pass, then download the script and check the timing. Cues can then be precisely adjusted from the main **Sequences List** view or from the **SMPTE Trigger** view and re-downloaded.

Remove Trigger

Use this button to remove a sequence from the **SMPTE Trigger List**. The sequence will be placed back in the **Cues On Deck List**.

Control SMPTE

Check this box to send **Set SMPTE Time**, **Enable SMPTE** and **Disable SMPTE** serial commands to a SMPTE Machine or Digital Binloop whenever the Cue d Dialog's timer is started, paused or reset. The message will be transmitted from the currently configured **Download Port**, which is selected using the **Tools Menu**.

Send Triggers

Check this box to send **Sequence Start** serial commands to the show controller whenever a sequence is transferred from the **Cues On Deck List** to the **SMPTE Trigger List** by clicking on the **Add Trigger** button. The message will be transmitted from the currently configured **Download Port**, which is selected using the **Tools Menu**.

Add Cue

Use this button to move a sequence from the **Sequence List** to the **Cues On Deck List**. This allows you to create a list of sequences that will be assigned SMPTE timecode triggers, and then dynamically move them to the **Trigger List** as the show runs. Once the sequences are in the **Trigger List**, their start times may be precisely adjusted from the main **Sequence** view or from the **SMPTE Trigger** view. If you accidentally move a sequence to the **Cues On Deck List**, you can remove it with the **Remove Cue** button.

Remove Cue

Use this button to remove a sequence from the **Cues On Deck List**. The sequence will be placed back in the **Sequences List**.

Start Sequence

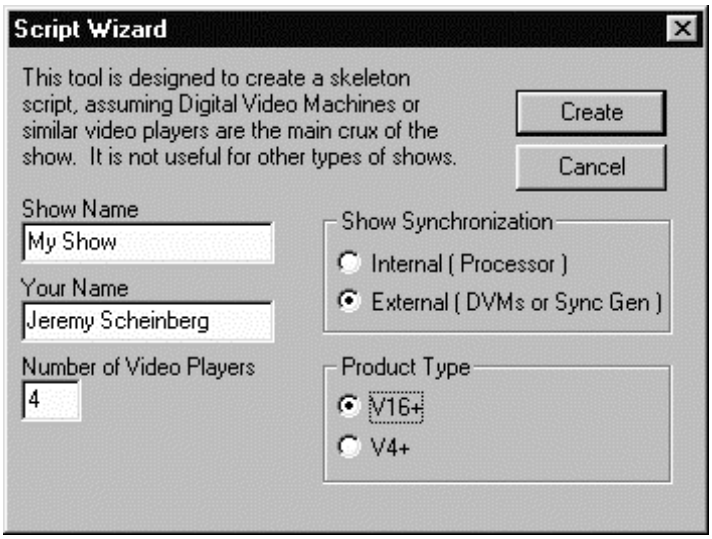
Use this button to start the currently selected sequence. The sequence may be in the **Sequences List, Cues On Deck List**, or **SMPTE Trigger List**. This button is quite useful for testing the operation of sequences before they are added to the **SMPTE Trigger List**.

Reset Sequence

Use this button to reset the currently selected sequence. The sequence may be in the Sequences List, **Cues On Deck List**, or **SMPTE Trigger List**. This button is useful for terminating execution of a sequence that has been inadvertently started either by the **Start Sequence** button or by adding it to the **SMPTE Trigger List** with **Send Triggers** enabled.

Script Wizard

Script Wizard creates a skeleton script for controlling multiple Digital Video Machines. To launch Script Wizard, choose **Tools | Script Wizard…** from the main menu. Then, enter the name of the new show, your name, the total number of video players in your show, a sync source for your Show Controller, and the type of Show Controller.



Note Script Wizard currently only supports automated script creation for the V16+ and V4+, but you can easily create a script for any other Alcorn McBride Show Controller by choosing one of these and then changing the unit type of the resulting script.

DMXWizard

DMXWizard gives you the ability to control your DMX Machine from your PC, using lighting board-like faders to control up to eight contiguous channels of DMX at once. Channels may be grouped so that multiple faders move with a single mouse drag. **DMXWizard** is particularly helpful in determining desired DMX values when developing scripts in WinScript, but it may also be run as a stand-alone program.

Fader

Use this control to ramp the assigned DMX channel's value up and down. If the associated **Ena** checkbox is selected, serial messages are dynamically sent to the DMX machine whenever any DMX value changes. If the associated **Grp** checkbox is selected, all faders assigned to the group will move up and down together. To jump the fader to a preset position, enter a value in the **Edit** box and then click the **Set** or **Set All** button.

Selecting DMX Channels

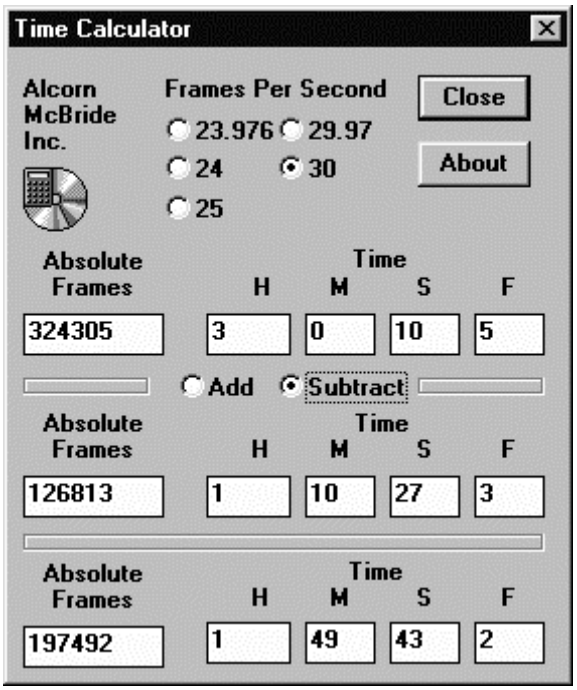
Set the Base Address to the first DMX channel in the block of 8 that will be mapped to the DMX Machine. Valid DMX Channels are 1 through 512, so the maximum value for Base Address is 505. You can manually enter the Base Address, or select it with the + and – buttons. Click this button to set all the sliders to the bottom position. DMX Channels assigned to sliders that have the **Ena** checkbox set will immediately go off. Select the Communications port to which the DMX Machine is connected. While DMXWizard is open, the port cannot be used by other applications. This edit box shows the exact setting of the assigned DMX channel, in either percent or actual value (0–255). The display format depends upon the setting of the **Percent Value** radio buttons. The channel may be adjusted very precisely by entering a value and clicking the **Set** button. This checkbox provides a quick way to enable or disable all eight DMX channels' serial update states. If this checkbox is clear, clicking it sets all of the **Ena** checkboxes, allowing serial messages to be sent to the DMX Machine whenever any channel value is changed. If the **Enable All** checkbox is already set, clicking it clears all of the **Ena** checkboxes. This checkbox provides a quick way to group or ungroup all eight DMX channels. When grouped, channel faders move together. If this checkbox is clear, clicking it sets all of the **Grp** checkboxes. If the **Grp All** checkbox is already set, clicking it clears all of the **Grp** checkboxes. If this checkbox is set, serial messages are sent to the DMX Machine whenever this channel changes value. The **Ena All** checkbox provides a quick way to check and uncheck all of the **Ena** checkboxes. If this checkbox is set, this channel is assigned to the group. When grouped, channel faders move together. The **Grp All** checkbox provides a quick way to check and uncheck all of the **Grp** checkboxes. This button sets the associated **Slider** to the value in the **Edit** box, and, if the **Ena** checkbox is set, sends a message to the DMX Machine to update the channel's value. The **Set All** button provides a quick way to set all of the channels at once. This button provides a quick way to set all of the

channels at once. For each channel, it sets the **Slider** to the value in the **Edit** box, and, if that channel's **Ena** checkbox is set, sends a message to the DMX Machine to update its value. This radio button causes all DMX channel values to be displayed in percent. In this mode the **Edit** boxes accept numbers from 0 through 100, and the **Slider** ranges are scaled accordingly. This radio button causes all DMX channel values to be displayed as numeric values. In this mode the **Edit** boxes accept numbers from 0 through 255, and the **Slider** ranges are scaled accordingly.

Time Calculator

Time Calculator is a handy utility that adds and subtracts LaserDisc/SMPTE times in either HH:MM:SS.FF or Absolute Frames format. You can also choose to base your calculations on one of several different frame rates.

Note Time Calculator was designated as one of the Top Ten Windows Multimedia Applications by Clicked.Com.



WinScript Options

WinScript provides several ways for you to customize your workspace.

The WinScript Toolbar

By default, the WinScript toolbar resides at the top of the main WinScript window, underneath the main menu, and provides shortcut buttons to several common WinScript functions (for more information, see *Navigating WinScript* earlier in this chapter). To Enable/Disable the Toolbar, choose **Tools | Options | View Toolbar**. A check mark will be displayed next to "View Toolbar" if the toolbar is currently enabled.

The WinScript Status Bar

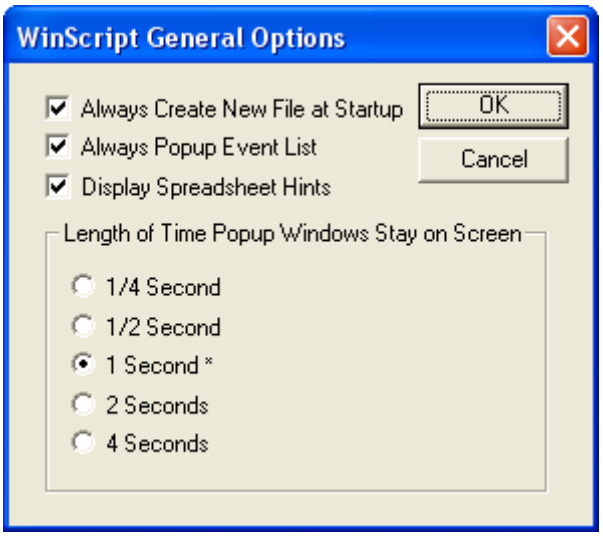
The WinScript status bar resides at the bottom of the main WinScript window and provides short descriptions of toolbar buttons or menu items when the mouse is over them (for more information, see *Navigating WinScript* earlier in this chapter). To Enable/Disable the status bar, choose **Tools | Options | View Status Bar**. A check mark will be displayed next to "View Status Bar" if the status bar is currently enabled.

General Preferences

By default, WinScript creates a new, blank script at startup. To disable this feature, choose **Tools | Options | General…** and then uncheck the Create New File at Startup checkbox and click **OK**. To re-enable the feature, check the checkbox.

Event Wizard automatically pops up with a suggested event name after you type the first few letters. To disable this feature, choose **Tools | Options | General…** and then uncheck the **Always Pop Up Event List** checkbox and click **OK**. To re-enable the Event Wizard popup, check the checkbox.

To limit the **Length of Time Popup Windows Stay on Screen**, select the appropriate button from the list.



Compiler Options

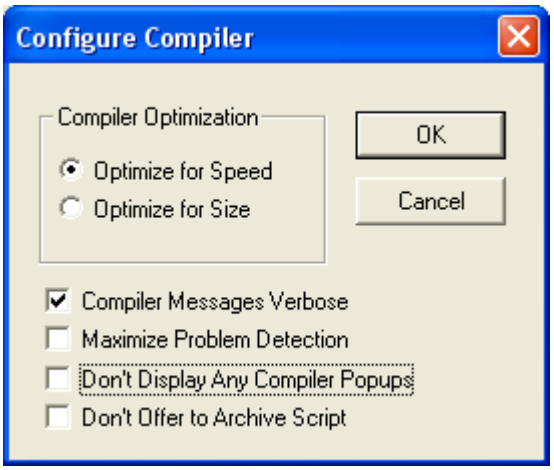
When WinScript compiles your show for download, it checks the validity of your sequences and the syntax of each event, and then compiles the script into a binary file to be downloaded into your Show Controller.

The WinScript Compiler provides a significant improvement over previous script compilers by allowing you to choose the way in which your script is compiled.

When **Compiling for Speed**, WinScript compiles each event and places it in the show data. When you make a change to the script and recompile, WinScript only recompiles the sequences you've changed and then links them to the other previously compiled sequences.

When **Compiling for Size**, WinScript reuses duplicate events within the same sequence to reduce the total size of the compiled show data (this reduces the risk of running out of available memory in the Show Controller).

To choose the desired method of compilation, choose **Tools | Options | Compiler…** from the main menu. Then, choose a compilation method from the two available choices: **Optimize for Speed** and **Optimize for Size**.



You can also choose to have WinScript tell you exactly what it is doing when it compiles your show by checking the **Compiler Messages Verbose** checkbox.

To check for duplicated resource names and other obscure problems in your script when you compile, check the **Maximize Problem Detection** checkbox.

To prevent error boxes from popping up during the Compile, check the **Don't Display Any Compiler Popups** checkbox.

You can choose to have WinScript not offer to archive your scripts when downloading by checking the **Don't Offer to Archive Scripts** checkbox.

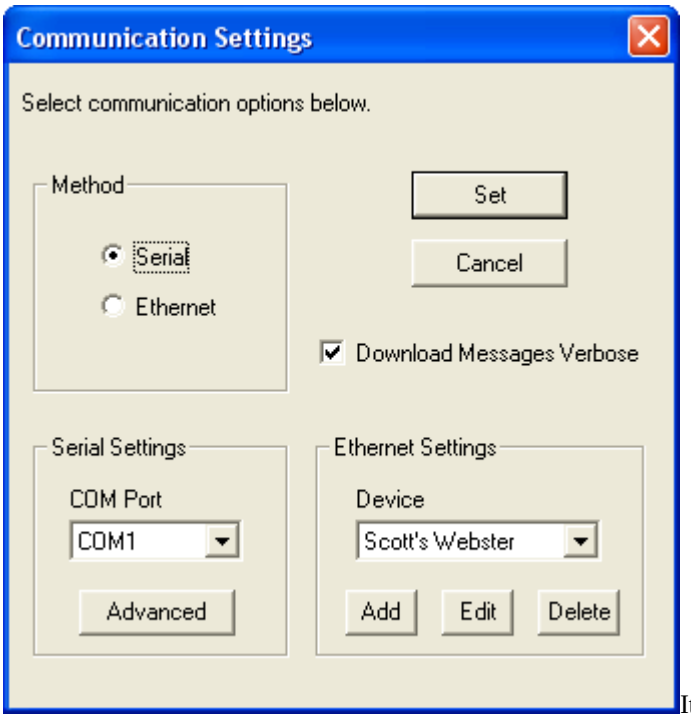
Communication Options

Before changing anything in this section, you must determine which method of communication you will use on your show controller. Select the appropriate communication method in the **Method** section.

If you intend to use the serial port to download a full show or test specific events, your PC must be connected to your Show Controller's Programmer Port by a straight-thru DB9F-DB9F serial cable. WinScript will automatically detect any serial ports that are available and add them to the drop box in the **Serial Settings** section.

If you are using a Show Controller with Ethernet Capability or you are using an Ethernet add-on product (Webster), you can configure it in the **Ethernet Settings** section.

In this screen you can also choose to display verbose download messages. This means that when your PC is downloading a compiled show to your Show Controller that it will tell you exactly what messages it is sending to the Show Controller and describe the Show Controller's responses.



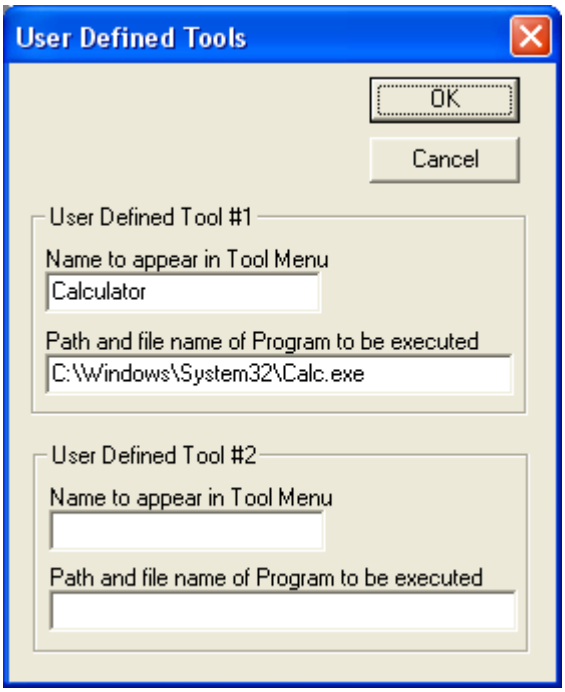
It

User-Defined Tools

User-defined tools may be added to the **Tools** menu by choosing **Tools | Options | User Defined Tools…**

To change one of the user-defined tools, enter a name for the tool in the Name field then enter the path and filename of the program to be run when the menu item is chosen.

To use a user-defined tool, choose **Tools | *tool name*** from the main menu.



Tip To create a shortcut for a user-defined tool, place an ampersand (&) before a letter in the name of the tool. When you wish to use the tool while scripting, press **ALT+T+*letter*** (where ***letter*** is the character following the ampersand).

Event Reference

Sequence events control all of the activities of the Show Controller including Output states, Serial Ports, the flow of sequences, and even other Show Controllers. In this chapter you'll find:

- Descriptions, syntax and examples of Discrete, Logical, Program Control, and LCD Display events.
- Descriptions and syntax of common Serial Events for controlling external serial devices.

Types of Events

There are several "types" of events from which to choose. Events can control resources internal to the Show Controller (Flags, Sequences, LCD), resources connected to the Show Controller (Outputs, Serial Ports), or even resources in another Show Controller.

Discrete Events – Control Outputs in a local or remote Show Controller.

Logical Events – Control Flags and State Variables in a local or remote Show Controller.

Program Control Events – Control Sequences, and logical "branching" within sequences.

LCD Display Events – Display custom messages on the LCD.

Built-In Serial Events – Send State Variable values, DMX Ramp commands, or custom serial messages out a Serial Port.

In addition to these built-in event types, Alcorn McBride Show Controllers are infinitely extensible as far as Serial Events are concerned. By creating your own Protocol Files, you can actually expand the language of your Show Controller. We ship WinScript with a selection of useful Protocol Files. Here are just a few:

MIDI Events – Control MIDI devices from your Show Controller's MIDI port.

SMPTE Events – Serially control an Alcorn McBride SMPTE Machine.

LaserDisc Player Events – Control video playback, searches, stills, and Spinup / Spindown in many common LaserDisc players.

Digital Video Machine Events – Control video playback and drive selection in an Alcorn McBride Digital Video Machine.

Digital Binloop Events – Control audio/video playback and SMPTE generation in an Alcorn McBride Digital Binloop.

Internal vs. External Events

Events that control resources inside the "local" Show Controller (the one you are currently scripting) are called Internal Events. Events that control resources inside a "remote" Show Controller (connected to the local Show Controller via a serial port) are called External Events.

All Discrete, Logical, LCD Display, and Program Control events can be used as External events (with the exception of the branching instructions **Nop**, **Goto**, **IfOn**, **IfOff**, **IfVarEQ**, **IfVarGE**, **IfVarGT**, **IfVarNE**, **IfVarLT**, and **IfVarLE**).

To change the syntax of an event from Internal to External, move all required parameters one Data column to the right (e.g. if a parameter is in the **Data1** column, move it to the **Data2** column) and type the name of the Serial Port connected to the remote Show Controller in the **Data1** column.

Note For a port to accept External events, it must be configured with **AMI Product Wizard** as an Alcorn McBride Show Controller (see *Communicating With Alcorn McBride Show Controllers* in Chapter 4). Choose **Resources | Ports…** to configure a port.

Example – Internal Event Syntax

Event	Data1	Data2	Data3
On	Output1		

Turns on Output1 in the local Show Controller.

Example – External Event Syntax

Event	Data1	Data2	Data3
On	Port2	Output1	

Turns on Output1 in a remote Show Controller connected to Port2.

Note If you did not configure the Serial Port connected to the remote Show Controller using AMI Product Wizard, you will need to replace any remote resource names with their corresponding Index Numbers.

Discrete Events

Discrete Events utilize discrete relay contact closures (or lamp drivers in some Show Controllers).

To Do This…	Use This Event…
Turn on an Output	**On**
Turn off an Output	**Off**
Toggle the state of an Output	**Toggle**
Continuously blink an Output at a constant rate	**Blink**
Pulse an Output for a user-defined length of time	**Pulse**
Set a group of eight Outputs to a binary value	**OutPort**
Read a group of eight Inputs to a state variable	**InPort**

➢ On

Turns on an Output. The Output remains on until another event modifies its state.

Event Syntax

Event	Data1
On	*Name of Output*

➢ Off

Turns off an Output. The Output remains off until another event modifies its state.

Event Syntax

Event	Data1
Off	*Name of Output*

➢ Toggle

Toggles the state of an Output. If the Output is currently on, it will be turned off. If the Output is currently off, it will be turned on.

Event Syntax

Event	Data1
Toggle	*Name of Output*

➢ Blink

Blinks an Output. Blinking an Output causes it to turn on (for the specified Blink Time) and off (for the specified Blink Time) continuously until reset by an **Off**, **On**, **Pulse**, **OutPort**, or **Toggle** event.

Event Syntax

Event	Data1	Data2
Blink	*Name of Output*	*Blink Time**

**The Blink Time should be in Seconds.Frames (e.g. 4.15) and can have a maximum value of 255 frames (8.15 max @ 29.97 and 30 fps; 10.15 max @ 23.976 and 24 fps; 10.05 max @ 25 fps).*

Example

Event	Data1	Data2
Blink	Output1	1.15

Blinks Output1 with a Blink Time of 1.15 (one second, fifteen frames). This means that if Output1 is currently "off", it will turn on for 1.15 and then off for 1.15 repeatedly until reset by another Discrete Control event.

➢ Pulse

Pulses an Output. If the Output is currently on, it will be turned off for the specified Pulse Length and then on again. If the Output is currently off, it will be turned on for the specified Pulse Length and then off again.

Event Syntax

Event	Data1	Data2
Pulse	*Name of Output*	*Pulse Length**

**The Pulse Length should be in Seconds.Frames (e.g. 4.15) and can have a maximum value of 255 frames (8.15 max @ 29.97 and 30 fps; 10.15 max @ 23.976 and 24 fps; 10.05 max @ 25 fps).*

Example

Event	Data1	Data2
Pulse	Output3	2.00

Pulses Output3 (assume it is currently "off") with a Pulse Length of 2.00 (two seconds). This means that Output3 will turn on for 2.00 and then off again.

➢ OutPort

Sets a group of eight Outputs to a single binary value (0-255). The lowest number Output becomes the Least Significant Bit (or LSB), the highest becomes the Most Significant Bit (or MSB).

Event Syntax

Event	Data1	Data2
OutPort	*Output Bank**	*Desired Literal Value (0-255)*

**Bank1 = Outputs 1-8; Bank2 = Outputs 9-16; Bank3 = Outputs 17-24; Bank4 = Outputs 25-32*

Example

Event	Data1	Data2
OutPort	Bank1	157

Sets output bank 1 (Outputs 1-8) to the binary representation of 157 (or **10011101**). After the **OutPort** event is executed, the following outputs are actuated:

1	2	3	4	5	6	7	8
✓		✓	✓	✓			✓

➢ InPort – *(New in version 6.36)*

Reads a group of eight inputs to a state variable. The lowest number input becomes the LSB, etc.

Event Syntax

Event	Data1	Data2
InPort	*Input Bank**	*Name of State Variable*

**Bank1 = Inputs 1-8; Bank2 = Inputs 9-16; Bank3 = Inputs 17-24; Bank4 = Inputs 25-32*

Example

Event	Data1	Data2
InPort	Bank1	Var7

Sets var7 to the value of input bank 1 (inputs 1-8). Assuming inputs of **10011101** (where 1 is on), after the **InPort** event is executed, Var7 will contain the value 157.

Logical Events

Logical Events utilize Flags and State Variables in a local or remote Show Controller.

To Do This…	Use This Event…
Turn on a flag	**On**
Turn off a flag	**Off**
Toggle the state of a flag	**Toggle**
Add a value to a State Variable	**AddVar**
Subtract a value from a State Variable	**SubVar**
Set the value of a State Variable	**SetVarEQ**
Save a State Variable to non-volatile memory	**SaveVar**
Recover a State Variable from non-volatile memory	**RestoreVar**

➢ On

Turns on a Flag. The Flag remains on until another event modifies its state.

Event Syntax

Event	Data1
On	*Name of Flag*

➢ Off

Turns off a Flag. The Flag remains off until another event modifies its state.

Event Syntax

Event	Data1
Off	*Name of Flag*

➢ Toggle

Toggles the state of a Flag. If the Flag is currently on, it will be turned off. If the Flag is currently off, it will be turned on.

Event Syntax

Event	Data1
Toggle	*Name of Flag*

➢ AddVar

Adds a value to a State Variable. This value can be a constant value (0-255) or another State Variable.

Event Syntax

Event	Data1	Data2
AddVar	*Name of State Variable*	*Constant value (0-255) <or> Name of another State Variable*

➢ SubVar

Subtracts a value from a State Variable. This value can be a constant value (0-255) or another State Variable.

Event Syntax

Event	Data1	Data2
SubVar	*Name of State Variable*	*Constant value (0-255) <or> Name of another State Variable*

➢ SetVarEQ

Sets the value of a State Variable to a constant value (0-255) or to the value of another State Variable.

Event Syntax

Event	Data1	Data2
SetVarEQ	*Name of State Variable*	*Constant value (0-255) <or> Name of another State Variable*

➢ SaveVar *– (New in version 6.35)*

Stores the value of a state variable in non-volatile memory so that it can be recovered, even after power cycling, using RestoreVar.

Event	Data1
SaveVar	*Name of State Variable*

➢ RestoreVar *– (New in version 6.35)*

Recovers the value of a state variable from non-volatile memory.

Event	Data1
RestoreVar	*Name of State Variable*

Program Control Events

Program Control Events can be used to control the flow of your show. Program Control Events include events for controlling Sequences in a local or remote Show Controller. Events are also included for performing conditional branching within a sequence based on State Variable values and/or Input/Output/Flag states.

To Do This…	Use This Event…
Start a Sequence	**Start**
Stop a Sequence	**Reset**
Pause a Sequence at the current event	**Stop**
Stop a looping Sequence after the last event	**Pause**
Unconditionally jump over events	**Goto**
Jump over events if an Input, Output, or Flag is "on"	**IfOn**
Jump over events if an Input, Output, or Flag is "off"	**IfOff**
Jump over events if a State Variable is equal to a constant value or the value of another State Variable	**IfVarEQ**
Jump over events if a State Variable is greater than a constant value or the value of another State Variable	**IfVarGT**
Jump over events if a State Variable is greater than or equal to a constant value or the value of another State Variable	**IfVarGE**
Jump over events if a State Variable is less than a constant value or the value of another State Variable	**IfVarLT**
Jump over events if a State Variable is less than or equal to a constant value or the value of another State Variable	**IfVarLE**
Jump over events if a State Variable is not equal to a constant value or the value of another State Variable	**IfVarNE**
Set a dummy placeholder for a branch event	**Nop**

➢ Start

Starts a sequence. If the sequence is not currently running and was never paused in the middle by a **Stop** event, the sequence will begin execution at the first event. If the sequence started *was* running and is now stopped by some other sequence, the sequence started will resume execution at the event. If the sequence started is currently running and the setup for the sequence has Restart Enabled, the sequence will stop event execution and restart execution from the first event. If the sequence started is currently running and does not have Restart Enabled, it will continue running as it was and the start event will be ignored.

Event Syntax

Event	Data1
Start	*Sequence Name*

➢ Stop

Stops a sequence at the current event. A Start event will cause the sequence to resume from the point at which it was stopped.

Event Syntax

Event	Data1
Stop	*Sequence Name*

➢ Pause

Causes a looping sequence to stop looping after the last event. If the sequence is restarted, it starts execution from the first event.

Event Syntax

Event	Data1
Pause	*Sequence Name*

➢ Reset

Stops a sequence immediately. If the sequence is restarted, it starts execution from the first event.

Event Syntax

Event	Data1
Reset	*Sequence Name*

➢ Goto

Unconditionally jumps over events. Only forward jumps are allowed.

Note A branch event causes no change in time within the sequence; all events occur based on time from sequence start.

Event Syntax

Label	Time	Event	Data1	Data2
	00:00.00	Goto	*Event Label*	
	00:00.00	Skipped	Events	
Event Label	00:00.00	*Some Event*		

Example

Label	Time	Event	Data1	Data2	Data3
	00:00.00	IfVarEQ	ShowVar	1	RunShow1
	00:00.00	IfVarEQ	ShowVar	2	RunShow2
	00:00.00	**Goto**	End		
RunShow1	00:00.00	Start	GoShow1		
	00:00.00	**Goto**	End		
RunShow2	00:00.00	Start	GoShow2		
End	00:00.00	Nop			

If ShowVar is not a valid number, the first Goto is reached and the sequence jumps to the end and performs no action. If ShowVar is equal to 1, "Show 1" is started, then the second Goto event causes the sequence to jump over the "Show 2" events.

➢ IfOn, IfOff

Conditionally jumps over events based on the state of an Input, Output, or Flag. Only forward jumps are allowed.

- **IfOn** -- Jumps over events if an Input, Output, or Flag is "on".
- **IfOff** -- Jumps over events if an Input, Output, or Flag is "off".

Note A branch event causes no change in time within the sequence; all events occur based on time from sequence start.

Event Syntax

Label	Time	Event	Data1	Data2
	00:00.00	*Event Name*	*Name of Input, Output, or Flag*	*Event Label*
	00:00.00	Skipped	Events	
Event Label	00:00.00	*Some Event*		

Example

Label	Time	Event	Data1	Data2
	00:00.00	**IfOn**	NightModeFlag	End
	00:00.00	Play	Ldp1	
End	00:00.00	Nop		

The Play event is skipped if the system is in Night Mode.

➢ IfVarEQ, IfVarNE, IfVarGT, IfVarGE, IfVarLE, IfVarLT

Conditionally jumps over a group of events based on the value of a State Variable.

- **IfVarEQ** -- Jumps over events if the value of a State Variable is equal to a constant value (0-255) or the value of another State Variable.
- **IfVarNE** -- Jumps over events if the value of a State Variable is not equal to a constant value (0-255) or the value of another State Variable.
- **IfVarGT** -- Jumps over events if the value of a State Variable is greater than a constant value (0-255) or the value of another State Variable.
- **IfVarGE** -- Jumps over events if the value of a State Variable is greater than or equal to a constant value (0-255) or the value of another State Variable.
- **IfVarLE** -- Jumps over events if the value of a State Variable is less than or equal to a constant value (0-255) or the value of another State Variable.
- **IfVarLT** -- Jumps over events if the value of a State Variable is less than equal to a constant value (0-255) or the value of another State Variable.

Event Syntax

Label	Time	Event	Data1	Data2	Data3
	00:00.00	*Event Name*	*State Variable*	*Constant value (0-255) <or> another State Variable*	*Event Label*
	00:00.00	Skipped	Events		
Event Label	00:00.00	SomeEvent			

Example #1

Label	Time	Event	Data1	Data2	Data3
	00:00.00	**IfVarGE**	ShowVar	5	End
	00:00.00	Play	Ldp1		
End	00:00.00	Nop			

The Play event is skipped if ShowVar ≥ 5.

Example #2

Label	Time	Event	Data1	Data2	Data3
	00:00.00	AddVar	ShowVar	1	
	00:00.00	**IfVarLE**	ShowVar	100	End
	00:00.00	SetVarEQ	ShowVar	0	
End	00:00.00	Nop			

This sequence adds one to ShowVar and then sets it back to 0 if it greater than 100.

➢ Nop

Used as a branch placeholder. "Nop" stands for "No Operation".

Event Syntax

Event	Data1
Nop	

Example

Label	Time	Event	Data1	Data2	Data3
	00:00.00	IfVarEQ	ShowVar	5	End
	00:00.00	Play	Ldp1		
End	00:00.00	**Nop**			

LCD Display Events

LCD Display Events display custom text messages as well as Flag and Variable states on the LCD.

To Do This…	Use This Event…
Display a custom message on the LCD	**Display**
Store the currently displayed LCD message	**StoreLCD**
Retrieve and display a previously stored LCD message	**RecoverLCD**
Display the state of a group of flags on the LCD	**ShowFlags**
Display the value of a State Variable on the LCD	**ShowVar**

➢ Display

Displays a custom message on the LCD Display.

Note When using the **Display** event as an External Event, the LCD message must reside in the local Show Controller.

Event Syntax

Event	Data1
Display	*Name of LCD String <or> Literal Message**

Tip For more information on entering LCD Strings and special syntax for displaying State Variable values and positioning text within the LCD, see Chapter 4, pages 6-7.

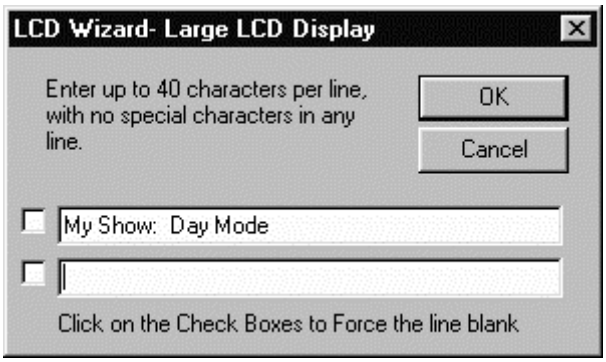
Example #1

Event	Data1
Display	DayModeMsg

Displays:

```
My Show: Day Mode
```

If DayModeMsg is:



Example #2

Event	Data1
Display	"My Show: Night Mode ",h0D," "

Displays:

```
My Show: Night Mode
```


➢ StoreLCD

Stores both lines of text currently displayed on the LCD. Text may be recovered at any time by using RecoverLCD.

Event Syntax

Event	Data1
StoreLCD	

➢ RecoverLCD

Re-displays both lines of text previously stored by StoreLCD. If no text was previously stored, the Show Controller version number is displayed.

Event Syntax

Event	Data1
RecoverLCD	

➢ ShowFlags

Displays the status of one bank of flags on the LCD Display.

Event Syntax

Event	Data1
ShowFlags	*Flag Bank**

** Bank1 = Flags 1-16; Bank2 = Flags 17-32*

Example

Event	Data1
ShowFlags	Bank1

Displays:

```
 Flag Bank # 1
1001011000011110
```

If these flags are "on":

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
✓			✓		✓	✓					✓	✓	✓	✓	

➢ ShowVar

Displays the value of a State Variable on the LCD Display.

Event Syntax

Event	Data1
ShowVar	*Name of State Variable*

Example

Event	Data1
ShowVar	MainShowVar

Displays:

```
State Variable #
     1 = 125
```

If the index number of MainShowVar is **1**, and the current value is **125**.

Built-In Serial Events

Built-In Serial Events send a custom message or a specially formatted value of a State Variable out a Serial Port.

To Do This…	Use This Event…
Send a custom serial message out a port	**MessageOut**
Send the value of a State Variable formatted as an ASCII Decimal out a port	**SendAsciiDec**
Send the value of a State Variable formatted as an ASCII Hexadecimal out a port	**SendAsciiHex**
Send the value of a State Variable formatted as an ASCII Octal out a port	**SendAsciiOct**
Send the value of a State Variable out a port as one binary byte	**SendVar**
Set the value of a State Variable in another Show Controller equal to the value of a local State Variable	**PutVar**
Ramp a DMX Channel	**DMXRamp**
Generate a Break level on a serial port	**Break**

➢ MessageOut

Sends a custom serial message out one of the serial ports. The message is sent in the protocol defined for that port, but the Show Controller will not wait for an ACK or other response.

Important Extra bytes may be added by the Show Controller to the front and/or rear of the message depending on the protocol selected for that port.

Event Syntax

Event	Data1	Data2
MessageOut	*Name of Port*	*Name of Data String or Literal Message**

**See "Entering Data Strings" in Section 4-8.*

Example #1

Event	Data1	Data2
MessageOut	Port3	DataMsg

Sends:
```
h4C h56 h00 h0D
```
If DataMsg is:
```
h4C h56 h00 h0D
```

Example #2

Event	Data1	Data2
MessageOut	Port3	h4C h56 h00 h0D

Sends:
```
h4C h56 h00 h0D
```

➢ MessageOutVar

MessageOutVar functions just like MessageOut only it has the ability to send variable values within the custom message. This operates the same way as displaying variables with LCD Strings, only with a few minor differences. Simply precede the variable index with an hF3 for an ASCII Value, hF4 for a right justified value with leading zeros, or hF5 for a Binary byte value. In instances where you want to send the actual values hF3, hF4, or hF5 simply double them as in example #4.

Example #1 – ASCII Value

Event	Data1	Data2
MessageOutVar	Port3	"Executed " hF3 h01 " times" h0D

(Where “4” is the current value of Var1)

Sends (ASCII) :
```
"Executed 4 times" h0D
```

Example #2 – Leading Zeros

Event	Data1	Data2
MessageOut	Port3	"Executed " hF4 h01 " times" h0D

(Where “21” is the current value of Var1)

Sends (ASCII) :
```
"Executed 021 times" h0D
```

Example #3 – Byte Value

Event	Data1	Data2
MessageOut	Port3	h49 hF5 h01

(Where “37” is the current decimal value of Var1)

Sends:
```
h49 h25
```

Example #4 – Actual Value

Event	Data1	Data2
MessageOut	Port3	h04 hF3 hF3 h80 h0D

Sends:
```
h04 hF3 h80 h0D
```

Important: This feature can be extremely useful for writing protocol files that you want to send variable values. If the "Supported" field in the command you create is at least 6.40 Winscript will automatically implement this new feature. See the **User-Defined Serial Protocols** section for more details.

➢ SendAsciiDec, SendAsciiHex, SendAsciiOct

Sends an ASCII formatted State Variable out a serial port. The output data can also be formatted to include leading zeros or spaces (either leading or trailing) by inserting an optional formatting code in the **Data3** column.

- **SendAsciiDec** -- Sends the value of a State Variable formatted as an ASCII Decimal ("000"-"255"). For example, if the State Variable holds the Decimal value *23*, the Show Controller will send 'h32 h33' (or "23") out the port. **SendAsciiDec** sends a maximum of three characters.
- **SendAsciiHex** -- Sends a State Variable out a serial port formatted as an ASCII Hexadecimal ("00"-"FF"). For example, if the State Variable holds the Hexadecimal value *A5*, the Show Controller will send 'h41 h35' (or "A5") out the port. **SendAsciiHex** sends a maximum of two characters.
- **SendAsciiOct** -- Sends a State Variable out a serial port formatted as an ASCII Octal ("000"-"377"). For example, if the State Variable holds the Octal value *13*, the Show Controller will send 'h31 h33' (or "13") out the port. **SendAsciiOct** sends a maximum of two characters.

Event Syntax

Event	Data1	Data2	Data3
Event Name	*Name of Port*	*Name of State Variable*	*Optional Formatting Code**

**LZ = Leading Zeros; LS = Leading Spaces; TS = Trailing Spaces*

Example #1

Event	Data1	Data2	Data3
SendAsciiDec	Port3	ShowVar	

Sends:
```
h31 h32 h33
```

If the value of ShowVar is decimal 123.

Example #2

Event	Data1	Data2	Data3
SendAsciiHex	Port3	ShowVar	LZ

Sends:
`h30 h44`

If the value of ShowVar is h0D.

Example #3

Event	Data1	Data2	Data3
SendAsciiOct	Port3	ShowVar	TS

Sends:
`h31 h33 h20`

If the value of ShowVar is octal 13.

➢ SendVar

Sends the value of a State Variable out a serial port as one binary byte.

Event Syntax

Event	Data1	Data2
SendVar	*Name of Port*	*Name of State Variable*

Example

Event	Data1	Data2
SendVar	Port3	ShowVar

Sends:
`h31`

If the value of ShowVar is decimal 49.

➢ PutVar

Sets the value of a State Variable in another Show Controller equal to the value of a local State Variable.

Event Syntax

Event	Data1	Data2	Data3	Data4
PutVar	*Name of Port*	*Unit Address of Remote Show Controller*	*Name of Remote State Variable**	*Name of Local State Variable*

** To address a remote Show Controller resource by its name, configure the port using AMI Product Wizard.*

Example

Event	Data1	Data2	Data3
PutVar	Port3	ShowVar	SlaveShowVar

Sets "SlaveShowVar", located in a remote Show Controller connected to Port3, equal to the value of "ShowVar", a local State Variable.

➢ DMXRamp

Sets a DMX dimmer to a given value over a given period of time.

Event Syntax

Event	Data1	Data2	Data3
DMXRamp	*Channel Number (1-512)*	*Final Value**	*Optional Ramp Duration***

**Final Value can be in Percent (0% - 100%), Decimal (0 - 255) or Hex (h00 - hFF).*

***The Ramp Duration should be in Minutes:Seconds.Frames (e.g. 03:04.15) and can have a maximum value of 65535 frames (36:26.20 max @ 29.97 and 30 fps; 45:30.15 max @ 23.976 and 24 fps; 43:41.10 max @ 25 fps). If no ramp duration is entered, the channel is immediately set to the final value.*

Example

Event	Data1	Data2	Data3
DMXRamp	250	35%	02:06.15

Ramps DMX channel 250 to 35% brightness over a period of two minutes, six seconds, and fifteen frames.

➢ Break – *(New in version 6.35)*

Sends a Break on the specified serial port. Break is not “queued”, so wait until all previous data has finished transmitting before it is issued. Special warning: Since frame 0 and 1 of a sequence are really the same, and since serial messages are synchronized using a one frame delay, if you put a Msgout at frame 0 and a Break at frame 1, the break will actually occur first! A standard SMPTE break is 17-21 bits at the current data rate. At 38.4K baud this corresponds to a Data2 value of 2. For 9600 baud use a value of 8.

Event Syntax

Event	Data1	Data2	Data3	Data4
Break	*Name of Port*	*Duration of break in multiples of 250 usec*		

MIDI Events

MIDI Events send standard MIDI control messages out a MIDI port (or any other port configured for the MIDI protocol).

To Do This…	Use This Event…
Send a MIDI "Note On" message out a port	**NoteOn**
Send a MIDI "Note Off" message out a port	**NoteOn**
Send a MIDI "Program Change" message out a port	**ProgramChange**
Send a MIDI "Control Change" message out a port	**ControlChange**

➢ NoteOn

Sends a MIDI "Note On" message out a MIDI port (or any serial port configured for the MIDI protocol). To turn off a MIDI note, set the Note Velocity to 0.

Event Syntax

Event	Data1	Data2	Data3	Data4
NoteOn	*Port Name*	*Channel Number (1-16)*	*Note Number (0-127)*	*Note Velocity (0-127)**

**A Note Velocity of 0 is equivalent to a "Note Off".*

➢ ControlChange

Sends a MIDI "Control Change" message out a serial port.

Event Syntax

Event	Data1	Data2	Data3	Data4
ControlChange	*Port Name*	*Channel Number (1-16)*	*Control Change Value (0-127)*	*Controller Number (0-127)*

➢ ProgramChange

Sends a MIDI "Program Change" message out a serial port.

Event Syntax

Event	Data1	Data2	Data3
ProgramChange	*Port Name*	*Channel Number (1-16)*	*Program Change Value (0-127)*

SMPTE Serial Events

SMPTE events control SMPTE timecode in an Alcorn McBride SMPTE Machine or Digital Binloop.

Note To use SMPTE Events, you will need to manually configure the protocol of the port to **Alcorn McBride SMPTE Machine** or **Alcorn McBride Digital Binloop**.

To Do This…	Use This Event…
Set the current SMPTE time in an Alcorn McBride SMPTE Machine or Digital Binloop	**SetSMPTETime**
Start Reading/Generating SMPTE in an Alcorn McBride SMPTE Machine or Digital Binloop	**EnableSMPTE**
Stop Reading/Generating SMPTE in an Alcorn McBride SMPTE Machine or Digital Binloop	**DisableSMPTE**
Pause SMPTE generation at the current frame in an Alcorn McBride SMPTE Machine or Digital Binloop	**PauseSMPTE**

➢ SetSMPTETime

Sets the current SMPTE time to a new value. If currently generating SMPTE, the time will immediately jump to the new value, otherwise a subsequent EnableSMPTE event will start SMPTE generation from the new time. If the SMPTE Machine or Digital Binloop is configured to read SMPTE, the event is ignored.

Event Syntax

Event	Data1	Data2
SetSMPTETime	*Name of Port connected to SMPTE Machine or Digital Binloop*	*Time to Generate From**

**Time to Generate From should be in HH:MM:SS.FF, with leading zeros (e.g. 04:23:35.15).*

Example

Event	Data1	Data2
SetSMPTETime	SMPTEPort	12:23:00.00

Sets current SMPTE time to 12:23:00.00

➢ EnableSMPTE

Starts SMPTE reading/generation. Generation begins from the current SMPTE time in the SMPTE Machine. If the SMPTE Machine is already generating or reading SMPTE, the event is ignored.

Event Syntax

Event	Data1
EnableSMPTE	*Name of Port connected to SMPTE Machine or Digital Binloop*

➢ DisableSMPTE

Stops SMPTE reading/generation. If SMPTE is already stopped, the event is ignored.

Event Syntax

Event	Data1
DisableSMPTE	*Name of Port connected to SMPTE Machine or Digital Binloop*

➢ PauseSMPTE

Pauses SMPTE generation at the next loop point. A subsequent EnableSMPTE event will resume SMPTE from the start frame.

Event Syntax

Event	Data1
PauseSMPTE	*Name of Port connected to SMPTE Machine or Digital Binloop*

➢ IdleSMPTE

Freezes SMPTE generation at the current frame. A subsequent EnableSMPTE event restarts generation from the start frame.

Event Syntax

Event	Data1
IdleSMPTE	*Name of Port connected to SMPTE Machine or Digital Binloop*

Disc Player Serial Events

Disc Player events control video playback, searches, stills, and Spinup / Spindown in many common Disc players. Specific Disc players may support additional events, so consult the PCL file of your specific player for more information.

Note To use Disc Player Events, you will need to configure the protocol of the port to a Disc player.

To Do This…	Use This Event…
Spinup a Disc Player	**Spinup**
Spindown a Disc Player	**Spindown**
Search the Disc to a frame	**Search**
Play a Disc from the current position	**Play**
Pause the Disc at the current position	**Still**

➢ Spinup

Spins up the Disc and searches to the first frame.

Event Syntax

Event	Data1	Data2
Spinup	*Name of Port connected to Disc Player*	

➢ Spindown

Spins down the Disc and places the player in park.

Event Syntax

Event	Data1	Data2
Spindown	*Name of Port connected to Disc Player*	

➢ Search

Searches the Disc to the desired frame.

Event Syntax

Event	Data1	Data2
Search	*Name of Port connected to Disc Player*	*Desired frame number*

Example

Event	Data1	Data2
Search	Ldp1	1200

Searches the Disc in Ldp1 to frame 1200.

➢ Play

Plays the Disc from the current position.

Event Syntax

Event	Data1	Data2
Play	*Name of Port connected to Disc Player*	

➢ Still

Pauses the Disc at the current position.

Event Syntax

Event	Data1	Data2
Still	*Name of Port connected to Disc Player*	

LightCue Serial Events

LightCue events control DMX recording, cue selection, and playback in an Alcorn McBride LightCue. For more information about these and other functions of the LightCue, please consult the LightCue User's Guide.

Note To use LightCue Events, you will need to configure the protocol of the port to **Alcorn McBride LightCue**.

To Do This…	Use This Event…
Select a cue	**SelectCue**
Play the currently selected cue	**Play**
Play and loop the currently selected cue	**PlayAndLoop**
Begin recording DMX to a cue	**Record**
Play the currently selected cue, jam-syncing to SMPTE	**ChasePlay**
Map DMX input to DMX output, without recording	**FeedThrough**
Pile-on additional cues to the current cue	**PileOn**
Pile-on additional cues to the current cue and loop	**PileOnAndLoop**
Clear a cue in a currently playing pile-on	**ClearCue**
Still the currently playing cue at the current look	**Still**
Stop all currently playing cues and hold the last look	**Reset**

➢ SelectCue

Selects which cue should be played when a **Play** command is received.

Event Syntax

Event	Data1	Data2
SelectCue	*Name of Port connected to LightCue*	*Cue Number (1-511)*

➢ Play

Plays the currently selected cue. If a crossfade time is entered into **Data2**, the current look will crossfade into the currently selected cue during the specified crossfade time. If no cue is currently selected, an optional cue number may be placed in **Data2**, with a corresponding crossfade time placed in **Data3**. If there is no currently selected cue and **Data2** does not contain a valid cue number, cue #1 is played immediately without a crossfade.

Event Syntax

Event	Data1	Data2	Data3
Play	*Name of Port connected to LightCue*	*Optional Cue Number <or> Crossfade Time**	*Crossfade Time**

** Crossfade Time should be in HH:MM:SS.FF, with leading zeros (e.g. 04:23:35.15).*

➢ Play

Plays and loops the currently selected cue. If a crossfade time is entered into **Data2**, the current look will crossfade into the currently selected cue during the specified crossfade time. If no cue is currently selected, an optional cue number may be placed in **Data2**, with a corresponding crossfade time placed in **Data3**. If there is no currently selected cue and **Data2** does not contain a valid cue number, cue #1 is played immediately without a crossfade.

Event Syntax

Event	Data1	Data2	Data3
PlayAndLoop	*Name of Port connected to LightCue*	*Optional Cue Number <or> Crossfade Time**	*Crossfade Time**

** Crossfade Time should be in HH:MM:SS.FF, with leading zeros (e.g. 04:23:35.15).*

➢ PlayAndLoop

Plays and loops the currently selected cue. If a crossfade time is entered into **Data2** , the current look will crossfade into the currently selected cue during the specified crossfade time. If no cue is currently selected, an optional cue number may be placed in **Data2** , with a corresponding crossfade time placed in **Data3** . If there is no currently selected cue and **Data2** does not contain a valid cue number, cue #1 is played immediately without a crossfade. When the cue has finished playing, it loops back to the beginning.

Event Syntax

Event	Data1	Data2	Data3
PlayAndLoop	Name of Port connected to LightCue	*Optional Cue Number <or> Crossfade Time**	*Crossfade Time**

➢ Record

Begins recording a valid incoming DMX stream to the specified cue.

Event Syntax

Event	Data1	Data2
Record	*Name of Port connected to LightCue*	*Cue Number*

➢ ChasePlay

Plays a cue, jam-synced to SMPTE. If a chase offset is entered into **Data2**, and a crossfade time is entered into **Data3**, the current look will crossfade into the currently selected cue during the specified crossfade time - when the incoming SMPTE timecode reaches the specified chase offset. This effectively overrides the SMPTE start trigger embedded into a cue number when it is recorded. If no cue is currently selected, an optional cue number may be placed in **Data2**, with a corresponding chase offset placed in **Data3**, and a corresponding crossfade time placed in **Data4**. If there is no currently selected cue and **Data2** does not contain a valid cue number or chase offset, cue #1 is selected for SMPTE-triggered playback without a crossfade.

Event Syntax

Event	Data1	Data2	Data3	Data4
ChasePlay	*Name of Port connected to LightCue*	*Optional Cue Number <or> Chase Offset HH:MM:SS.FF**	*Chase Offset HH:MM:SS.FF* <or> Crossfade Time HH:MM:SS.FF**	*No Parameter < or> Crossfade Time HH:MM:SS.FF**

** Crossfade Time and Chase Offset should be in HH:MM:SS.FF, with leading zeros (e.g. 04:23:35.15).*

➢ FeedThrough

Patches the DMX Input to the DMX Output, without recording to a cue.

Event Syntax

Event	Data1	Data2
FeedThrough	*Name of Port connected to LightCue*	

➢ PileOn

Causes the LightCue to play a new cue simultaneously with other currently playing cues. Up to 6 cues may be piled-on at one time. Each of the 512 channel values of each cue that is playing is compared against the corresponding channel in the other playing cues, and the highest value is output. A separate PileOn event is needed for each cue. Cues may be removed from a pile-on by using the ClearCue event.

Event Syntax

Event	Data1	Data2
PileOn	*Name of Port connected to LightCue*	*Cue Number*

➢ PileOnAndLoop

Causes the LightCue to play a new cue simultaneously with other currently playing cues. Up to 6 cues may be piled-on at one time. Each of the 512 channel values of each cue that is playing is compared against the corresponding channel in the other playing cues, and the highest value is output. A separate PileOn event is needed for each cue. Cues may be removed from a pile-on by using the ClearCue event. As each cue ends, it is individually looped back to the beginning.

Event Syntax

Event	Data1	Data2
PileOnAndLoop	*Name of Port connected to LightCue*	*Cue Number*

➢ ClearCue

Clears a cue from a currently playing pile-on.

Event Syntax

Event	Data1	Data2
ClearCue	*Name of Port connected to LightCue*	*Cue Number*

➢ Still

Stills playback at the current look. A subsequent **Play** command will restart playback from the current look.

Event Syntax

Event	Data1	Data2
Still	*Name of Port connected to LightCue*	

➢ Reset

Stops playback, holding the current look.

Event Syntax

Event	Data1	Data2
Reset	*Name of Port connected to LightCue*	

Digital Video Machine Serial Events

Digital Video Machine events control video playback and clip/drive selection in an Alcorn McBride Digital Video Machine. For more information about these and other functions of the Digital Video Machine, please consult the Digital Video Machine User's Guide.

Note To use Digital Video Machine Events, you will need to configure the protocol of the port to **Alcorn McBride Digital Video Machine**.

To Do This…	Use This Event…
Select a clip	**SelectClip**
Select the Internal/Removable drive for playback	**SelectDrive**
Play the currently selected clip	**Play**
Play and loop the currently selected clip	**PlayAndLoop**
Still video playback at the current position	**Still**

➢ SelectClip

Selects which clip should be played when a **Play** command is received.

Event Syntax

Event	Data1	Data2
SelectClip	*Name of Port connected to Digital Video Machine*	*Clip Number (1-511)*

➢ SelectDrive

Selects which drive should play back the currently selected clip when a **Play** command is received.

Event Syntax

Event	Data1	Data2
SelectDrive	*Name of Port connected to Digital Video Machine*	Internal <*or*> Removable

➢ Play

Plays the currently selected clip (or any other clip) from the currently selected drive. If no clip is currently selected and **Data3** does not contain a valid clip number, the first clip on the currently selected drive is played.

Event Syntax

Event	Data1	Data2
Play	*Name of Port connected to Digital Video Machine*	*Optional Clip Number*

➢ PlayAndLoop

Plays the currently selected clip (or any other clip) from the currently selected drive. When the clip has finished playing, it is restarted. If no clip is currently selected and **Data3** does not contain a valid clip number, the first clip on the currently selected drive is played and looped.

Event Syntax

Event	Data1	Data2
PlayAndLoop	*Name of Port connected to Digital Video Machine*	*Optional Clip Number*

➢ Still

Stills playback at the current position. A subsequent **Play** command will restart playback from the current position.

Event Syntax

Event	Data1	Data2
Still	*Name of Port connected to Digital Video Machine*	

Digital Binloop Serial Events

Digital Binloop events control audio/video playback in an Alcorn McBride Digital Binloop (SMPTE generate/read events for the Digital Binloop are discussed in the SMPTE Serial Events section, earlier in this reference). Some versions of the Digital Binloop support additional events. For more information about these and other functions of the Digital Binloop, please consult the Digital Binloop User's Guide.

Note To use Digital Binloop Events, you will need to configure the protocol of the port to **Alcorn McBride Digital Binloop**.

To Do This…	Use This Event…
Play a sound/video clip from a reproducer or group of reproducers	**Play**
Play and loop a sound/video clip from a reproducer or group of reproducers	**PlayAndLoop**
Pause audio/video playback from a reproducer or group of reproducers	**Pause**
Mute audio playback from a reproducer or group of reproducers	**Mute**
Play a SMPTE or Video-synchronized sound/video clip from a reproducer or group of reproducers	**SPlay**
Play and loop a SMPTE or Video-synchronized sound/video clip from a reproducer or group of reproducers	**SPlayAndLoop**
Un-Mute audio playback from a reproducer or group of reproducers	**UnMute**

➢ Play

Plays a sound or video clip from a reproducer or group of reproducers.

Event Syntax

Event	Data1	Data2	Data3	Data4
Play	*Name of Port connected to Digital Binloop*	*Reproducer Number (R1-R16)* <*or*> *Group Number (G1-G13)* <*or*> "All"	"Primary" *socket* <*or*> "Secondary" *socket* <*or*> "Consecutive" *sockets*	*Sound/Video Clip Number (1-511)*

Example

Event	Data1	Data2	Data3	Data4
Play	Binloop1	R2	Primary	10

Plays clip 10 from Reproducer 2, Primary Socket.

➢ PlayAndLoop

Plays a sound or video clip from a reproducer or group of reproducers. When the clip has finished playing, it is restarted.

Event Syntax

Event	Data1	Data2	Data3	Data4
PlayAndLoop	*Name of Port connected to Digital Binloop*	*Reproducer Number (R1-R16) <or> Group Number (G1-G13) <or>* "All"	"Primary" *socket <or>* "Secondary" *socket <or>* "Consecutive" *sockets*	*Sound/Video Clip Number (1-511)*

Example

Event	Data1	Data2	Data3	Data4
PlayAndLoop	Binloop1	All	Consecutive	5

Plays and loops clip 5 from all Reproducers, first from Primary then Secondary sockets.

➢ Pause

Pauses audio/video playback at the current position. A subsequent **Play** command will restart playback from the current position.

Event Syntax

Event	Data1	Data2
Pause	*Name of Port connected to Digital Binloop*	*Reproducer Number (R1-R16) <or> Group Number (G1-G13) <or>* "All"

Example

Event	Data1	Data2	Data3	Data4
Pause	Binloop1	G3		

Pauses all Reproducers in Group 3.

➢ Mute

Mutes audio playback from a reproducer or group of reproducers.

Event Syntax

Event	Data1	Data2
Mute	*Name of Port connected to Digital Binloop*	*Reproducer Number (R1-R16) <or> Group Number (G1-G13) <or>* "All"

➢ UnMute

Un-Mutes audio playback from a reproducer or group of reproducers.

Event Syntax

Event	Data1	Data2
UnMute	*Name of Port connected to Digital Binloop*	*Reproducer Number (R1-R16) <or> Group Number (G1-G13) <or>* "All"

➢ SPlay

Plays a sound or video clip from a reproducer or group of reproducers. Audio playback is frame-synchronized a SMPTE or Composite Video Sync signal.

Event Syntax

Event	Data1	Data2	Data3	Data4
SPlay	*Name of Port connected to Digital Binloop*	*Reproducer Number (R1-R16) <or> Group Number (G1-G13) <or>* "All"	"Primary" *socket <or>* "Secondary" *socket <or>* "Consecutive" *sockets*	*Sound/Video Clip Number (1-511)*

Example

Event	Data1	Data2	Data3	Data4
SPlay	Binloop1	R2	Primary	10

Plays clip 10 from Reproducer 2, Primary Socket synchronized to Video Sync or SMPTE.

➢ SPlayAndLoop

Plays a sound or video clip from a reproducer or group of reproducers. When the clip has finished playing, it is restarted. Audio playback is frame-synchronized a SMPTE signal.

Event Syntax

Event	Data1	Data2	Data3	Data4
SPlayAndLoop	*Name of Port connected to Digital Binloop*	*Reproducer Number (R1-R16)* <or> *Group Number (G1-G13)* <or> "All"	"Primary" *socket* <or> "Secondary" *socket* <or> "Consecutive" *sockets*	*Sound/Video Clip Number (1-511)*

Other Serial Device Events

WinScript supports almost any serial device automatically by using a Protocol (or PCL) file. PCL files contain all the information WinScript needs to create device-specific events that send command messages to the external device. When you configure a port for a device's protocol, WinScript loads the PCL file and adds the new events to Event Wizard.

WinScript ships with a standard group of PCL files (including the SMPTE, LaserDisc, Digital Video Machine, and Digital Binloop PCL files described in the above sections) that support many common devices. You can use these PCL files as is, customize them, or create your own (for more information, see *Appendix A*). As always, you can download new or updated PCL files from our home page (www.alcorn.com).

For an up-to-date list of all PCL files currently installed on your PC (and individual listings of all their events and parameters), choose **Tools | Protocol Editor** from the WinScript main menu.

Advanced WinScript Programming

In this section, one of our experienced show programmers takes you through several common techniques for efficiently scripting a complex show by combining Show Controller resources and clever algorithms. You'll find such tips as:

- Synchronized video playback from multiple sources.
- Extending the life span of show equipment by using Day and Night Modes.
- Creating "randomized" sequences
- Creating a real-time clock.
- Tight control of show elements.

Introduction

This section is designed to illustrate some advanced techniques of script programming that we have come to rely upon as the most robust and straightforward way of utilizing our equipment in shows.

Terms Used

The term “PC or Program Counter” is used to refer to the current event that each sequence is on. If it is at the top of the sequence, it means that the PC is pointing to the first event. It could be anywhere between the top of the sequence and the last event. The PC advances every time the event it is pointing to has event time equal to (or prior to) the TC, described below. At that time, it executes the event. The PC can only move forward in the sequence. It will automatically move to the next event when the last is completed, or it can jump forward.

The term “TC or Time Counter” is used to refer to the current time in frames that each sequence is at. The TC always starts at zero when the PC is at the top of the sequence, meaning that the time is 00:00.00 when each sequence begins running. The TC increments one frame every time the Show Controller advances one frame, and does not change based upon the time any event is set to. Any time that the TC encounters an event that has a time less than or equal to it, the event is executed on that frame. The TC always moves forward, and does so as long as the sequence is running. If the event being executed is an external serial command that takes longer than one frame to execute, the TC continues to move forward during that time.

Although these techniques apply to all Alcorn McBride Show Controllers, most of these examples assume that the controller is a V16+, unless indicated otherwise.

Finally, even though all of the examples in this section are written for WinScript, the scripting strategy involved is exactly the same for DOS Script. Most users should be able to reformat these examples for use in any version of DOS Script or WinScript.

Get Control of Your Sequences

When scripting a show, the show normally flows from beginning to end in a straightforward manner, chronologically. However, there are times when the normal show flow is halted abruptly, and changed to some other condition. If the change is not handled properly, two problems could occur. The first is when things start happening when they're not supposed to, and the second when things won't happen when they're supposed to.

When things happen on their own, it's usually because sequences are running that you didn't know were running. I often get phone calls from people who say "My show ran fine all day long, but when I put it in Night Mode it started running again all by itself 20 minutes later".

When things don't happen when they're supposed to, it's usually because the sequence you're trying to run is already running. If Restart is not enabled in the setup for that sequence, it won't run if it's already running. I will hear "My show is supposed to loop over and over again. It runs fine the first time, but won't loop and run again."

The solution to both problems is to make sure all sequences that could be running are reset when the abrupt change occurs. This is especially important for looping sequences, which never stop running until they are reset. What I do for an absolute guarantee is to have a ResetAllSequences sequence that resets all sequences (except the one that calls ResetAllSequences of course). Sometimes I will not reset tiny sequences that are short in time, and don't run other sequences, but this can be attributed to laziness. Here is an example of ResetAllSequences:

ResetAllSequences

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Reset	DayMode			
	00:00.00	Reset	NightMode			
	00:00.00	Reset	WaitLdps			
	00:00.00	Reset	StartShow			
	00:00.00	Reset	PreShow			
	00:00.00	Reset	MainShow			
	00:00.00	Reset	PostShow			
	00:00.00	Reset	Maintenance			

After calling ResetAllSequences, it is a good idea to wait a few frames before doing anything else, to give all events that were running in those sequences time to settle, especially serial commands to external devices like players. This is shown in the following sequence, AbruptHaltToShow:

AbruptHaltToShow

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Start	ResetAllSequences			
	00:00.02	Still	dvm1			
	00:00.02	Still	dvm2			
	00:00.02	Still	dvm3			

Day and Night Mode

Most shows that only run during a portion of the day should have a Day and Night mode of operation. There is no reason to have audio, video, lighting effects, etc. playing all night long. It can reduce the life of the equipment, be very annoying, and even be potentially hazardous if there is no operator supervision.

The best approach for a show that doesn't have some other computer to tell the Show Controller when to go to Daymode or Nightmode is to have a button perform the function. It is better to have one button toggle between Daymode and Nightmode than to have two buttons because you can potentially confuse the Show Controller if the two buttons are pushed near the same time, unless you go to great programming lengths to prevent it. Here are some sequences that explain how to use one button for both Daymode and Nightmode:

SelectDayorNightMode

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Start	ResetAllSequences			
	00:00.02	IfOff	GoingDayFlag	GoDay		
GoNight	00:00.02	Start	NightMode			Go to Sleep
	00:00.02	Goto	End			
GoDay	00:00.02	Start	DayMode			Wake Up
End	00:00.02	Toggle	GoingDayFlag			Flip Flag

DayMode

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Display	GoingToDayModeMsg			
	00:00.00	Start	Spinupdvm1			
	00:00.00	Start	Spinupdvm2			
	00:00.00	Start	Spinupdvm3			
	00:00.00	Start	TurnLightsOn			
	00:00.00	Start	GoBGM			
	00:00.00	Display	AtDayModeMsg			

NightMode

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Display	GoingToNightModeMsg			
	00:00.00	Start	Spindowndvm1			
	00:00.00	Start	Spindowndvm2			
	00:00.00	Start	Spindowndvm3			
	00:00.00	Start	TurnLightsOff			
	00:00.00	Start	OffBGM			
	00:00.00	Display	AtNightModeMsg			

Synchronized Scripting

More often than not, our Show Controllers interface to multiple digital video players at one time. When these players are commanded to play unsynchronized, there is little concern with timing. Here is an example of two unsynchronized video players.

AutoExec *(Autostart Enabled)*

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Search	Dvm1	1		
	00:00.00	Search	Dvm2	2		
	00:00.00	Start	LeftKiosk			
	00:00.00	Start	RightKiosk			

LeftKiosk *(Looping Enabled)*

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Play	dvm1			Presentation On Chess
	02:05.12	Search	dvm1	1		Loop Presentation

RightKiosk *(Looping Enabled)*

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Play	dvm2			Presentation on Checkers
	01:34.25	Search	dvm2	2		Loop Presentation

Synchronized Video Playback

When Digital Video Machines are asked to output video and audio together, it is important that they are commanded to play simultaneously in order to achieve frame-to-frame synchronization of audio and video.

The following sequence causes the second player to play after the first, which causes unsynchronized playback. Even though the **Play** events happen on the same frame, the first **Play** event may take a frame or two for the Show Controller to send out the serial play message. The DVM2 will begin playing, return an Acknowledge, and only then can the second Play event begin to occur, throwing the sync out the window.

UnSynchronized

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Play	dvm1			
	00:00.00	Play	dvm2			

The following sequences show the correct way to script this. The serial messages will go out both ports simultaneously, and the players will begin playing in synchronization.

Synchronized

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Start	PlayDVM1			
	00:00.00	Start	PlayDVM2			

PlayDVM1

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Play	dvm1			

PlayDVM2

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Play	dvm2			

Synchronized Searching

Although synchronized playback is the only *required* element in order for the show to perform correctly, synchronized searching is almost always required. Unsynchronized searching in most show scenarios takes too long. It is much better for the players to begin and end searching at about the same time. Here is an example of unsynchronized searching.

Unsynchronized

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Search	Dvm1	1		
	00:00.00	Search	Dvm2	2		
	00:00.00	Search	Dvm3	3		
	00:00.00	Search	Dvm4	4		
	00:00.00	Search	Dvm5	5		
	00:05.00	Start	MainShow			Go Play 'Em

Depending on which video player you are using, this could take forever! For our purposes, let's say that the searches take one second each. This sequence will take five seconds to complete. If the audience is in the theatre while these searches take place, this is unacceptable! Here is an example of synchronous searching. This sequence will complete in one second. Much better!

Synchronized

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Start	MainSearch1			
	00:00.00	Start	MainSearch2			
	00:00.00	Start	MainSearch3			
	00:00.00	Start	MainSearch4			
	00:00.00	Start	MainSearch5			
	00:01.00	Start	MainShow			Go Play 'Em

MainSearch1

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Search	Dvm1	1		

MainSearch2

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Search	Dvm2	2		

MainSearch3

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Search	Dvm3	3		

MainSearch4

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Search	Dvm4	4		

MainSearch5

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Search	Dvm5	5		

Searching As Quickly As Possible

The above examples show you how to search all players at the same time, instead of one after the other, to save time. Using that method you still allow enough time for the searches to take place before issuing the **Play** commands.

Sometimes you just can't afford to wait a moment longer than you have to because you don't want the audience to see the show lag due to the searches. To reduce this lag to an absolute minimum, use the following sequences. This method uses flags to determine when all the searches are done, even if some take longer than others. These sequences add a lot of code to your script, but you have to do what you have to do.

Note This method also works wonderfully for spinning up LaserDisc players which can take up to a minute (depending on the player).

SynchronizedAndFast

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Off	Dvm1Done			
	00:00.00	Off	Dvm2Done			
	00:00.00	Off	Dvm3Done			
	00:00.00	Off	Dvm4Done			
	00:00.00	Off	Dvm5Done			
	00:00.00	Start	MainSearch1			
	00:00.00	Start	MainSearch2			
	00:00.00	Start	MainSearch3			
	00:00.00	Start	MainSearch4			
	00:00.00	Start	MainSearch5			
	00:00.00	Start	WaitForSearches			

MainSearch1

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Search	dvm1	1		
	00:00.00	On	DVM1Done			

MainSearch2

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Search	dvm2	2		
	00:00.00	On	DVM2Done			

MainSearch3

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Search	dvm3	3		
	00:00.00	On	DVM3Done			

MainSearch4

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Search	dvm4	4		
	00:00.00	On	DVM4Done			

MainSearch5

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Search	dvm5	5		
	00:00.00	On	DVM5Done			

WaitForSearches *(Looping Enabled)*

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	IfOff	DVM1Done	TryAgain		
	00:00.00	IfOff	DVM2Done	TryAgain		
	00:00.00	IfOff	DVM3Done	TryAgain		
	00:00.00	IfOff	DVM4Done	TryAgain		
	00:00.00	IfOff	DVM5Done	TryAgain		
	00:00.00	Start	MainShow			Go Play 'Em
	00:00.02	Pause	WaitForSearches			Stop Checking
TryAgain	00:00.00	Nop				

Modularity

Modularity is a word you probably thought you'd only hear in programmers' circles. Well, in many ways, scripting is in fact programming; many of the same concepts apply. Modularity is an attempt to place programming code in appropriate sections that make sense. If you were making a "House" program, you would have a "Kitchen" module with code in it that applied to kitchen appliances, and a "Bathroom" module with code that applied to bathroom appliances. You would not want your "blender" code residing in your Bathroom module. It makes it hard to read, hard to understand, and most importantly, hard to change later. That is, unless you make margaritas in your bathroom's jet spa!

Script programming is much simpler than real computer language programming, but scripts can become large and unwieldy too, so modularity begins to play a bigger importance, as your scripts become more complex.

Let's assume that we are asked to program a script for a "Zoo Animals" pre-show that has five video segments all coming off the same LaserDisc player, being shown to an audience on ten different monitors where all the monitors display the same video. Let's further assume that the pre-show is started manually by an operator, after the audience has filled the pre-show area. We will use a V4+ for this job. For simplicity, we'll also assume a frame rate of 30 frames per second, even though the players really run at 29.97.

Note When working with a real show such as this one, always use the exact frame rate of the players, projectors, or whatever media source you are using. Even miniscule differences in frame rate can have a profound impact on the quality of your show.

Our “Zoo Animals” video segments have the following properties:

Segment	Name	Length (mm:ss.ff)
1	Monkeys	02:46.20
2	Elephants	00:33.10
3	Tigers	01:40.00
4	Democrats	02:46.20
5	Zoo Summary	05:33.10

Non-Modular Approach

This approach searches and plays the five segments in order in one sequence called MainShow. MainShow is started by **Input9**, which is an external button that is pushed by an operator on an OCC console. The delay between **Search** and **Play** commands is necessary to wait for the searches to take place. If the delay were not put in, the **Play** command, which would not start until after the **Search** was completed, would occur at the wrong time; effectively ruining the segment.

Although this sequence works, it has some undesirable qualities. The mandatory two second wait for searches to take place means that guests will be forced to watch a two second pause in their show, instead of the minimum time it takes to actually perform the searches, which could be as low as one frame. In addition, the programmer had to figure out the playing time of each segment, and if a segment is added or deleted, or a segment is shortened or lengthened, the programmer will have to re-calculate those **Search** and **Play** times every time a change is made to the show.

MainShow *(Start Trigger: Button 1)*

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Search	dvm1	1		Monkey Segment
	00:02.00	Play	dvm1			Wait 2 seconds for search
	02:48.20	Search	dvm1	2		Elephant Segment
	02:50.20	Play	dvm1			Wait 2 seconds for search
	03:24.00	Search	dvm1	3		Tiger Segment
	03:26.00	Play	dvm1			Wait 2 seconds for search
	05:06.00	Search	dvm1	4		Democrat Segment
	05:08.00	Play	dvm1			Wait 2 seconds for search
	07:54.20	Search	dvm1	5		Summary Segment
	07:56.20	Play	dvm1			Wait 2 seconds for search
	13:30.00	Search	dvm1	1		Search to Black- Done!

Modular Approach #1

This approach breaks up the show into six sequences, one of which is the trigger sequence, and the rest are dedicated to individual video segments. It has the advantage of having search times that occur as fast as possible, without any delay required. The **Start** event will happen whenever the search is completed, but since the sequence it starts resets the event time back to zero, the events occur at the appropriate time regardless of how long the searches take. The

programmer has only to enter the play times once, and their the length of each segment, so no calculation needs to be done. In addition, this approach makes it easy to add or remove segments by changing the search frames and reconnecting which sequence starts any other sequence. It does have one disadvantage, though: The programmer must look through all the sequences to analyze the flow of the show, whereas the non-modular approach lets the programmer see the whole show at a glance.

This method is how most Script programmers create their shows.

MainShow *(Start Trigger: Input 9)*

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Search	dvm1	1		Monkey Segment
	00:00.00	Start	Monkey			

Monkey

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Play	dvm1			
	02:46.20	Search	dvm1	2		Elephant Segment
	02:46.20	Start	Elephant			

Elephant

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Play	dvm1			
	00:33.10	Search	dvm1	3		Tiger Segment
	00:33.10	Start	Tiger			

Tiger

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Play	dvm1			
	01:40.00	Search	dvm1	4		Democrat Segment
	01:40.00	Start	Democrat			

Democrat

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Play	dvm1			
	02:46.20	Search	dvm1	5		Summary Segment
	02:46.20	Start	Summary			

Summary

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Play	dvm1			
	05:33.10	Search	dvm1	1		Video Black-Done!

Modular Approach #2

This approach also breaks up the show into six sequences, one of which is the trigger sequence, and the rest are dedicated to individual video segments. The flow of the show can be seen by looking at **MainShow**, yet all the time programming still occurs in the individual sequences. The searches are all as fast as possible. The programmer has only to enter the beginning and ending frame numbers of each video segment, and adding segments or changing the order is simply a matter of changing **MainShow**! The two frame delay between segments in **MainShow** allow the individual sequences time to pause **MainShow**. Since ScriptOS is a multi-tasking operating system, **MainShow** would start all video segments at once if there was no brief delay.

This method is how I design shows.

MainShow *(Start Trigger: Input 9)*

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Search	dvm1	1		Monkey Segment
	00:02.00	Start	Monkey			
	00:02.02	Start	Elephant			
	00:02.04	Start	Tiger			
	00:02.06	Start	Democrat			
	00:02.08	Start	Summary			
	00:02.10	Search	dvm1	1		Video Black-Done!

Monkey

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Stop	MainShow			Freezes MainShow time
	00:00.00	Search	dvm1	1		Monkey Segment
	00:00.00	Play	dvm1	2		
	00:00.00	Start	MainShow			UnFreezes MainShow

Elephant

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Stop	MainShow			Freezes MainShow time
	00:00.00	Search	dvm1	2		Elephant Segment
	00:00.00	Play	dvm1	3		
	00:00.00	Start	MainShow			UnFreezes MainShow

Tiger

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Stop	MainShow			Freezes MainShow time
	00:00.00	Search	dvm1	3		Tiger Segment
	00:00.00	Play	dvm1	4		
	00:00.00	Start	MainShow			UnFreezes MainShow

Democrat

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Stop	MainShow			Freezes MainShow time
	00:00.00	Search	dvm1	4		Democrat Segment
	00:00.00	Play	dvm1	5		
	00:00.00	Start	MainShow			UnFreezes MainShow

Summary

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Stop	MainShow			Freezes MainShow time
	00:00.00	Search	dvm1	5		Summary Segment
	00:00.00	Play	dvm1	6		
	00:00.00	Start	MainShow			UnFreezes MainShow

Randomization

The only reasonable way to do randomization is to increment a state variable once per frame, letting it wrap at 256, continuously, and then checking the value when a random number is desired. Since the increment of a state variable once per frame is predictable when you look at the value at normalized intervals (i.e. the value is 34 at frame 0, and if you check again at frame 30 it's 64), you will only get truly random numbers if you check based upon a non-timed, random event. For example, if you check the variable when an operator pushes a button,

that will generate a good random number because the operator could push the button any time, and will never push it twice at the same time. The following sequence will generate a random number:

Random *(Autostart Enabled; Looping Enabled)*

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	AddVar	RandomVar	1		increment RandomVar

The following sequences will get a random number when an operator pushes a button attached to input9. The desired range of random numbers is 0 - 9, so we will have to trim it down from 0 - 255.

GetRandom *(Start Trigger: Input9)*

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	SetVarEQ	MyVar	RandomVar		
	00:00.00	Start	ForceRange			

ForceRange *Forces MyVar to be in range 0-9; (Looping Enabled)*

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	IfVarLE	MyVar	9		if <= 9, we're done
	00:00.00	SubVar	MyVar	9		
	00:00.00	Goto	End			Do it again Sam
Done	00:00.00	Start	GotRandom			
	00:00.02	Nop				wait 2 frames here
End	00:00.00	Nop				loop here

GotRandom *Random number now in range 0-9; (Looping Enabled)*

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Reset	ForceRange			Don't Loop Anymore
	00:00.00	Nop				Use MyVar Here

Now let's take these sequences, and add them to our Zoo Animals show above to show an example of randomization. Assume the Art Director wants the first four video segments to play at random, not allowing any segment to play more than once, and then play the summary.

We can't get a random number four times for two reasons. One, only the first random number will be truly random, because it is based upon an operator pressing a button, the remaining three random numbers would all be gotten at a predictable time after the first one was gotten. Second, if we get four random numbers, we could get a random number to play a segment we've already played. Checking to see if we have already played a segment, and choosing another one if so would force us to write way too many sequences. The correct approach is to get one random number when the operator presses the button, thereby guaranteeing it is a truly random number, and then using that one number to determine what order all four segments will be shown in. The maximum combinations of four selections, each with one unique position are 24.

We'll also use the Modular Approach #2 for this job. This example shows how useful the approach can be.

Random *(Autostart Enabled; Looping Enabled)*

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	AddVar	RandomVar	1		increment RandomVar

StartShow *Takes random number from button push; (Start trigger: Input9)*

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	SetVarEQ	MyVar	RandomVar		
	00:00.00	Start	ForceRange			

ForceRange *Forces MyVar to be in range 0-23; (Looping Enabled)*

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	IfVarLE	MyVar	23	Done	if <= 23, we're done
	00:00.00	SubVar	MyVar	23		
	00:00.00	Goto	End			Do it again Sam
Done	00:00.00	Start	MainShow			
	00:00.02	Nop				wait 2 frames
End	00:00.00	Nop				loop here

MainShow *Pick order of video segments from random number*

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Reset	ForceRange			
	00:00.00	IfVarEq	MyVar	0	Random1	Decides order
	00:00.00	IfVarEq	MyVar	1	Random2	
	00:00.00	IfVarEq	MyVar	2	Random3	
	00:00.00	IfVarEq	MyVar	3	Random4	
	00:00.00	IfVarEq	MyVar	4	Random5	
	00:00.00	IfVarEq	MyVar	5	Random6	
	00:00.00	IfVarEq	MyVar	6	Random7	
	00:00.00	IfVarEq	MyVar	7	Random8	
	00:00.00	IfVarEq	MyVar	8	Random9	
	00:00.00	IfVarEq	MyVar	9	Random10	
	00:00.00	IfVarEq	MyVar	10	Random11	
	00:00.00	IfVarEq	MyVar	11	Random12	
	00:00.00	IfVarEq	MyVar	12	Random13	
	00:00.00	IfVarEq	MyVar	13	Random14	
	00:00.00	IfVarEq	MyVar	14	Random15	
	00:00.00	IfVarEq	MyVar	15	Random16	
	00:00.00	IfVarEq	MyVar	16	Random17	
	00:00.00	IfVarEq	MyVar	17	Random18	
	00:00.00	IfVarEq	MyVar	18	Random19	
	00:00.00	IfVarEq	MyVar	19	Random20	
	00:00.00	IfVarEq	MyVar	20	Random21	
	00:00.00	IfVarEq	MyVar	21	Random22	
	00:00.00	IfVarEq	MyVar	22	Random23	
	00:00.00	IfVarEq	MyVar	23	Random24	
	00:00.00	Display	ErrorMsg			Never get here
	00:00.00	Goto	End			
Random1	00:00.02	Start	Monkey			Order 1, 2, 3, 4
	00:00.04	Start	Elephant			
	00:00.06	Start	Tiger			
	00:00.08	Start	Democrat			
	00:00.10	Goto	Summary			
Random2	00:00.02	Start	Monkey			Order 1, 2, 4, 3
	00:00.04	Start	Elephant			
	00:00.06	Start	Democrat			
	00:00.08	Start	Tiger			
	00:00.10	Goto	Summary			
Random3	00:00.02	Start	Monkey			Order 1, 3, 2, 4
	00:00.04	Start	Tiger			
	00:00.06	Start	Elephant			

	00:00.08	Start	Democrat			
	00:00.10	Goto	Summary			

…Etc…

Random24	00:00.02	Start	Democrat			Order 4, 3, 2, 1
	00:00.04	Start	Tiger			
	00:00.06	Start	Elephant			
	00:00.08	Start	Monkey			
Summary	00:00.12	Start	Summary			Always done here
	00:00.14	Search	dvm1	1		Video Black-Done!

Monkey

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Stop	MainShow			Freezes MainShow time
	00:00.00	Search	dvm1	1		Monkey Segment
	00:00.00	Play	dvm1	2		
	00:00.00	Start	MainShow			UnFreezes MainShow

Elephant

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Stop	MainShow			Freezes MainShow time
	00:00.00	Search	dvm1	2		Elephant Segment
	00:00.00	Play	dvm1	3		
	00:00.00	Start	MainShow			UnFreezes MainShow

Tiger

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Stop	MainShow			Freezes MainShow time
	00:00.00	Search	dvm1	3		Tiger Segment
	00:00.00	Play	dvm1	4		
	00:00.00	Start	MainShow			UnFreezes MainShow

Democrat

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Stop	MainShow			Freezes MainShow time
	00:00.00	Search	dvm1	4		Democrat Segment
	00:00.00	Play	dvm1	5		
	00:00.00	Start	MainShow			UnFreezes MainShow

Summary

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Stop	MainShow			Freezes MainShow time
	00:00.00	Search	dvm1	5		Summary Segment
	00:00.00	Play	dvm1	6		
	00:00.00	Start	MainShow			UnFreezes MainShow

As you can see, randomization can add a lot of sequences and events to your script, but if you design it properly ahead of time, you can make your code modular, flexible, and elegant.

Real Time Clock

It is often desirable to have events occur at chronological times during the day. Our Show Controllers do not have internal real time clocks; however, there are two ways to accomplish this task. The first is to use an external Real Time Clock module, which transmits the current time to our equipment via serial port once per second. This device is accurate to a few seconds a year, and doesn't

forget what time it is when the power is turned off in a power outage. The second solution is to *simulate* a Real Time Clock in ScriptOS. This solution does have the advantage of being *free*, but has the disadvantage of being off by approximately 1 minute per day and forgetting what time it is if the power goes out. If a standard UPS is used, and some device (or person) resets the time once per day, these problems can become negligible.

Both solutions write the hour, minute, second, and frame to four state variables. I will now show you several examples of using the Real Time Clock (either external or simulated).

Start Event at 8 p.m.

This sequence is started whenever the **HourVar** reaches 20.

TimeToTapeFriends *(Start trigger: HourVar=20)*

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Start	RecordTV			Do Whatever

Start Event at 11:58 p.m.

This sequence is started whenever the **MinuteVar** state variable reaches 58 minutes, and then checks to see if **HourVar** is 23. If it is, it starts the event, if not, it exits.

TwoTilMidnight *(Start trigger: MinuteVar=58)*

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	IfVarEQ	HourVar	23	11:58	Now!
	00:00.00	Goto	End			
11:58	00:00.00	Start	DoIt			Do Whatever
End	00:00.00	Nop				

Start Event Every Hour.

This sequence is started whenever the **HourVar** state variable changes. Because sequences always look for *edge-triggered* occurrences, every time **HourVar** is changed, this sequence will run because **HourVar** will always be greater or equal to zero.

AtTheHour1 *(Start trigger: HourVar≥0)*

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Start	DoIt			Do Whatever

Start Event Three Frames after Every Minute from Midnight to Six a.m.

This sequence is a little hairier, but is again demonstrative of the power of ScriptOS.

AtTheHour2 *(Start trigger: FrameVar=3)*

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	IfVarEQ	SecondVar	0	Minute	3 frames past minute
	00:00.00	Goto	End			
Minute	00:00.00	IfVarGT	VarHour	6	End	No Good
	00:00.00	Start	DoIt			Do Whatever
End	00:00.00	Nop				

Make Sure Event is Running from 10a.m. to 8:30p.m.

Since sequences are edge triggered, it is possible to miss the time something is supposed to happen if the power goes out while the trigger time occurs. The power may come back on, with ScriptOS again knowing what time it is (if you have the external RTC),but it won't know that it was supposed to have triggered something in the past if you write the sequences as we have been.

This sequence is an example of when you have to make sure something is running during a specific time. If the power goes out, ScriptOS must re-determine if the event should be occurring. For this example, we will assume that back ground music for an entire theme park needs to play between 10 a.m. and 8:30 p.m. We will further assume that when **Output3** is on, the BGM is also.

BGM *(AutoStart Enabled; Looping Enabled)*

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	IfVarLT	HourVar	10	NoGood	It's before 10 a.m.
	00:00.00	IfVarGT	HourVar	21	NoGood	It's after 9 p.m.
	00:00.00	IfVarEq	HourVar	20	Past8	Between 8 and 9 p.m.
	00:00.00	Goto	BGM_Ok			It's between 10 a.m. a
Past8	00:00.00	IfVarGE	MinuteVar	30	NoGood	It's past 8:30 p.m.
BGM_Ok	00:00.00	On	output3			BGM is on
	00:00.00	Goto	End			
NoGood	00:00.00	Off	output3			BGM is off
End	00:00.00	Nop				

Communications Between Alcorn McBride Equipment

All of our equipment can talk to each other via serial communications using our own Alcorn 9 Bit Control protocol. This is useful if, for example, one V16+ is in charge an entire attraction, including the PreShow, and it communicates serially with two other V16+s that control two mainshows in two independent theatres. It is also useful for simply adding expansion capabilities, such as connecting an IO64 to a V16+, where the V16+ is the main Show Controller. In this scenario, the IO64 adds 32 inputs and outputs to the V16's existing 16.

Let's use the IO64 as an I/O expansion box and see what the best way is to integrate it into your show. For starters, you need to plug a Null modem cable in between the V16+ and the IO64, using any available serial port (except the

Programmer Port) on each box. You also need to select the Alcorn 9 Bit Control protocol for both of these ports, as well as the same baud rate for both ports.

Since you have to set the baud rate and protocol in the IO64, this automatically means you have to have two scripts, one for the V16+ and one for the IO64, but need not program much else in the IO64 if desired.

There are three ways to divide programming between the two boxes. The first is to program little or no sequences into the IO64, and directly access the I/O of the IO64 from the V16+. The second is to program as many sequences as needed to handle the I/O in the IO64, and simple start sequences back and forth between the two boxes as needed. The third is to utilize a combination of both.

My recommendation is to keep things modular and place as many sequences as necessary in the IO64. In other words, any programming that interfaces to I/O in the IO64 should remain in the IO64, and the V16+ can be the main Show Controller and just talk to the IO64 when necessary. This means the programming will be more distributed, causing less show memory to be used up in the V16+. It also makes it more readable because there are fewer sequences in the V16+ that have anything to do with the IO64. In general, it's modular.

Here are two example scripts to illustrate this idea. The first is for the V16+, the second is for the IO64. The IO64 in this case is connected to the entrance and exit doors and a PLC, which is controlling pyrotechnics.

The doors are simple output signals of the IO64, and the PLC both receives output signals from the V16+, and sends input signals to the V16+.

As always, don't forget to configure the IO64 port of the V16+ using AMI Product Wizard. This allows you to address the IO64's sequences by their full names. See *Communicating with Alcorn McBride Show Controllers* in Chapter 4 for more information.

V16+ Script

StartShow *Checks with PLC to see if it's OK to start show (Start trigger: StartShowButton (Input1))*

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Off	PLCOkFlag			Assume not OK
	00:00.00	Start	IO64	OKToStart?		Start IO64 Seq
	00:01.00	If Off	PLCOkFlag	NotOk		If PLC did not turn on flag
	00:01.00	Start	MainShow			Ok to start show
	00:01.00	Goto	End			
NotOk	00:01.00	Display	ErrorMsg			Inform operator
End	00:01.00	Nop				

StartShow *Started externally by IO64 (from PLC)*

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	On	PLCOkFlag			Now it's ok to start show

MainShow

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Start	IO64	OpenEntrDoors		
	01:00.00	Start	IO64	CloseEntrDoors		
	06:03.15	Start	IO64	StartPyro1		
	08:42.23	Start	IO64	StartPyro2		
	09:00.00	Start	IO64	OpenExitDoors		
	10:00.00	Start	IO64	CloseExitDoors		

IO64 Script

OKToStart? *Started externally by V16+*

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	IfOff	PyroOk	End		Low signal from PLC
	00:00.00	Start	V16+	StartShow		Go turn on PLCOkFlag
End	00:00.00	Nop				

OpenEntrDoors *Turns off magnet that holds doors shut; Started externally by V16+*

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Off	EntrMagnet1			Deactivate Door Electromagnet
	00:00.00	Off	EntrMagnet2			Deactivate Door Electromagnet
	00:00.00	Off	EntrMagnet3			Deactivate Door Electromagnet
	00:00.00	Off	EntrMagnet4			Deactivate Door Electromagnet

CloseEntrDoors *Moves doors to close position; Started externally by V16+*

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	On	EntrMagnet1			Hold Door Closed
	00:00.00	On	EntrMagnet2			Hold Door Closed
	00:00.00	On	EntrMagnet3			Hold Door Closed
	00:00.00	On	EntrMagnet4			Hold Door Closed
	00:00.00	Pulse	EntrMotor1	01.00		Motor Closes Door
	00:00.00	Pulse	EntrMotor2	01.00		Motor Closes Door
	00:00.00	Pulse	EntrMotor3	01.00		Motor Closes Door
	00:00.00	Pulse	EntrMotor4	01.00		Motor Closes Door

StartPyro1 *Started externally by V16+*

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	IfOff	PyroOk	End		Make darn sure again
	00:00.00	Pulse	GoPyro1	01.00		Pulse for 1 second
End	00:00.00	Nop				

StartPyro2 *Started externally by V16+*

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	IfOff	PyroOk	End		Make darn sure again
	00:00.00	Pulse	GoPyro2	01.00		Pulse for 1 second
End	00:00.00	Nop				

OpenExitDoors *Turns off magnet that holds doors shut; Started externally by V16+*

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Off	ExitMagnet1			
	00:00.00	Off	ExitMagnet2			
	00:00.00	Off	ExitMagnet3			
	00:00.00	Off	ExitMagnet4			

CloseExitDoors *Moves doors to close position; Started externally by V16+*

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	On	ExitMagnet1			
	00:00.00	On	ExitMagnet2			
	00:00.00	On	ExitMagnet3			
	00:00.00	On	ExitMagnet4			
	00:00.00	Pulse	ExitMotor1	01.00		
	00:00.00	Pulse	ExitMotor2	01.00		
	00:00.00	Pulse	ExitMotor3	01.00		
	00:00.00	Pulse	ExitMotor4	01.00		

ESTOPs and Fire Alarms

Although it is IMPERATIVE that our Show Controllers are not used to control safety critical equipment, it is very useful to have a Show Controller mute audio, stop video, open doors, and turn on lights, etc. during an emergency situation. This response is typically actuated when a PLC or some other device sends an E-Stop or Fire Alarm signal. Here is an example of such a sequence. Note that the normal condition of the E-Stop input is high, and the V16 will run this sequence whenever the input goes low, indicating a true emergency. If the input went low when there was not an emergency, the V16 indicates a failed signal that would alert the staff that maintenance needs to fix the problem.

E-Stop *(Start trigger: EstopInput goes off)*

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Start	ResetAllSeqs			
	00:00.02	Start	KillAudio			
	00:00.02	Start	KillVideo			
	00:00.02	Start	LightsUp			
	00:00.02	Start	OpenAllDoors			

Frame Accuracy

There are two reasons why execution of sequences may take longer than expected, or appear to take longer than expected, even though the box is frame accurate and will execute hundreds of events in one frame.

Serial Events Take Time

Any event that sends a serial message to a device will take at least a frame to execute, and in many cases, much longer. A **Search** event on a Alcorn McBride DVM2 takes at most a second. A **Play** event could last for several minutes. Any sequence that contains an event like this will be frozen in time until an Acknowledge is received from the player (or other device). The events

after the external event will not be able to execute until the external event is finished processing.

The Processor Scans Events like a PLC

ScriptOS is a multi-tasking operating system. This means that it can do several things at once. Well, it can't actually do several things at once, but it can do many, many things in one frame. The processor executes events one sequence at a time. This process is similar to how a Programmable Logic Controller works.

ScriptOS performs the following processes in order, once per frame:

1. Process Incoming Serial Messages
2. Process Input Changes to see if there are any sequences that should be marked to start
3. Process State Variables to see if there are any sequences that should be marked to start
4. Parse Through List of Running Sequences

   Execute any event that matches the current frame time
5. Process Output Changes
6. Increment the Frame

Let me give you some examples of how this affects you:

If you turn on an output, it won't actually go on the instant the event is processed. It actually turns on just before the end of the current frame, along with any other output changes. This means that if you were to turn on an output and then turn it back off again on the same frame, the output would never actually turn on at all. The last commanded state of the output before the end of the frame is used.

OutputDoesntActivate

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	On	output1			
	00:00.00	Off	output1			
	00:00.00	On	output1			
	00:00.00	Off	output1			
	00:00.00	On	output1			
	00:00.00	Off	output1			
	00:00.00	On	output1			
	00:00.00	Off	output1			Never came on

This example probably is a little more useful. If you have an event that tells another sequence to start, it does not actually start it, but rather, it marks it for execution. This means that if you start a sequence that is before the one you call it from, it will not begin execution until the next frame, whereas if you start a sequence that is after the one you call it from, it will begin execution on the same frame.

SequenceA

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	On	output2			

SequenceB

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	On	Output1			
	00:00.00	Start	SequenceA			
	00:00.00	Start	SequenceC			

SequenceC

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	On	output3			

The result of running **SequenceB** is that **output3** will turn on one the same frame as **output1**, and **output2** won't turn on until a frame later. This happens because **SequenceA** has already been determined not to be marked for execution, so the processor then moves on to **SequenceB**. **SequenceB** is marked for execution because that's the sequence we told to run, so the processor attempts to process all events that occur on frame zero. Since both **Start** events happen on frame zero, they are both processed. The result of them being processed is that both **SequenceA** and **SequenceC** are marked for execution. The processor then determines that **SequenceC** is marked for execution, and executes it. **SequenceA** is not processed until the processor starts all over again at the top of the sequence list on the next frame. Easy, right?

Using a PlayUntil Event

When controlling LaserDisc playback, the **Play** event can have two separate meanings. When a frame number is provided in the Data2 column after a **Play** event, the **Play** event becomes a **PlayUntil** event. **PlayUntil** tells a LaserDisc player to begin playing from the current location and *play until* a particular frame is reached. Alternatively, a normal **Play** event tells a LaserDisc player to begin playing from the current location, until some other event is sent to stop it from doing so.

As soon as the player receives the **Play** event, it returns an "Acknowledge" to the Show Controller, which allows the sequence to continue. The **PlayUntil** event however, does not return this "Acknowledge" until after the LaserDisc has reached the desired ending frame. While the player is playing, the sequence is frozen right where it is. This could be used to your advantage, as I have done in my Modular Script Programming #2 example.

PlayExample

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Play	ldp1			

PlayUntilExample

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Play	ldp1	12345		

Power up Conditions

If your script has any sequences that are **Autostart Enabled** and do anything with LaserDisc or DVD players, including spinning them up, you should wait at

least 25 seconds before attempting to communicate with them in any way. If the Show Controller is Autostarting, then that must mean that it was previously deprived of power, which means that it is likely that the rack of video players was also deprived of power. Whether or not this condition was intentional is not important. What is important, is that our Show Controllers power up within a few frames and LaserDisc/DVD players take about 25 seconds to "Wake Up", so you need to wait before you try to talk to them.

Restart and Restart Lockout

Restart Enabling a sequence allows the sequence to start, even though it is already running. When it does so, it starts over at the beginning with the PC set to event1 and the TC set to 00:00.00.

Restart Lockout allows a sequence to be restarted, but prevents it from doing so for a specified amount of frames after it was originally started.

Let's say you are programming a kiosk in a museum on the "Life of Frogs". The guest presses a button, and the guest sees and hears information about frogs. Normally, the guest watches the entire presentation, and when the presentation is over, the guest leaves. The sequence that played the presentation has ended. But suppose the guest got bored during the middle of the presentation and walked away. Now someone else walks up and wants to hear about frogs (little does he know how bored he will be). This guest does not want to sit through the remainder of the previous guests presentation. He wants to be able to press the button and have the presentation start over from the beginning. **Restart** allows this.

This is a nice feature. But let's say that no-one is watching the presentation (It's off), and a thirteen year old boy walks up to the kiosk. He starts the presentation, gets bored within 0.0000015 of a second and out of curiosity pushes the button again, to find that the presentation starts over. In fact, if he pushes the button over and over as fast as he can, he can get the frog presentation to "rap". This is oh so much more exciting than the presentation itself. Now people are staring. **Restart Lockout** allows you to set a number of frames that the sequence will not restart in. This allows serious guests to be able to restart the show when they don't want to watch the last half of the show first, and it prevents your and my favorite milk shake globbering, paint chipping teenager from rapping the frogs.

Preventing Glitches

Glitches occur when an input of a Show Controller receives a voltage close enough to the maximum to turn it on, or low enough to ground to turn it off, even though no person or device intended the signal to do so. This can be caused by noisy signals or a noisy device transmitter (people are automatically noisy transmitters in the case of buttons). There are two ways to reduce the effects of glitches.

The Purpose of an Input or Button

If it's possible to do so, make each input signal serve only one purpose. If some computer or PLC somewhere is sending pulses to an input to tell the Show Controller what to do, the Show Controller could become confused if one pulse is supposed to tell it to do one thing, and two pulses another. This is possible, but confusing and dangerous. Likewise, a button on an OCC panel which the operator is supposed to press several times to mean different things can cause a problem because the person could accidentally press it the wrong number of times, by not pressing it solidly each time. You can afford to buy a few more $90 Allen-Bradley buttons.

I realize that I recommend using one button for Daymode/Nightmode. This is due to the way that LaserDiscs and DVD Players react to being spun up and spun down. I'm not concerned with glitches for Daymode/Nightmode because this button is pushed when there are no guests in the theatre and likely the building.

Check the Input Again

Even if your inputs only serve one purpose, they can still glitch and cause inappropriate behavior. The best way to confirm that your input went on, off, or pulsed, is to check it again. If there was a glitch, it is unlikely that the signal is still glitching when you check later. Here is an example that checks 10 frames into a 15 frame pulse to make sure the input is still on.

StartShowNow *Starts show on ½ second Input 3 pulse (Start trigger:*

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.10	IfOff	input3	End		It must have glitched!
	00:00.11	Start	MainShow			
End	00:00.00	Nop				

Tight Control and Awareness

In some cases it is not important if a show goes down for short periods of time. This is especially the case of exhibits or kiosks in museums and the like where the electronics may be a small part of the overall show. For example, let's say your museum has a Pepper's Ghost effect that transforms a wooden cigar store Indian into a video still of a Native American, and the effect fails during the day. One of the janitors at closing may leave a message to the maintenance people that "Elijah went down sometime today", and the effect will get fixed by morning.

Most of the time, however, inactive show elements are just not acceptable; someone needs to be told immediately when all or part of the show fails, so that it can be brought back up as soon as possible.

Equipment in most shows consists of a main Show Controller and other devices connected it. With WinScript, tight control of most peripheral devices is quite easy. If several of our Show Controllers are connected together, awareness of what all Show Controllers are doing is just as important. If you send a command to another box, you want to be sure it was carried out.

For example, let's say you have a V16+ sending light cue commands to a DMX Machine. The best way to make sure the cue was carried out (the sequence executed) is to send a message back to the V16+ to confirm it. There are several ways to do this, but this one seems to be the easiest.

V16+ Script

SendingLightCue

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Off	ConfirmFlag			
	00:00.00	Start	Dmx	Cue3		Run Cue 3
	00:00.05	IfOn	ConfirmFlag	Confirmed		
	00:00.05	Start	Dmx	Cue3		Try Again!
	00:00.10	IfOn	ConfirmFlag	Confirmed		
Failed!	00:00.10	Start	Cue3Failed			No good
	00:00.00	Goto	End			
Confirmed	00:00.00	Start	Cue3Success			Good
End	00:00.00					

ConfirmIt

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	On	ConfirmFlag			

DMX Script

Cue3

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Start	v16+	ConfirmIt		Turn on ConfirmedFlag
	00:00.00	DMXRamp	15	50%	02.00	Do Cue 3 Stuff
	00:00.00	DMXRamp	241	FF	01.15	
	00:00.00	DMXRamp	242	FF	01.15	
	00:00.00	DMXRamp	243	FF	01.15	
	00:00.00	DMXRamp	69	75%		

In this manner, you can check individual commands sent back and forth between boxes. Sometimes, where you want to know *immediately* if a Show Controller has failed, and not wait until a message is sent between them, you can implement a "Watch Dog Timer", which will notify a Show Controller if a subsystem Show Controller has failed. You can even put a watchdog timer in the subsystem to watch over the main Show Controller. The procedure is the same.

Here is such an example. If the subsystem IO64 fails entirely, or the serial port fails, or the cable fails or falls off, the V16 will know about it, and alert some theme park wide central computer. The V16 could even flash the lights in the employee bathroom, or log the time of the failure, if a Real Time Clock is installed.

V16+ Script

WatchDogTimer *Increments watchdog timer once a frame (Autostart Enabled, Looping Enabled)*

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	AddVar	WatchDogVar	1		

WatchDogFailed *WatchDogVar has reached 60 frames (Start trigger: WatchDogVar GE 60)*

Label	Time	Event	Data1	Data2	Data3	Comment
	00:00.00	Start	AlertDACS			Announce Failure

IO64 Script

SendImOK *Sets V16+'s WatchDogVar to 0 once per second (Autostart Enabled, Looping Enabled)*

Label	Time	Event	Data1	Data2	Data3	Comment
	00:01.00	SetVarEq	v16+	0	WatchDogVar	WatchDogVar = 0

Application Notes

Alcorn McBride Show Controllers can be used in very simple and very complex applications. Here are a few sample applications to get you started.

The Application Notes available in this section are:

- Large Theatre Control
- Controlling an Alcorn McBride Digital Video Machine
- Controlling Automatic Doors

Large Theatre Control

Many large shows are designed in a theatre format. This design provides high guest throughput by utilizing a PreShow, where guests gather to watch a short film or audio-animatronic presentation. As these guests are watching the PreShow, another group of guests is already in the Theatre watching the main show. The attraction is timed so that when the Preshow is over and the operator has given any special instructions to the guests, the automatic entrance doors open. The previous group will have left the theatre only moments earlier. As the entrance doors close and the main show starts again, another group of guests is gathering to watch the Preshow.

This application note discusses the design of a large theatre just like the one described above. This design utilizes an Alcorn McBride V16+ and several generic show elements to create a simple, but powerful theatre experience.

The Theatre In Question

Every show design starts with an attraction description. This is where the desired guest experience, operator interface and performance requirements come together to create a show equipment list. For our imaginary theatre we have selected a multi-channel audio film projection theatre and a multi-screen video preshow area. As with most shows of this type the preshow

and theatre run in relative synchronization, allowing guests to accumulate in the preshow during the film presentation in the main theatre.

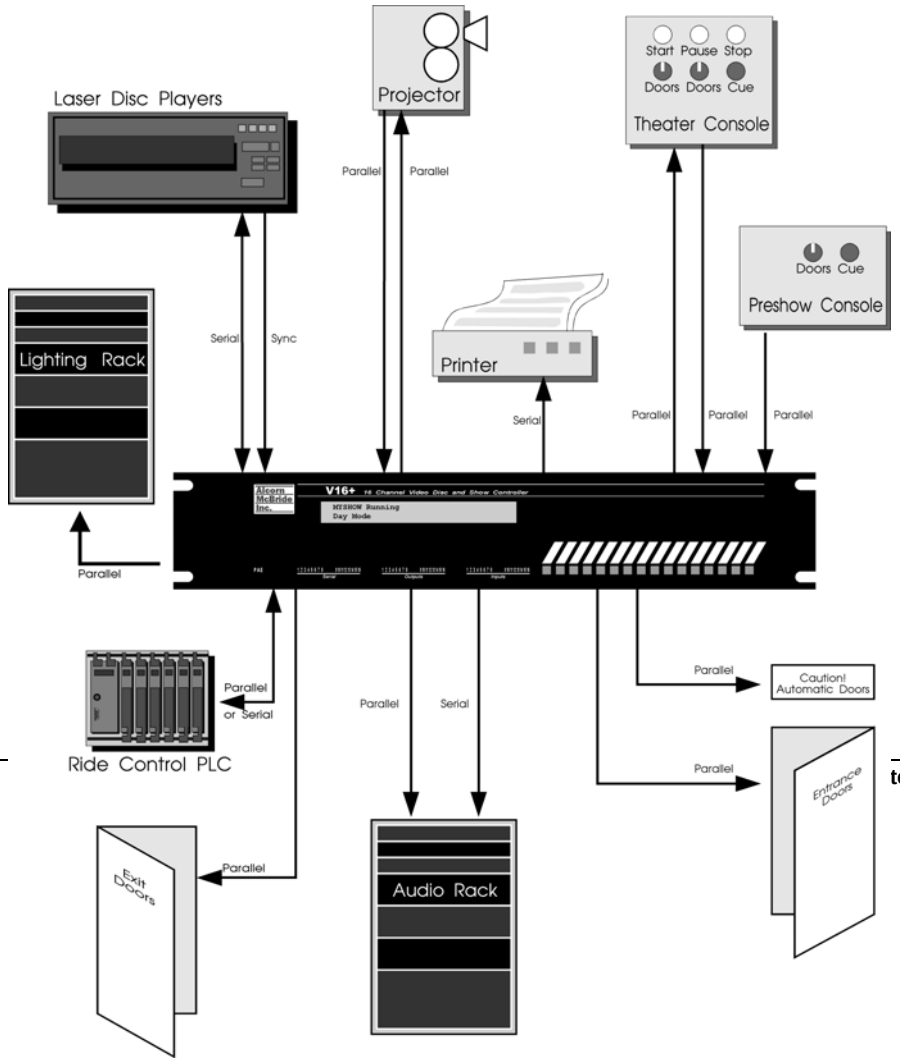
As we shall see, a single V16+ will provide total control of both theatres, including operator consoles, projector, doors, audio equipment, and the Digital Video Machines. For the sake of completeness our application also incorporates some specialty hardware located in the main theatre. In this instance the V16+ handshakes with a ride control system which sends motion data to moving seats located in the theatre. In a more generic installation this could instead control special effects or other show-synchronized activities within the main theatre.

You can follow along with this application note in WinScript by opening **MYSHOW.AMW** (located in the WinScript\Scripts\Examples\ directory).

Note This application note assumes that the reader possesses rudimentary scripting skills. New users should take the WinScript Tutorial in Chapter 3 before continuing.

Architecture

The control system architecture for our imaginary theatre is illustrated in the figure below. This block diagram shows the relationship of all the equipment previously mentioned. The V16+ is the ultimate collector of all operator and status inputs and the distribution point for commands throughout the attraction.


Laser Disc Players
Projector
Start Pause Stop
Doors Doors Cue
Theater Console
Parallel
Parallel
Doors Cue
Preshow Console
Lighting Rack
Serial
Sync
Printer
Serial
Parallel
Parallel
Parallel
Alcorn McBride Inc.
V16+
16 Channel Video Disc and Show Controller
MISHOW Running
Day Mode
Parallel
Parallel
or Serial
Ride Control PLC
Parallel
Serial
Parallel
Caution! Automatic Doors
Parallel
Entrance Doors
Exit Doors
Parallel
Audio Rack

tes

Inputs, Outputs, Sync and Serial Ports

To begin configuring our V16+ we need to make a list of the inputs and outputs to which it will be connected. This information will then be entered into the configuration menus of WinScript.

Digital inputs consist of contact closures or voltage sources throughout the building which are used to sense the status of remote equipment and operator pushbuttons. In addition, switches on the V16+ front panel provide user-defined initialization, test, and special functions.

Digital outputs provide dry contact closures for switching control voltages throughout the building. These signals can be used to open doors, illuminate lights, and handshake with other equipment.

Digital Video Machine serial connections provide the RS-232 commands and status that permit the V16+ to control up to sixteen DVM2s.

A Composite Sync connection provides synchronization from any or all of the DVM2s. This guarantees that the V16+ remains exactly in frame sync with all DVM2s.

Front Panel Buttons

Our inputs include the first eight front panel buttons of the V16+. We will use the first switch as a show startup button. This button will bring all of the external equipment up to its nominal starting condition. The show startup button will activate the same sequence which will execute automatically whenever the V16+ is powered up.

An evening shutdown button could perform much the opposite of the show Startup sequence. It would provide a means to stop the video players, take projectors off line, and turn off operator prompting.

The other internal buttons have been left unassigned at this point but could be used for special test features, a way to select a different show cycle or combination, or almost any other function, limited only by the designer's imagination.

Theatre OCC

The Theatre OCC must provide a way to start the show and to request that the show pause at rollover. (Rollover is the point when the projector has reached the end of the theatre show material, the theatre audience has exited and the preshow audience is in the process of entering the theatre.) Our show will be designed to automatically cycle all day long, thereby encouraging the operators to maintain maximum throughput. However, for large audiences the operators may require more load time than that provided in the automatic recycling. The Theatre OCC Pause button allows the operator to request a pause during this load cycle prior to the next theatre presentation. We have also provided a Theatre OCC Stop button. This button's function is to stop a show during an emergency situation. It will close the projector douser, mute the theatre audio and bring up the houselights. The Theatre OCC will also have open/close/auto switches for

the theatre entrance and exit doors. Inputs from these switches do not need to go to the V16+ in our simple theatre architecture. Although they certainly could be processed by the V16+, it is sufficient in our application that the V16+'s door outputs are wired through these switches to provide automated door opening when these switches are in the auto position.

The Theatre OCC could also be outfitted with an audio mute switch. This switch allows the operator to request the V16+ to mute the theatre audio entirely. This switch is often used by maintenance during the test show in the morning so that they do not have to listen to the entire theatre audio program.

The designer could even include a PA talk button that allows the operator to mute the audio system by a predetermined amount and to mix audio from the Theatre OCC microphone into the amplifiers so that the operator can provide theatre loading and unloading direction to guests. In our simple example, this button is routed directly to the audio equipment, although the V16+ could easily handle it, and perform logical operations upon it.

Show status at both the Theatre and Preshow OCCs is indicated by the cue light. This light will be illuminated when the system is Ready to run the next show. This light can also be blinked to serve as a cue for the Preshow load spiel, end of show warning, etc.

Preshow OCC

The Preshow OCC is simpler than the Theatre OCC and does not require any switches with inputs going to the V16+. It does have a theatre entrance door switch which can manually open or close those doors.

Ride Control Computer

In our imaginary theatre we will be interfacing the V16+ to two other pieces of equipment located in the projection room. One of these is the Ride Control Computer. Since the "RCC" will control the moving seats in our theatre, we will use a standard Allen-Bradley PLC to provide the highest possible margin of safety for our guests. The RCC must tell the V16+ when it is ready to reproduce the motion program, and accept a command to start that program. Several handshaking scenarios are possible. In an even more safety critical application we could let the theatre operator request motion playback from the RCC using a keyswitch connected directly to the RCC. When the RCC is ready, it would advise the V16+ with a ready line. When the V16+ starts the projector and video players, it would also cue the RCC.

In our application we are going to assume that the RCC is just providing special effects, and allow the V16+ to start the show. It will still check that the RCC is ready, but this will allow it to cycle continuously all day unless the Theatre OCC Pause button is pushed. Note that even with this architecture the RCC could still be enabled by a momentary keyswitch, which would prevent the V16+ from starting the show, by removing the RCC ready line. Regardless of the approach taken our block diagram remains the same, and only minor changes are involved in the V16+ script.

Entrance and Exit Doors

The V16+ uses two of its outputs to control the theatre doors. Another V16+ output is used to flash the warning lights in the preshow area above the theatre entrance doors. This alerts guests who might be standing too near the doors, and also provides a means for beckoning the crowd through the doors in order to increase theatre load efficiency.

Projector

The final piece of projection room equipment connected to the V16+ is the projector. The projector has a ready line that tells the V16+ it has recycled to the end of its film loop and is ready for the next theatre presentation. The V16+ has two control lines which go to the projector. One starts the projector if it is ready and has recycled from the previous show. The other opens and closes the projector douser. This provides a means for the V16+ to stop the projection of the film in the theatre without having to stop the automated mechanism of the projector.

Audio System

Our Theatre Audio System consists of five tracks of digital audio that has been sampled to be in synchronization with the video material when cued on the same frame as the video players. This audio will be sourced from an Alcorn McBride Digital Binloop system that accepts simple serial commands from the V16+.

Through a parallel connection to the audio mixing system, the V16+ can fully mute the audio to eliminate theatre sound entirely. Although the mute button could be connected directly to the audio system, it is wise to route it through the V16+ as we have described. This allows the V16+ to automatically unmute the audio at the end of each show. One common operational error occurs when the maintenance staff that tests the theatre each morning mutes the audio. During the first show of the day, the operator may not notice that the audio is muted until the first portion of the program material has been missed. By programming the V16+ to unmute the audio at the end of each show cycle, the audio will be automatically unmuted before the first show of the day begins.

Digital Video Machines

In our design example we are using the Alcorn McBride Digital Video Machine 2 (DVM2) which has a 15-pin connector. A standard cable available from Alcorn McBride allows connection between the DB9

connector at the rear of the V16+ and the DB15 on the DVM2. Each DVM2 used in the show requires one serial connection to the V16+.

The preshow of our theatre uses eight small monitors and one large screen video projector, arranged in an aesthetically pleasing pattern on the preshow walls. Each of these monitors is driven by its own video program. For the sake of simplicity we have used nine separate, synchronized DVM2s for the preshow; it might be possible to use the three main theatre disc players for three of the preshow monitors, however this would constrain the timing relationship between the preshow and the main theatre. Since we want flexibility during installation to alter the timing between the two theatres we will use nine separate DVM2s for the preshow.

The preshow audio is provided by two digital tracks sourced from the Digital Binloop system.

Video Sync

It is important that the theatre DVM2s run in absolute frame synchronization to guarantee that the audio program is started on the same frame as the video program. This frame synchronization is achieved by using BNC cables to daisy-chain the sync signal between the video players, ending at the V16+ frame sync input. The sync works best when the V16+ is at the end of the line, with the 75 ohm terminator enabled using the internal jumper.

When these frame sync signals are connected to multiple players the V16+ can guarantee that a play command issued to multiple players will be processed by all players simultaneously, assuring that each player and the Digital Binloop system will reproduce their source material in exact synchronization.

Even though the Preshow and Theatre players source different video programs, by keeping them in perfect synchronization we assure that the Preshow and Theatre programs both begin at the same time. This makes for a smooth transition between theatres.

In order to avoid audio synchronization problems, we could synchronize the V16+, DVM2s and Digital Binloop Audio System to SMPTE timecode by using an Alcorn McBride SMPTE Machine. Each of the sequences in the V16+ could then be triggered at a preset SMPTE time code, but for this installation there is no advantage in using this SMPTE option since the V16+ and the players are always in agreement as to the current frame time. The SMPTE option would be handy, though, if our audio source were coming from a Tape Deck or other source that could induce time variances that would affect show performance.

Let's not forget to distribute sync to the PLC and projector, also. This will guarantee that the motion playback stays in sync with the projector and audio tracks.

Houselights

A V16+ output commands the dimmer cabinet to lower the theatre houselights for film projection. In an emergency situation, as well as at the end of every show, the houselights are brought back up to their original levels.

Printer

A serial printer can easily be connected to the show system to log the show cycle and any errors. In our example, we will use a small thermal printer (normally used in cash registers) to log system power-up.

More Outputs?

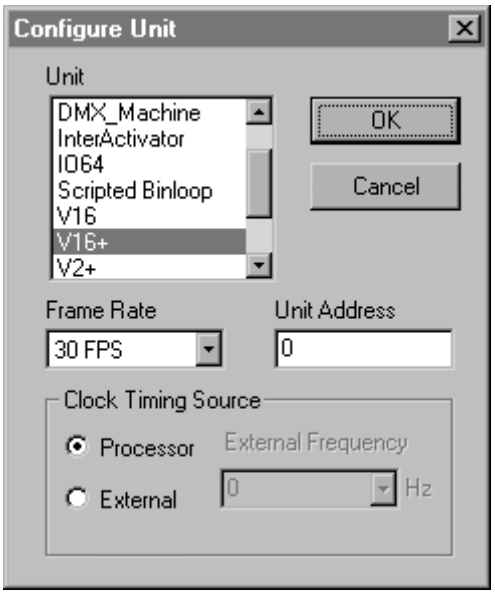
To keep our sequence examples simple, we have used only eight outputs of the sixteen available on the V16+. Many other discrete output possibilities can be added. For example, you could add independent show run, pause, and stop lights, cue lights for both the Theatre and Preshow OCCs, and control of special effects within the theatre. Also, the V16+ could control the OCC microphone mix to the audio equipment. To utilize more than sixteen inputs or outputs, additional IO64 Discrete I/O Expanders must be connected to the V16+.

Configuring the V16+

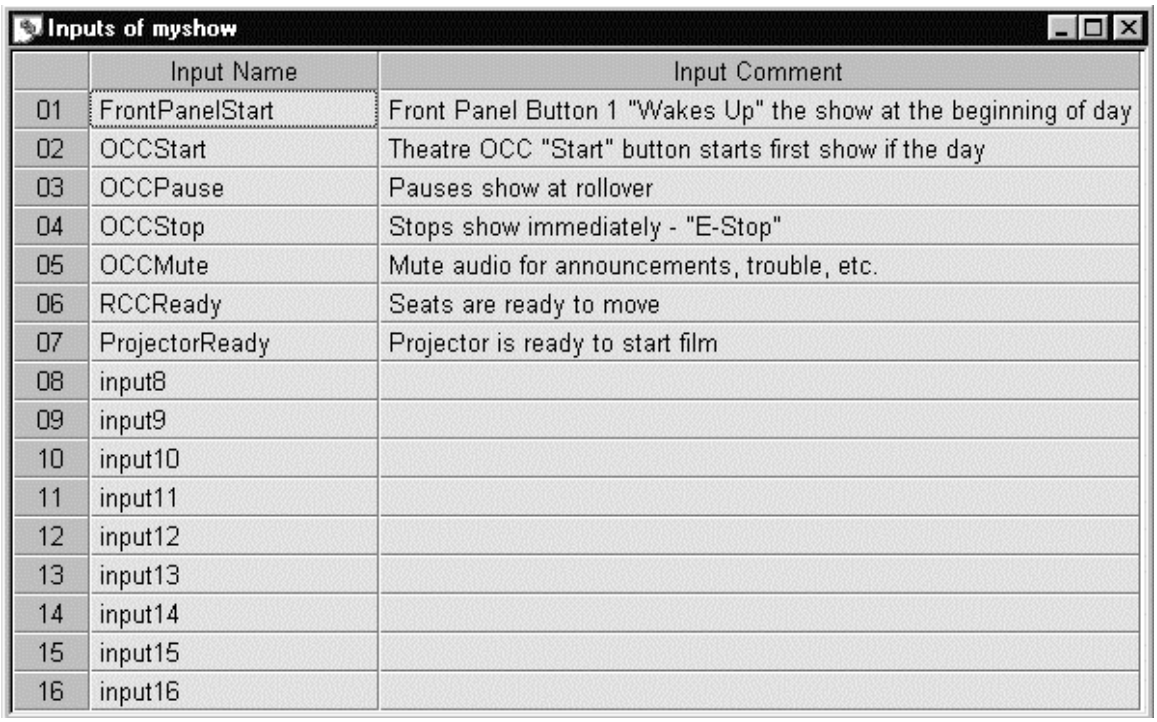
Now that we have designed the architecture of our show we need to describe it to the V16+. This is done with screens that, to a large extent, mimic the decisions that we have already made.

We begin from the main menu of the WinScript programming software by selecting the **File | New** option and choosing V16+ from the product list. Next, let's give our show a name…how about "MYSHOW"?

Let's continue by selecting the **Configuration | Unit…** menu item. This Dialog Box allows us to describe the environment that the script will be executing in. Information requested here includes the Unit Type (V16+), Unit Address, and frame rate. The selection of frame rate affects the frame numbers used while programming our sequences, so this selection should be made before we do any sequence programming. The V16+ clock can be sourced from the processor's internal oscillator or from an external clock at any rate up to 3000Hz. We will be using external frame sync from one of the Digital Video Machines, so set the Clock Source to **External**.

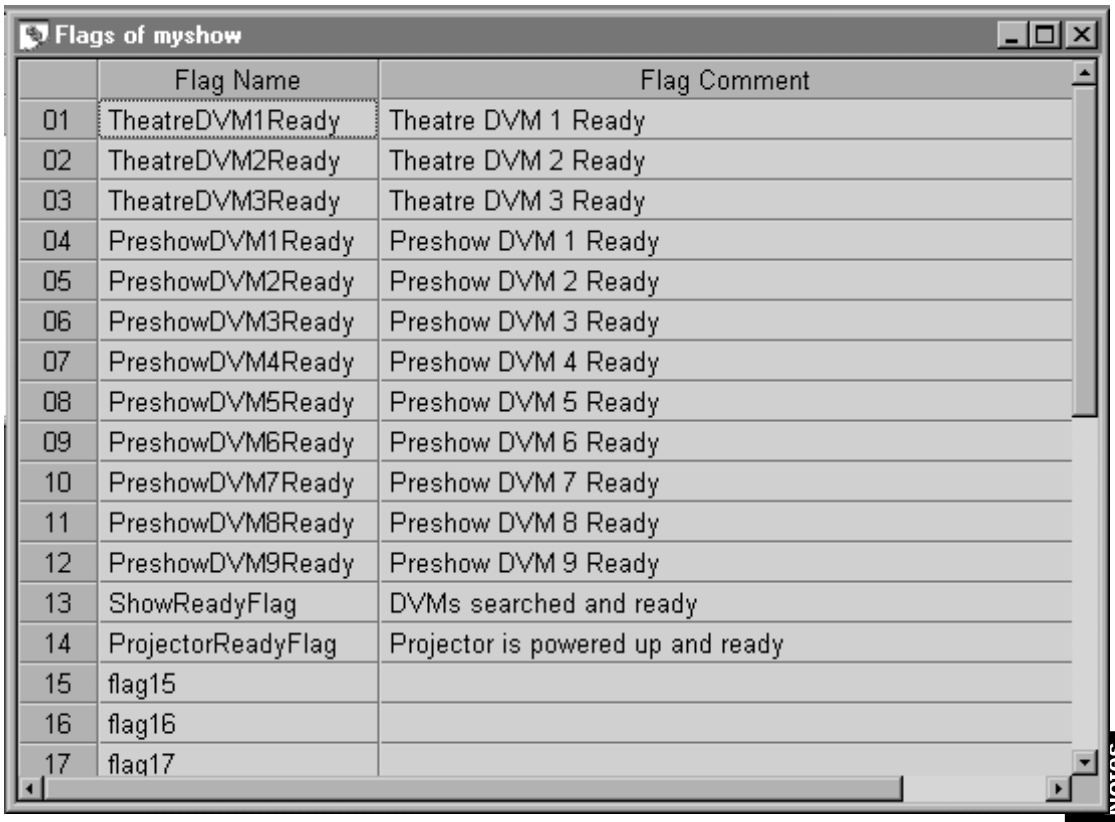


After closing this menu, we choose **Resources | Inputs…** . This is a simple menu which lists all of the inputs to the V16+ and allows us to give them English names which will be used throughout our sequences. Using the input hardware descriptions we arrived at previously, we assign our names.



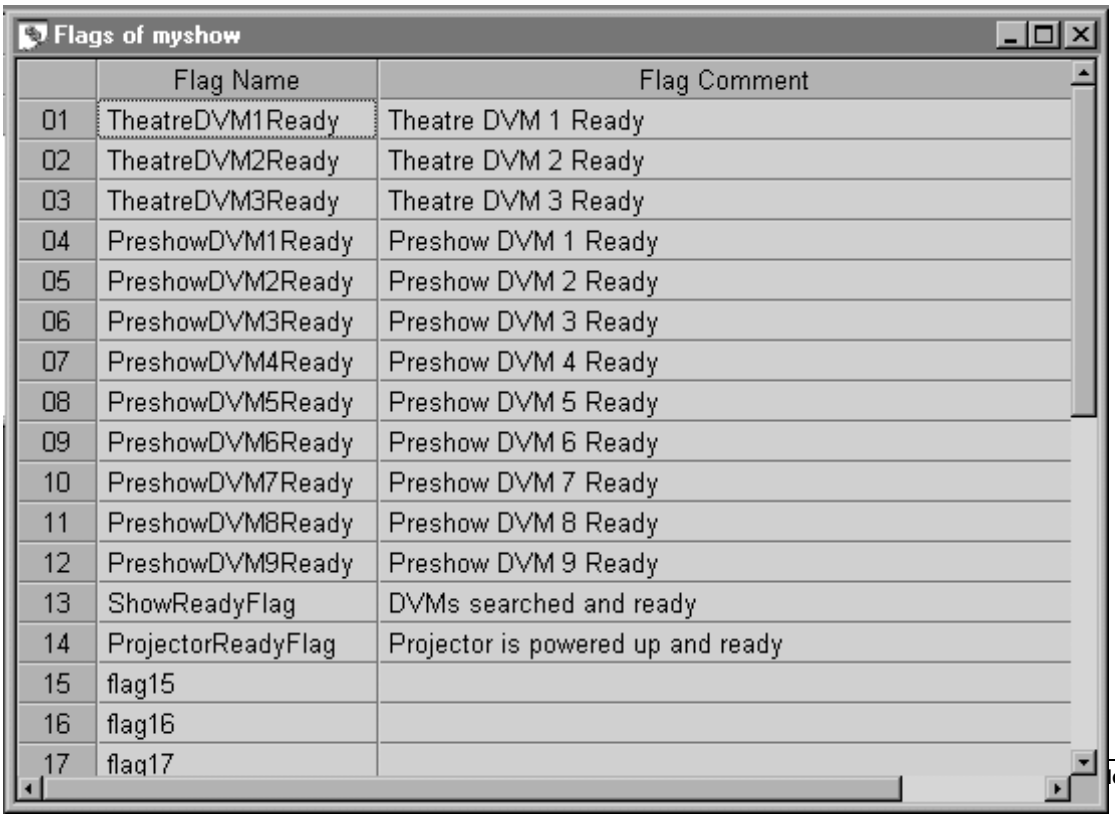
	Input Name	Input Comment
01	FrontPanelStart	Front Panel Button 1 "Wakes Up" the show at the beginning of day
02	OCCStart	Theatre OCC "Start" button starts first show if the day
03	OCCPause	Pauses show at rollover
04	OCCStop	Stops show immediately - "E-Stop"
05	OCCMute	Mute audio for announcements, trouble, etc.
06	RCCReady	Seats are ready to move
07	ProjectorReady	Projector is ready to start film
08	input8	
09	input9	
10	input10	
11	input11	
12	input12	
13	input13	
14	input14	
15	input15	
16	input16	

Next we close this screen and move on to **Resources | Outputs…** . In a similar fashion we give the outputs names that we wish to use throughout our sequences.



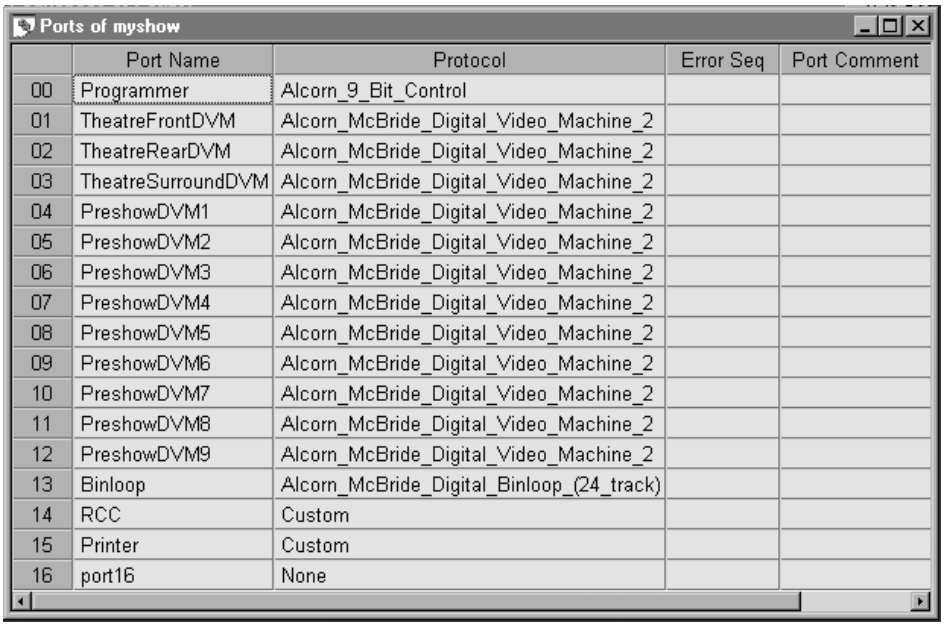
	Flag Name	Flag Comment
01	TheatreDVM1Ready	Theatre DVM 1 Ready
02	TheatreDVM2Ready	Theatre DVM 2 Ready
03	TheatreDVM3Ready	Theatre DVM 3 Ready
04	PreshowDVM1Ready	Preshow DVM 1 Ready
05	PreshowDVM2Ready	Preshow DVM 2 Ready
06	PreshowDVM3Ready	Preshow DVM 3 Ready
07	PreshowDVM4Ready	Preshow DVM 4 Ready
08	PreshowDVM5Ready	Preshow DVM 5 Ready
09	PreshowDVM6Ready	Preshow DVM 6 Ready
10	PreshowDVM7Ready	Preshow DVM 7 Ready
11	PreshowDVM8Ready	Preshow DVM 8 Ready
12	PreshowDVM9Ready	Preshow DVM 9 Ready
13	ShowReadyFlag	DVMs searched and ready
14	ProjectorReadyFlag	Projector is powered up and ready
15	flag15	
16	flag16	
17	flag17	

Next we choose **Resources | Flags…**. Flags 1-12 are used as “Ready Flags” to be turned “ON” when the corresponding Digital Video Machines is “Ready” to start the show. The exact information to enter into the fields is given in Figure 11.


Flags of myshow
Flag Name
Flag Comment
01 TheatreDVM1Ready Theatre DVM 1 Ready
02 TheatreDVM2Ready Theatre DVM 2 Ready
03 TheatreDVM3Ready Theatre DVM 3 Ready
04 PreshowDVM1Ready Preshow DVM 1 Ready
05 PreshowDVM2Ready Preshow DVM 2 Ready
06 PreshowDVM3Ready Preshow DVM 3 Ready
07 PreshowDVM4Ready Preshow DVM 4 Ready
08 PreshowDVM5Ready Preshow DVM 5 Ready
09 PreshowDVM6Ready Preshow DVM 6 Ready
10 PreshowDVM7Ready Preshow DVM 7 Ready
11 PreshowDVM8Ready Preshow DVM 8 Ready
12 PreshowDVM9Ready Preshow DVM 9 Ready
13 ShowReadyFlag DVMs searched and ready
14 ProjectorReadyFlag Projector is powered up and ready
15 flag15
16 flag16
17 flag17

lotes

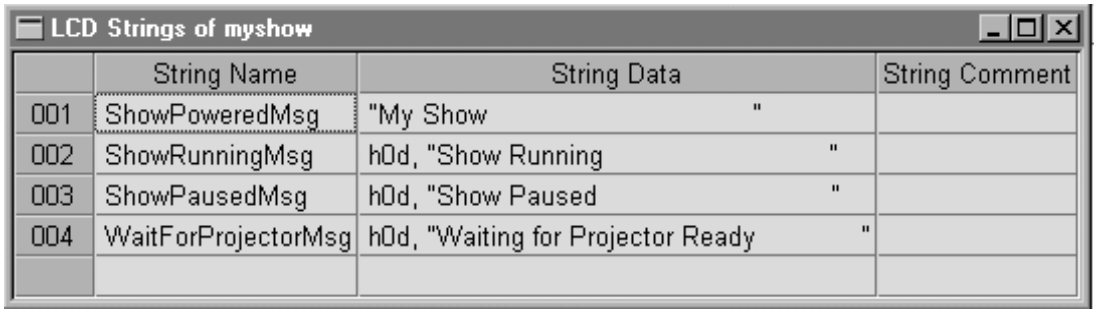
Now we move on to **Resources | Ports…** . This is where we configure the V16+ for the number and type of Digital Video Machine to which it is connected. For each player in use we select a baud rate, data format (parity, length in bits, and number of stop bits) and a manufacturer's protocol. This protocol can be specific to Sony or Pioneer disc players, or can be a custom protocol designed by the user. The Programmer Port is always port 0, and its type is set to Alcorn 9 Bit Control. In our show we will connect the V16+ to the 12 Pioneer disc players described previously, plus the Digital Binloop Audio System, a serial printer for data logging, and a Ride Control PLC. This uses 15 of the 16 serial ports of the V16+.



	Port Name	Protocol	Error Seq	Port Comment
00	Programmer	Alcorn_9_Bit_Control		
01	TheatreFrontDVM	Alcorn_McBride_Digital_Video_Machine_2		
02	TheatreRearDVM	Alcorn_McBride_Digital_Video_Machine_2		
03	TheatreSurroundDVM	Alcorn_McBride_Digital_Video_Machine_2		
04	PreshowDVM1	Alcorn_McBride_Digital_Video_Machine_2		
05	PreshowDVM2	Alcorn_McBride_Digital_Video_Machine_2		
06	PreshowDVM3	Alcorn_McBride_Digital_Video_Machine_2		
07	PreshowDVM4	Alcorn_McBride_Digital_Video_Machine_2		
08	PreshowDVM5	Alcorn_McBride_Digital_Video_Machine_2		
09	PreshowDVM6	Alcorn_McBride_Digital_Video_Machine_2		
10	PreshowDVM7	Alcorn_McBride_Digital_Video_Machine_2		
11	PreshowDVM8	Alcorn_McBride_Digital_Video_Machine_2		
12	PreshowDVM9	Alcorn_McBride_Digital_Video_Machine_2		
13	Binloop	Alcorn_McBride_Digital_Binloop_(24_track)		
14	RCC	Custom		
15	Printer	Custom		
16	port16	None		

App Notes

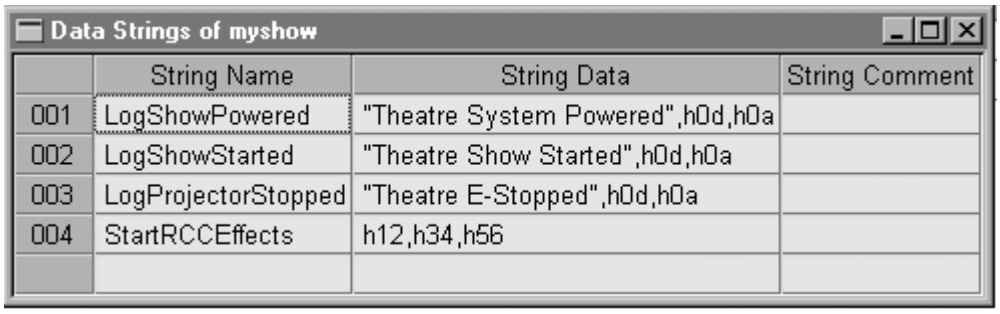
Next, we choose the **Resources | LCD Strings…** menu and create the display messages that will be seen on the V16+ LCD Display before, during, and after each show.



	String Name	String Data	String Comment
001	ShowPoweredMsg	"My Show "	
002	ShowRunningMsg	h0d, "Show Running "	
003	ShowPausedMsg	h0d, "Show Paused "	
004	WaitForProjectorMsg	h0d, "Waiting for Projector Ready "	

Finally, we go to the **Resources | Data Strings…** menu and create some serial strings for use in our sequences. This allows us to construct specialized serial messages that are not constructed by the script compiler. Do not enter search and play commands here. They are created automatically. This *is* the place, however, to define custom messages to be sent to the printer and RCC.

In a more complex show we could design a custom serial protocol for the RCC into a Protocol File, but since we will only be sending it one "start" message, we will keep the message in the Data Strings configuration for simplicity. In a real show situation, the messaging might be more complex, so please refer to your specific equipment manuals for information on serial protocols.



	String Name	String Data	String Comment
001	LogShowPowered	"Theatre System Powered",h0d,h0a	
002	LogShowStarted	"Theatre Show Started",h0d,h0a	
003	LogProjectorStopped	"Theatre E-Stopped",h0d,h0a	
004	StartRCCEffects	h12,h34,h56	

Now our V16+ is fully configured for its operating environment. The next step is to create and add events to the sequences of MYSHOW.

Configuring Sequences

We now will edit and configure our sequences by working with the **Sequences of MYSHOW** window. The V16+ supports up to 256 sequences. Each sequence may be up to 32,767 events long (although our V16+ can only hold around 8,192 total events since it supports a maximum of 64KB of show memory), and all sequences execute independently and simultaneously. Each sequence is started, paused, stopped and reset by its own unique set of conditions and can interact with other sequences as well. The logical place to begin our sequence programming is with our auto-executed sequence, the one that is also initiated by pressing the first button on the V16+ front panel. This is our show startup function and will bring all of the equipment in the attraction to a known starting state whenever the V16+ is first powered up or this first button is pushed.

Each sequence that we write must have its own setup properly filled in, in order to behave in the way that we expect. Double-click on the name of the Default sequence in the list and change the sequence name to “Startup”. For each sequence we can assign dedicated start, stop, pause and reset functions. These are normally attached to the front panel buttons on the V16+. In the case of our Startup sequence we have no requirement for a stop, pause or reset button. We do, however, want to attach the V16+'s first button to start this sequence by setting the Start Trigger of Startup to **FrontPanelStart**. We also want this sequence to be Autostart Enabled so that it will start immediately at powerup.

Similarly, the sequences Startshow and EStop should be assigned start triggers of **OCCStart** and **OCCStop**, respectively. The rest of our sequences will be started and reset by other sequences, so they should not be assigned any triggers.

Programming Sequences

Up to this point we have configured the V16+ environment and given English names to its input, output and serial ports. We have also defined some general purpose strings and given them English names. All of this configuration information now becomes a tool which we can use to create the sequences that will make our theatre run.

The sequence entry we are about to perform will result in a completed V16+ script consisting of a few sequences. Obviously with nine unused inputs, eight unused outputs and 212 unused sequences there is plenty more we can make this V16+ do. But these sequences will give you an idea of the V16+'s capabilities and form a rudimentary but complete theatre control system.

One of the most powerful aspects of the V16+ is the inter-relationship that sequences can have amongst themselves. Several of our example sequences will illustrate the flexibility this gives us.

The first sequence for which we will enter events is our Startup sequence. The function of Startup is to initialize outputs to known states. As you recall, this sequence is executed automatically when the V16+ and other equipment is first powered up. It is also executed whenever the first push button on the V16+ front panel is pressed.

The very first activity in our startup sequence must be to reset other important sequences. Since many of our sequences operate the same outputs, allowing some other sequences to run during Startup could cause interesting and unpredictable interactions. When first powering up the V16+, of course, the other sequences will not be running, but they may be if the start button is pushed later during the day.

Startup continues by initializing all of the V16+ outputs to a known state. When the V16+ is first powered up all of its outputs are initialized to off; however, since the Startup sequence can be executed at any time, the state of the outputs is unknown. We therefore initialize all of them. Do this using the Off and On events in the Event column and the English names of the outputs in the Data1 column. Using these commands, we turn off the operator console cue light, close the exit doors, turn off the projector start and douser lines and turn off the audio mute line.

We also want to set the entrance doors to their normal rollover state, which in our case is going to be open. Before we do this we should blink the warning lights for 5 seconds to alert anyone near the doors that they are going to move. Do this using the Blink event, putting the warning light

name in the Data1 column and a one second blink rate into the Data2 column.

[Startup] of myshow

	R	Label	Time	Event	Data1	Data2	Data3	Data4	Comment
000001			00:00.00	Start	ResetAllSequences				Reset Important Sequences
000002			00:00.02	Off	OCCReady				OCC Ready Light Off
000003			00:00.02	Off	ExitDoors				Close Exit Doors
000004			00:00.02	Off	ProjectorStart				Projector Off
000005			00:00.02	Off	ProjectorDouse				Douser Closed
000006			00:00.02	Off	MuteAudio				Audio On
000007			00:00.02	On	HouseLights				Houselights Up
000008			00:00.02	Blink	DoorWarningLight	1.00			Impending Door Open Signal
000009			00:00.02	Display	ShowPoweredMsg				LCD "Powerup" Message
000010			00:00.02	Off	TheatreDVM1Ready				DVM Ready Flag Off
000011			00:00.02	Off	TheatreDVM2Ready				""
000012			00:00.02	Off	TheatreDVM3Ready				""
000013			00:00.02	Off	PreshowDVM1Ready				""
000014			00:00.02	Off	PreshowDVM2Ready				""
000015			00:00.02	Off	PreshowDVM3Ready				""
000016			00:00.02	Off	PreshowDVM4Ready				""
000017			00:00.02	Off	PreshowDVM5Ready				""
000018			00:00.02	Off	PreshowDVM6Ready				""
000019			00:00.02	Off	PreshowDVM7Ready				""
000020			00:00.02	Off	PreshowDVM8Ready				""
000021			00:00.02	Off	PreshowDVM9Ready				""

Now that the rest of the theatre is ready, we start the Recycle sequence which will get all 12 DVM2s ready. Since we do not know how long it will be until the first performance, it is necessary to search the DVM2s as fast as possible. To do this, we start 12 independent search sequences (SearchTheatre1, SearchTheatre2, SearchTheatre3, SearchPreshow1, etc.) that turn the corresponding flag "ON" when the player has been searched. Also, to insure that all outputs will be "OFF" when the Search sequences begin, we simply turn them all "OFF" before we start Search sequences 1-12.

If all twelve **SelectClip** events were put in the same sequence, the time that it takes for each player to spin-up will accumulate. Even though they would be scripted to occur on the same frame, the final **SelectClip** event could be over 4 minutes late!

[SearchTheatre1] of myshow

	R	Label	Time	Event	Data1	Data2	Data3	Data4	Comment
000001			00:00.00	SelectClip	TheatreFrontDVM	1			
000002			00:00.00	On	TheatreDVM1Ready				

[DVMSearched?] of myshow

	R	Label	Time	Event	Data1	Data2	Data3	Data4	Comment
000001			00:00.00	IfOff	TheatreDVM1Ready	loop			If not searched, check ag
000002			00:00.00	IfOff	TheatreDVM2Ready	loop			If not searched, check ag
000003			00:00.00	IfOff	TheatreDVM3Ready	loop			If not searched, check ag
000004			00:00.00	IfOff	PreshowDVM1Ready	loop			If not searched, check ag
000005			00:00.00	IfOff	PreshowDVM2Ready	loop			If not searched, check ag
000006			00:00.00	IfOff	PreshowDVM3Ready	loop			If not searched, check ag
000007			00:00.00	IfOff	PreshowDVM4Ready	loop			If not searched, check ag
000008			00:00.00	IfOff	PreshowDVM5Ready	loop			If not searched, check ag
000009			00:00.00	IfOff	PreshowDVM6Ready	loop			If not searched, check ag
000010			00:00.00	IfOff	PreshowDVM7Ready	loop			If not searched, check ag

[Recycle] of myshow

	R	Label	Time	Event	Data1	Data2	Data3	Data4	Comment
000001			00:00.00	Start	SearchTheatre1				Start DVM Search sequences
000002			00:00.00	Start	SearchTheatre2				
000003			00:00.00	Start	SearchTheatre3				
000004			00:00.00	Start	SearchPreshow1				
000005			00:00.00	Start	SearchPreshow2				
000006			00:00.00	Start	SearchPreshow3				
000007			00:00.00	Start	SearchPreshow4				
000008			00:00.00	Start	SearchPreshow5				
000009			00:00.00	Start	SearchPreshow6				
000010			00:00.00	Start	SearchPreshow7				
000011			00:00.00	Start	SearchPreshow8				
000012			00:00.00	Start	SearchPreshow9				
000013			00:00.00	Start	DVMSearched?				Check to see if DVMs are ready
000014			00:00.00	Start	ProjectorReady?				Check to see if Projector is ready

Recycle is used at the end of each show to bring the DVM2s to the beginning of the file in preparation for show playback. Make sure that there are no triggers assigned to this sequence. It cannot be activated by any switch closure. It is only activated by other sequences. This sequence does not have the ability to be restarted and will not Autostart either. Essentially the entire configuration has been set to an inactive state.

Just before Recycle ends we start another sequence: DVMSearched?. DVMSearched? constantly checks the status of each DVM2, so it should be Loop Enabled. If even one of the players isn't powered or is not responding, the show cannot begin, but eventually the **SelectClip** commands inside the Search sequences will time-out and the show will commence, even though a DVM2 may not be spun-up. When all DVM2s are searched. the **ShowReadyFlag** is set.

[StartShow] of myshow

	R	Label	Time	Event	Data1	Data2	Data3	Data4	Comme
000001			00:00.00	Display	WaitForProjectorMsg				Wait for Projector messa
000002			00:00.00	IfOff	ProjectorReadyFlag	loop			If projector is not ready,
000003			00:00.00	IfOff	ShowReadyFlag	loop			If DVMs are not ready, c
000004			00:00.00	Off	ProjectorReadyFlag				Reset flag to Off for next
000005			00:00.00	Off	ShowReadyFlag				Reset flag to Off for next
000006			00:00.00	Start	ShowTime				If everything is ready, it's
000007			00:00.00	Reset	StartShow				Don't loop forever
000008		loop	00:00.00	Nop					Looping placeholder

Our next sequence is StartShow. StartShow is actuated by the start button on the theatre operator's console. Our theatre presentation is designed so that it can automatically loop all day long after the first show is manually started. To run the first show of the day the operator presses the OCC start button and StartShow begins execution. Configure StartShow to have the **OCCStart** input as its start trigger and don't forget to check the Loop Enable checkbox to assure that we continually check for the projector ready-line.

StartShow uses the LCD display command to inform us that it is waiting for the projector ready line. Next it checks to see if the projector ready line is active. If it is not, it jumps over the next line to the **Nop** at the end of the sequence, labeled **loop**. As soon as the sequence reaches the end, it begins again at the beginning. When the projector is ready, StartShow confirms that the DVM2s have been searched to the correct frame, starts the main show sequence, Showtime, and resets itself so that it won't interfere with other sequences.

[ShowTime] of myshow

	R	Label	Time	Event	Data1	Data2	Data3	Dat
000001			00:00.00	Reset	StartShow			
000002			00:00.00	Start	PlayTheatre1			
000003			00:00.00	Start	PlayTheatre2			
000004			00:00.00	Start	PlayTheatre3			
000005			00:00.00	Start	PlayPreshow1			
000006			00:00.00	Start	PlayPreshow2			
000007			00:00.00	Start	PlayPreshow3			
000008			00:00.00	Start	PlayPreshow4			
000009			00:00.00	Start	PlayPreshow5			
000010			00:00.00	Start	PlayPreshow6			
000011			00:00.00	Start	PlayPreshow7			
000012			00:00.00	Start	PlayPreshow8			
000013			00:00.00	Start	PlayPreshow9			
000014			00:00.00	Play	Binloop	R1	Primary	1
000015			00:00.00	Pulse	ProjectorStart	0.15		
000016			00:00.00	MessageOut	RCC	StartRCCEffects		
000017			00:00.00	Display	ShowRunningMsg			
000018			00:00.00	Off	EntryDoors			
000019			00:00.00	Off	HouseLights			

Showtime is the main timekeeping sequence for running the theatre show. Showtime's 0 starting frame corresponds to the first frame played back from all of the DVM2s. We define it this way to make it easier to program the sequence of theatre events: all of the time offsets throughout the sequence are relative to the show frame being played back. (If events need to occur after StartShow and before the DVM2s play, these events should be placed in another sequence started by StartShow. At its completion that new sequence should start Showtime.)

Showtime immediately issues a play command to all of the DVM2s. Again we do this by starting multiple parallel sequences to assure that the commands are all processed in parallel and all the players start on the same frame. By doing this we have guaranteed that the V16+ will send the serial commands to all players simultaneously.

Simultaneously with a play command to all of the DVM2s, Showtime sends a start message to the Digital Binloop system. Next, we send a start pulse message to the projector. Then, we send a serial message to the RCC telling it to start its motion control playback.

Now that we have completed the time critical activities that occur at frame 0 we can perform some lower priority functions. We display "Show Running" on the LCD and command the house lights, entrance doors, audio mute, and cue light off. Five seconds after the projector started we open the douser.

The show is now running. Our imaginary show ends at 2 minutes, 45 seconds. Twenty seconds prior to that we pulse the operator console cue light for 3 seconds to cue the operators to prepare for their spiels. Now the show is over. We close the douser, bring up the house lights and open the exit doors. We also start the Recycle, previously described, to bring the DVM2s back to their starting positions. Notice that Recycle is performing this activity while Showtime continues to run.

Now we blink the warning lights for the entrance doors. The preshow operator provides a fifteen second speil and then we open the entrance doors and turn off the warning lights. After an additional 25 seconds we close the exit doors.

Next we check the state of the operator console pause switch. (To simplify things, we are using a maintained switch. A momentary would work just as well, but we would need an extra sequence and a flag to hold its state.). If the switch is in the pause position, then we should not Recycle the show automatically. We instead jump to the End label. If the switch is not paused, then we can re-initiate the entire show cycle by starting StartShow.

If we are in pause, we display a status message on the LCD display to that effect.

[EStop] of myshow

	R	Label	Time	Event	Data1	Data2	Data3	Data4	Comment
000001			00:00.00	Off	ProjectorDouse				Close Projector Douser
000002			00:00.00	On	HouseLights				Turn On House Lights
000003			00:00.00	On	MuteAudio				Mute Audio
000004			00:00.00	Stop	Binloop	All			Stop Binloop Playback
000005			00:00.00	Start	ResetAllSequences				Stop all sequences that could be runni

The final sequence, EStop, is responsible for handling the operator console stop button. When pressed it closes the douser, brings up the houselights and stops the other sequences.

Summary

As you can see, the V16+ provides a wealth of Show Control power and versatility to even the most complex of shows, providing exact timing and control over all show systems.

Digital Video Machine Control

The Alcorn McBride Digital Video Machine 2 is the most robust video playback unit available today; providing near-instantaneous access to up to 9,999 individual video clips. It works wonderfully as a LaserDisc player replacement in many applications -- kiosks, preshows, vehicles, etc. Because of its discrete inputs and playlisting abilities, the DVM2 can handle many such applications all by itself; however, when timeouts and logic are called for, a show controller is needed.

In this example, we have established a new hotel, the Alcorn Inn, and are seeking ways to advertise our new hotel to current or would-be tourists. Our marketing department comes up with an idea for an interactive kiosk that provides prospective customers with a rich multimedia presentation touting the great benefits of staying at the Alcorn Inn. Energized by the marketing pep-talk, we quickly decide to combine an Alcorn McBride InterActivator and DVM2 to provide both control and audio/video sourcing for our kiosk.

You can follow along with this application note in WinScript by opening **DVM.AMW** (located in the WinScript\Scripts\Examples\ directory).

Note This application note assumes that the reader possesses rudimentary scripting skills. New users should take the WinScript Tutorial in Chapter 3 before continuing.

How Our Kiosk Works

At power-up, our kiosk will run an "Attract Loop". This video sequence will be a succession of still-images taken at the Alcorn Inn and will loop at the end (the first and last still images are the same, providing a seamless transition back to the beginning).

When a guest steps up to the kiosk, the motion sensor is tripped and a short "welcome" video message is played. The guest is then given the choice to view one of four clips: Great Rooms, Great Food, Great Rates, and a Special Offer. Great Rooms, Great Food, and Great Rates are located on the Internal drive of the DVM2, and Special Offer is located on the Removable drive (this allows us to change our special offer at any time without having to copy the clip to the Internal drive). If the guest does not select a clip within ten seconds, it is assumed that they have walked away and the kiosk returns to the Attract Loop.

If the guest chooses a clip by pressing one of the buttons, the clip is played and then the Welcome clip is played again. Once the guest views all of the desired clips and walks away (hopefully to the nearest phone to reserve a week at the Alcorn Inn), the kiosk will return to the Attract Loop.

Here is a listing of all the clips and playlists on our DVM2:

Removable Drive		Internal Drive	
Clip Name	**File Name**	**Clip Name**	**File Name**
Special Offer	VID00001.MPG	Attract Loop Playlist	PLY00000.LST
		Great Rooms Clip	VID00001.MPG
		Great Food Clip	VID00002.MPG
		Great Rates Clip	VID00003.MPG
		Welcome Clip	VID00004.MPG
		Attract Loop Clip	VID00005.MPG

Creating The Attract Loop Playlist

We want our kiosk to start the Attract Loop as soon as possible after powerup, so we will use the Attract Loop Playlist located on the Internal drive to play and loop the Attract Loop clip as soon as the DVM2 has powered up. The Playlist is created as follows:

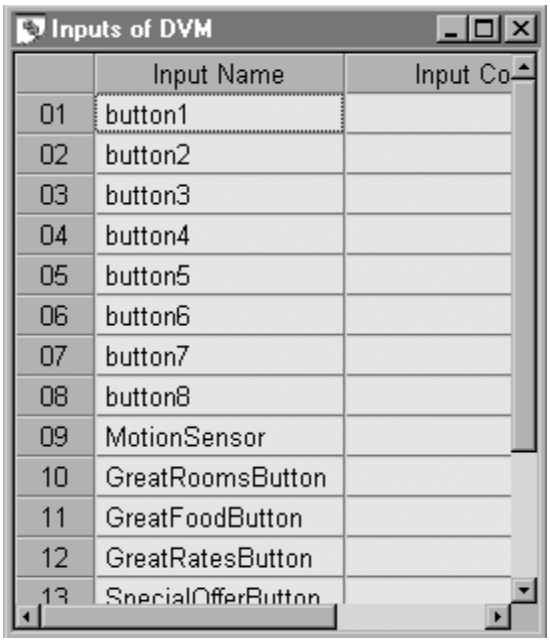
```
I  ;Our Attract Loop is interruptible
```

```
L5 ;Loop Attract Loop Clip (VID00005.MPG)
```

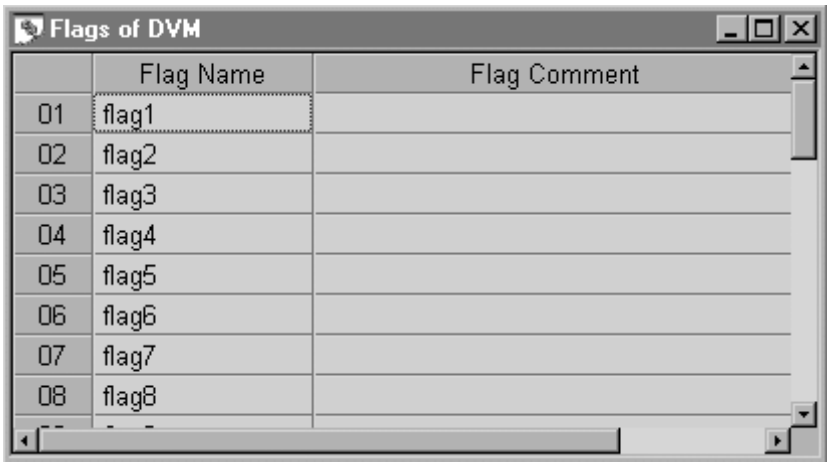
Programming the InterActivator

First, we configure Port 1 of the InterActivator for the Alcorn McBride Digital Video Machine 2:

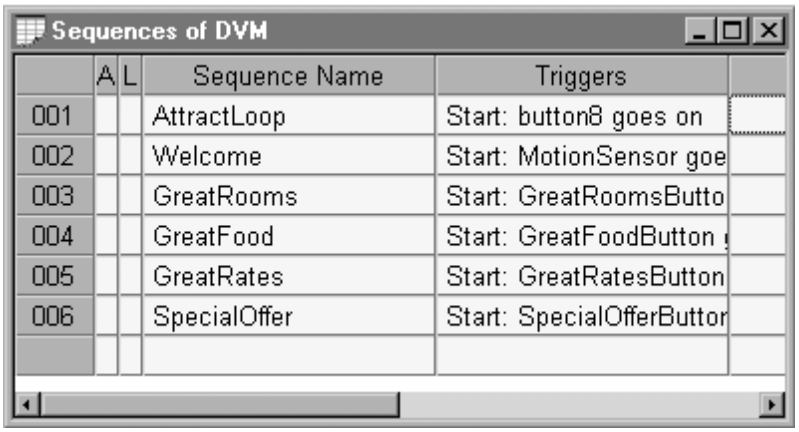
Next, we assign our contact closure inputs: Input 9 of the InterActivator is connected to the motion sensor, Inputs 10-13 are connected to the four external pushbuttons, and Input 14 is connected to the **Playing** output of the DVM2:



To prevent the guest from being able to interrupt a clip while it is playing, we will use two flags to keep track of where we are in the show. This will allow our sequences to decide whether or not they should accept input from the guest. **PlayingClipFlag** will be turned on when one of our four informational clips is playing, while **PlayingWelcomeFlag** will be turned on when the "Welcome" clip is playing.



Next, we want to create the sequences that provide the interactivity of our kiosk and tightly control the flow of the show. The sequences we will use are listed in the figure below:



Our first sequence will be the Attract Loop sequence. Although this sequence won't be used at powerup, it will be called on to play the Attract Loop after a guest has stepped away from the kiosk. AttractLoop selects the Internal drive of the DVM2 with the **SelectDrive** event and then commands the DVM2 to continuously play and loop the Attract Loop clip.

[AttractLoop] of DVM

	R	Label	Time	Event	Data1	Data2	Da
000001			00:00.00	SelectDrive	DVM	Internal	
000002			00:00.00	PlayAndLoop	DVM	2	

Our next sequence is a housekeeping sequence that has become commonplace in many scripts. This sequence, **ResetFlags**, indescriminately resets all of the flags that we are using in this script. We will use this sequence to return the flags to a known state at certain points in the show.

[Reset Flags] of DVM

	R	Label	Time	Event	Data1	Data2	Data
000001			00:00.00	Off	PlayingClipFlag		
000002			00:00.00	Off	PlayingWelcomFlag		

MotionSensor triggers the sequence **Welcome**. This sequence resets the flags using **ResetFlags** to ensure that the show is in a known state, turns on **PlayingWelcomeFlag** to alert the other sequences that the Welcome clip is currently playing, and then plays the Welcome clip.

[Welcome] of DVM

	R	Label	Time	Event	Data1	Data2	Dat
000001			00:00.00	SelectDrive	DVM	Internal	
000002			00:00.00	Play	DVM	1	
000003			00:00.00	Start	AttractLoop		

When **PlayInput** (the **Playing** output of the DVM2) turns off, we know that one of the clips has just finished playing - but which one? Using the two flags we created earlier (**PlayingWelcomeFlag** and **PlayingClipFlag**), we can create a sequence that is triggered when **PlayInput** turns off. We can then decide whether it should wait for the guest to push a button (after **Welcome** has finished), or immediately play the Welcome clip (after an informational clip has played).

Our sequence, **ClipFinished**, first checks the state of **PlayingClipFlag**. If it is on, the sequence knows that the DVM2 has just finished playing one of the four informational clips. It turns off **PlayingClipFlag** and starts Welcome (which plays the Welcome clip again). If **PlayingClipFlag** is off, then the sequence checks the state of **PlayingWelcomeFlag**. If **PlayingWelcomeFlag** is on, the sequence knows that the DVM has just finished playing the Welcome clip and that it should wait for the guest to push a button. It turns off the flag and starts our "waiting" sequence, **WaitingForSelection**. We are only interested in the status of the four informational clips and the Welcome clip during the show, so if both flags are off, we do nothing.

[ClipFinished] of DVM

	Label	Time	Event	Data1	Data2
000001		00:00.00	IfOff	PlayingClipFlag	CheckWelcome
000002		00:00.00	Off	PlayingClipFlag	
000003		00:00.00	Start	Welcome	
000004		00:00.00	Goto	End	End
000005	CheckWelcome	00:00.00	IfOff	PlayingWelcomeFlag	
000006		00:00.00	Off	WaitingForSelection	
000007		00:00.00	Start	WaitingForSelection	
000008	End	00:00.00	Nop		

WaitingForSelection waits ten seconds after the Welcome clip finishes and then restarts the Attract Loop, assuming that the guest has walked away. If the guest presses a button during the ten-second interval, the sequence that corresponds with that button will reset **WaitingForSelection** so that it does not restart the Attract Loop.

[WaitingForSelection] of DVM

	R	Label	Time	Event	Data1	Data2	Data3
000001			00:10.00	Start	ResetFlags		
000002			00:10.00	Start			

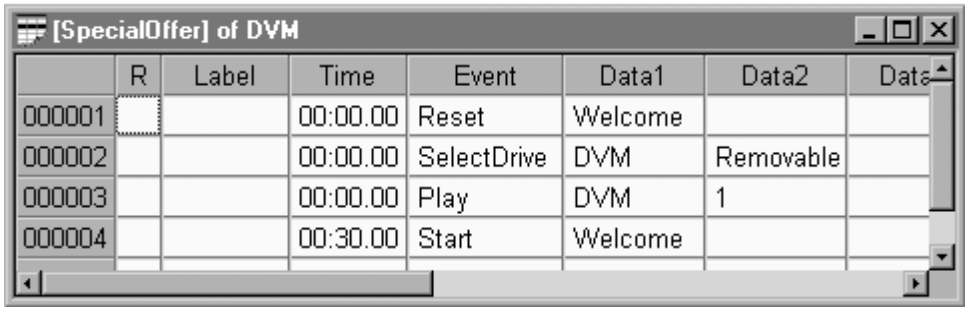
We provide four separate sequences (triggered individually by a corresponding pushbutton) to play our informational clips: **GreatRooms**, **GreatRates**, **GreatFood**, and **SpecialOffer**. These sequences check the status of both flags. If either flag is on, the sequence knows that another clip is playing and it should not interrupt it, so it does nothing. This forces the guest to watch a clip in its entirety before choosing another.

[GreatRooms] of DVM

	R	Label	Time	Event	Data1	Data2	Data3
000001			00:00.00	Reset	Welcome		
000002			00:00.00	SelectDrive	DVM	Internal	
000003			00:00.00	Play	DVM	1	
000004			00:30.00	Start	Welcome		

[GreatRates] of DVM

	R	Label	Time	Event	Data1	Data2	Data
000001			00:00.00	Reset	Welcome		
000002			00:00.00	SelectDrive	DVM	Internal	
000003			00:00.00	Play	DVM	3	
000004			00:30.00	Start	Welcome		



	R	Label	Time	Event	Data1	Data2	Data
000001			00:00.00	Reset	Welcome		
000002			00:00.00	SelectDrive	DVM	Removable	
000003			00:00.00	Play	DVM	1	
000004			00:30.00	Start	Welcome		

Each sequence resets **WaitingForSelection** to prevent it from starting the Attract Loop ten seconds later. After the informational clip has finished playing, **ClipFinished** starts the Welcome clip again. When the guest has viewed all the desired clips and walks away, the kiosk automatically times out, starts the Attract Loop and waits for the next guest.

Summary

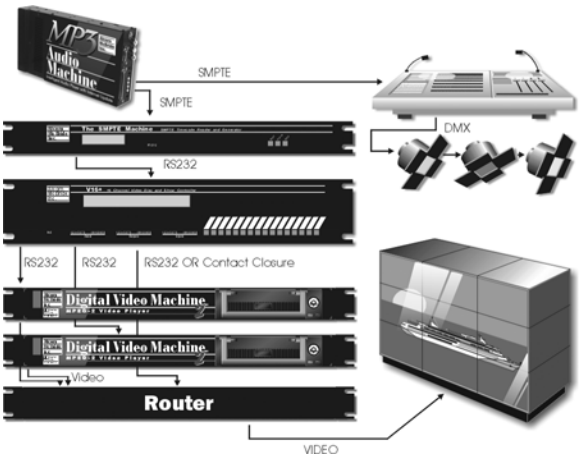
As you can see, controlling video playback from a Digital Video Machine 2 is extremely straightforward. Near-instantaneous access times eliminate the need for independent Spinup, Spindown, or Search sequences. Also, the Playing output allows us to make our script clip-independent, so we can change the lengths or content of our clips at any time without reworking the script. An InterActivator / DVM2 combination is ideal for many applications.

Using Cue List in a Live Show

Many live shows use SMPTE timecode to keep the audio, video, lighting and show control in sync. In some of these shows, the programmer has the luxury of a timecode list. Typically this list is dictated by the audio program and indicates the timecode locations at which certain events must happen. When this luxury exists, programming your show with timecode is as simple as entering in timecode triggers in WinScript in the appropriate sequences, as discussed earlier.

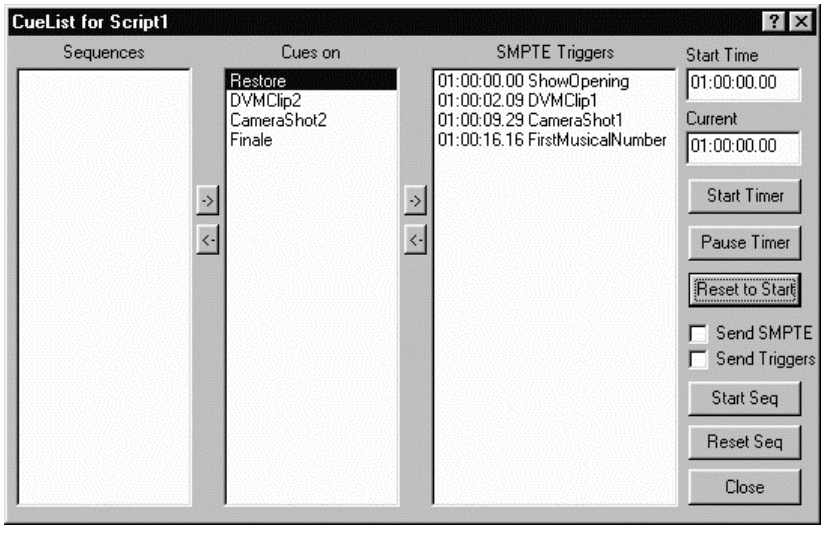
When you do not have the benefit of a timecode listing, you can use Cue List to attach timecode triggers to your sequences in real time. By running the show with timecode and cueing the show in real time, you can place your sequences at the exact time that you desire while watching the entire show with all show elements.

To illustrate the use of Cue List, here is a sample application: a live show on a cruise ship. This show involves an audio playback source and a lighting console that both track timecode. Additionally, there are video sources and a router that must function within the show. For this application, we will use a SMPTE Machine and a V16+.



In live shows, such as this one, the number of times the show is run with all elements is very small. This is because it is very difficult to run the show multiple times with the cast and the cast is often critical in adjusting the timing of show control and lighting elements. Therefore, it is important to use each valuable run of the show as much as possible. In this case, we would like to trigger as many sequences as possible and fine-tune the show with each successive run.

In this particular instance, we pre-program the sequences to decide which video clip should play at different phases in the show and what video source should be routed at various times. Once all of the programming has been done, we can run Cue List. The first step is to arrange the Sequences in the rough order that they should occur in the show under the "Cues On" window. While it is possible to re-arrange these Cues while we are running the show by dragging them up and down in the list, it is easier to do this now while you are not distracted by the show running. Once you are ready to go, you can set the Start Time, Reset to the Start Time, and Start the Timer. If you are running a show in which the SMPTE Machine is not the SMPTE generator, you should push the Start Timer button when the timecode source starts. As the director calls for the sequences to be run, it is easy to move the sequences from the "Cues On" window to the "SMPTE Triggers" window.



App Notes

After all of the Cues have been placed, the Cue Times can be adjusted by moving the questionable sequences back to the “Cues On” window and re-running the show. Another option is to modify the trigger times by right-clicking on the sequence, selecting the SMPTE Trigger, and modifying it accordingly.

If you would like to program your show off-line, while relaxing on the pool deck, it is easy to run Cue List with a tape of the audio source (or a video tape of the show). Simply run the source and start the timer. At the appropriate locations, move the sequences from the “Cues On” window to the “SMPTE Triggers” window. After this has been completed, you can return to the theatre, download your script and fine-tune the show on the next run-through. This also works if you are programming the show in your cabin if it is raining on the pool deck.

With Cue List, it is easy to adjust show control timing while all the other show components are adjusted and keep the director happy.

Controlling Automatic Doors

There are many applications where an Alcorn McBride Show Controller can perform non-safety-related duties normally delegated to a PLC. One application that immediately comes to mind is automatic theatre doors. These doors open when the main show is loading/unloading (as in the Large Theatre Control example). The Show Controller should automatically open/close the doors as dictated in the script except when overridden by an operator control switch.

This simple example utilizes a three-position maintained switch to provide a Show Controller with two inputs: **Open** and **Close**. The center position is Auto, and can be deduced by the absence of both **Open** and **Close** inputs. When the switch is in the **Open** position, the Show Controller should keep the doors open, regardless of what the show is doing at the moment. The same is true with the **Close** position; the doors should remain closed regardless of the status of the show. In the **Auto** position, the Show Controller can dynamically open and close the doors at the appropriate time. A flag will provide automated control of the doors from within any of the other sequences: the sequence will turn the flag on to open the doors and off to close the doors. If a set of doors is in **Auto** mode, our looping sequence should open/close them based on the state of the flag. If the doors are in **Open** or **Close** mode, the other sequences may still turn on and off the flag, but the doors will not be affected.

We will perform this function by using one **Loop Enabled** sequence that continuously checks the inputs and opens/closes the doors if necessary.

The figure below shows the events of our sequence, **OpenCloseDoors**. This sequence loops every 10 frames and update the state of the doors based upon the switch inputs (*DoorOpenInput* and *DoorCloseInput*) and the script open/close flag (*DoorFlag*). The sequence first checks if either input is on. If the operator has moved the switch to the **Open** position, the doors should be opened. Similarly, if the operator has moved the switch to the **Close** position, the doors are automatically closed without regard to *DoorFlag*. Finally, if the doors are in the **Auto** position, the status of DoorFlag is checked. If *DoorFlag* is "on" the doors are opened, and vice versa.

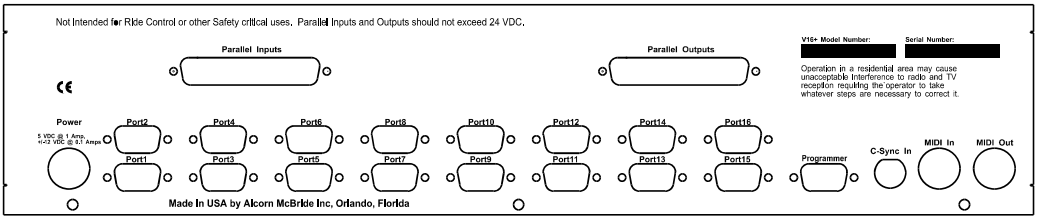
[OpenCloseDoors] of doors

	R	Label	Time	Event	Data1	Data2	Data3	Data4	Comment
000001			00:00.00	IfOn	DoorOpenInput	Open			If Manual Open, Open Doors
000002			00:00.00	IfOn	DoorCloseInput	Close			If Manual Close, Close Doors
000003			00:00.00	Goto	Auto				If in Auto, Let Script Open/Close Doors
000004		Open	00:00.00	On	DoorOutput				Open Doors
000005			00:00.00	Goto	End				
000006		Close	00:00.00	Off	DoorOutput				Close Doors
000007			00:00.00	Goto	End				
000008		Auto	00:00.00	IfOff	DoorFlag	AutoClose			Check Script's On/Off Flag for desired status
000009		AutoOpen	00:00.00	On	DoorOutput				Open Door if Door Flag is On
000010			00:00.00	Goto	End				
000011		AutoClose	00:00.00	Off	DoorOutput				Close Door if Door Flag is Off
000012		End	00:00.10	Nop					Loop and check again

Summary

Using flags as "permission" outputs allows a separate sequence to monitor the status of operator controls, check the flag, and perform the desired action ("grant permission"), if possible. As you can see, we have saved considerable Ladder Logic programming (and perhaps an entire PLC) by utilizing one sequence, one flag, and two inputs to control our automatic doors.

V16+ Hardware Reference



The V16+ is the latest version of our original, and still most powerful, Show Controller. It is ideally suited for the control of video walls, large theaters, and multiple kiosks or interactive games. It provides more serial ports than any of our other controllers, and offers the largest possible show memory capacity.

Specifications

Size and Weight:	Standard 2U rack mount (3.5” x 19” x 6.5”), 10 lbs
Power:	100 to 250 VAC, 50 to 60 Hz, 25 watts maximum. UL listed Class 2 power adapter
Environment:	0 to 35 C (32 to 100 F) 0 to 90% relative humidity, non-condensing
Front Panel:	2x40 LCD Display Power LED Acknowledge (ACK) LED Error LED 16 Serial Activity LEDs 16 Input Status LEDs 16 Output Status LEDs 16 Pushbuttons
Rear Panel:	Programming Port DB-9M 16 Serial Ports DB-9M MIDI Input 5-pin DIN Female MIDI Output 5-pin DIN Female Discrete Inputs DB-37M Discrete Outputs DB-37F NTSC or PAL Sync Input BNC Power 5-pin DIN Female
Serial Ports:	(16) RS-232C 300 baud - 38.4 Kbaud 7, 8, or 9 Data Bits 1 or 2 Stop Bits All parity types 4 ports can be configured as RS-485/422 1 port can be configured as MIDI
Opto Inputs:	(16) 24 VDC, 20 mA maximum Reconfigurable for voltages down to 5 VDC or for pure contact-closure operation. Trigger latency < 1 frame.
Relay Outputs:	(16) Contact Closures limited internally to 900 mA with self-restoring polymer fuses.
Show Memory:	32 Kbyte EEPROM, expandable to 64 Kbytes. Nonvolatile, robust memory retains show data permanently with no battery backup required.

Serial Ports

The V16+ provides 16 serial ports which may be configured as shown below:

Port	Type	Description	Connector
0	RS-232	Programmer Port	DB9M
1	RS-232* / RS-485	Port 1	DB9M
2	RS-232* / RS-485	Port 2	DB9M
3	RS-232* / RS-485	Port 3	DB9M
4	RS-232* / RS-485	Port 4	DB9M
5	RS-232	Port 5	DB9M
6	RS-232	Port 6	DB9M
7	RS-232	Port 7	DB9M
8	RS-232	Port 8	DB9M
9	RS-232	Port 9	DB9M
10	RS-232	Port 10	DB9M
11	RS-232	Port 11	DB9M
12	RS-232	Port 12	DB9M
13	RS-232	Port 13	DB9M
14	RS-232	Port 14	DB9M
15	RS-232	Port 15	DB9M
16	RS-232* / MIDI	Port 16	DB9M / (2) 5 Pin DIN F

*Table 1 – V16+ Ports located on the Rear Panel. *Factory Default Setting*

Note RS-485 is used throughout this manual to denote ports that may be used for both RS-422 and RS-485 communication.

Programmer Port

The Programmer Port is an RS-232C serial port used to program the V16+.

Pin	Connection
2	RS-232 TXD
3	RS-232 RXD
5	GND
8	+12V Pull Up

Table 2 – Programmer port connections.

Ports 1-4: RS-232 or RS-485

Ports 1-4 are factory configured as RS-232C, but can be reconfigured as a group as RS-485. The V16+ includes internal 220 Ohm termination for RS-485, so an external terminator for the unit is not necessary. To configure ports 1-4 for RS-485/422 operation, the 1488 and 1499 RS-232 Driver and Receiver chips must be removed and 75174 and 75175 Driver and Receiver chips installed. (See the Appendices for manufacturer's part numbers.)

Pin	RS-232 Connection	RS-485 Connection
2	RS-232 RXD	RS-485 RX+
3	RS-232 TXD	RS-485 TX+
4	+12V Pull up	+12V Pull up
5	GND	GND
6	N/C	RS-485 RX-
7	+12V Pull up	+12V Pull up
9	N/C	RS-485 TX-

Table 3 – Ports 1-4 connections for RS-232 and RS-485 operation.

➢ *Configuring Ports 1-4 as RS-485*

1. Remove the 1489 chip from U49 and the 1488 chip from U54.
2. Install a 75174 chip in U46 and a 75175 RS-485 chip in U47.
3. Install a 10K R-Pack in RP12 and a 220 Ohm SIP in RP13.

➢ *Configuring Ports 1-4 as RS-232*

1. Remove the 75174 chip from U46 and the 75175 chip from U47.
2. Install a 1489 chip in U49 and a 1488 chip in U54.
3. Remove the resistor packs located in RP12 and RP13.

Ports 5-15: RS-232

Ports 5-15 are permanently configured as RS-232C serial ports.

Pin	Connection
2	RS-232 RXD
3	RS-232 TXD
4	+12V Pull Up
5	GND
7	+12V Pull Up

Table 4 – Ports 1-15 connections for RS-232 operation.

Port 16: RS-232 or MIDI

Port 16 is factory configured as an RS-232C serial port, but can be reconfigured as a MIDI port. When reconfigured, MIDI Input is received by the MIDI IN port, and MIDI Output is sent out the MIDI OUT port.

➢ *Configuring Port 16 as MIDI*

1. Set jumpers W1 and W2 to the "MIDI" position.
2. Configure Port 16 in WinScript as "MIDI".
3. Configure the baud rate of Port 16 in WinScript as 31250 baud.

MIDI IN

Pin	Connection
4	MIDI RX+
5	MIDI RX-

Table 5 – MIDI IN connections.

MIDI OUT

Pin	Connection
2	GND
4	MIDI TX+
5	MIDI TX-

Table 6 – MIDI OUT connections.

➢ *Configuring Port 16 as RS-232*

1. Set jumpers W1 and W2 to the "RS-232" position.

LCD Display

The V16+ includes a standard 2x40 (80 character) Backlit LCD Display. An internal potentiometer is used to adjust the contrast (viewing angle) of the LCD.

➢ *Adjusting the LCD contrast*

1. To make the display lighter, turn "CONTRAST" control R8 clockwise.
2. To make the display darker, turn R8 counter-clockwise.

Digital Inputs

Input Connector

The V16+ includes 16 Opto-isolated inputs that can control the show operation. These inputs can be activated by pressing the corresponding front panel button (button 1 corresponds with input 1, etc.) or by electrically activating the input through the Parallel Inputs connector located on the rear panel.

Pin	Connection	Pin	Connection
1	Input 1	20	Input 1 Return
2	Input 2	21	Input 2 Return
3	Input 3	22	Input 3 Return
4	Input 4	23	Input 4 Return
5	Input 5	24	Input 5 Return
6	Input 6	25	Input 6 Return
7	Input 7	26	Input 7 Return
8	Input 8	27	Input 8 Return
9	Input 9	28	Input 9 Return
10	Input 10	29	Input 10 Return
11	Input 11	30	Input 11 Return
12	Input 12	31	Input 12 Return
13	Input 13	32	Input 13 Return
14	Input 14	33	Input 14 Return
15	Input 15	34	Input 15 Return
16	Input 16	35	Input 16 Return
17	N/C	36	N/C
18	N/C	37	N/C
19	N/C		

Table 7 – Parallel Input connections.

Two forms of input signal can be applied to the Parallel Inputs connector: Voltage Inputs, and Contact Closures. When a specific input on the V16+ is configured for Voltage Inputs, power for the connection is provided by an external source (in-rack power supply etc.), but when the input is configured as a Contact Closure, power is taken internally from the V16+.

Voltage Inputs vs. Contact Closures

There are many advantages to using Voltage Inputs over Contact Closures. First, a Contact Closure can only be located a short distance from the V16+. Second, Contact Closures use the V16+'s own power supply, so external wiring errors can damage the entire unit.

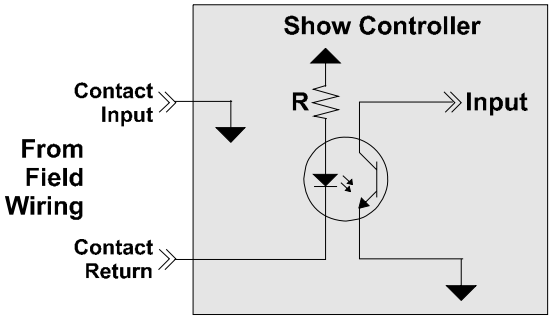


Figure 1 – Contact Closure Schematic.

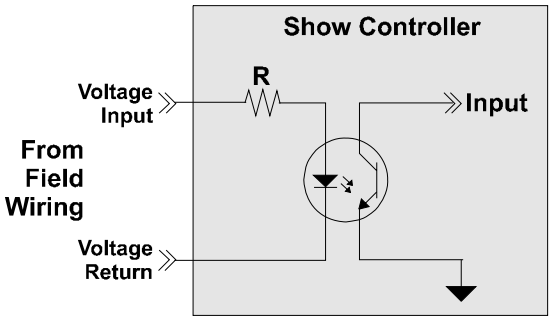


Figure 2 – Voltage Input Schematic.

Configuration	Maximum Distance
Contact Closures	10ft
Voltage Inputs	Limited only by wire gauge

Table 8 – Voltage Inputs are advantageous for many reasons, including the distance at which they are operational.

Input Configuration

Two sets of DIP switches on the main V16+ circuit board select the type of each input. Switches SW17 & SW18 configure Inputs 1-8, while switches SW19 & SW20 configure Inputs 9-16.

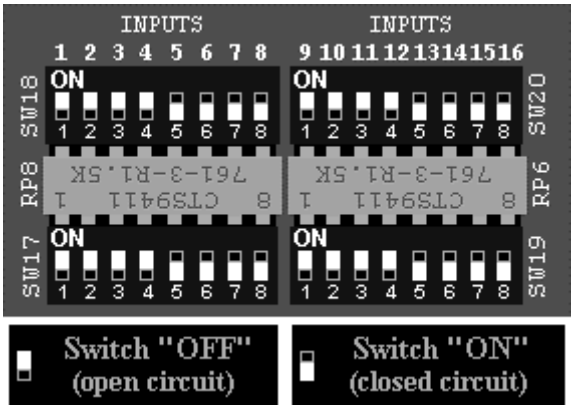


Figure 3 – Inputs 1-4 and 9-12 are Voltage Inputs. Inputs 5-9 and 13-16 are Contact Closures.

➢ *Configuring Inputs as Voltage Inputs*

1. Install the appropriate Resistor Pack in RP6 and RP8 (see table 9).
2. For each Input that is to be a voltage input, switch ***both*** corresponding DIP switches (one position on SW17 & SW18 for Inputs 1-8 or one position on SW19 & SW20 for inputs 9-16) to the "OFF" (or down) position. In the Figure, Inputs 1-4 and 9-12 have been configured as voltage inputs.

Voltage Level Used	Resistor Pack Value
5V	180 Ohm
12V	470 Ohm
24V	1.5K Ohm*

Table 9 – Recommended Resistor Pack values for Voltage Inputs.

** Factory Default Setting*

➢ *Configuring Inputs as Contact Closures*

1. For each Input that is to be a contact closure, switch ***both*** corresponding DIP switches (one position on SW17 & SW18 for Inputs 1-8 or one position on SW19 & SW20 for inputs 9-16) to the "ON" (or up) position. In the Figure, Inputs 5-8 and 13-16 have been configured as contact closures.

Input Wiring

➢ *Connecting a Voltage Input*

1. Verify that the appropriate Resistor Pack is installed in sockets RP6 and RP8 (see Table 9).
2. Locate DIP switches SW17, SW18, SW19, and SW20.
3. Verify that the appropriate switches are configured for Voltage Input.
4. Using a Female DB37 connector, attach the appropriate wire from the Input signal pin (pin 1 for Input1, pin 2 for Input2, etc.) to the positive terminal of the external power supply.
5. Connect the negative terminal of the external power supply to one of the terminals of the contact closure or push button.
6. Connect the appropriate Input Return pin to the other terminal of the contact closure (pin 20 for Input1, Pin 21 for Input2, etc.)

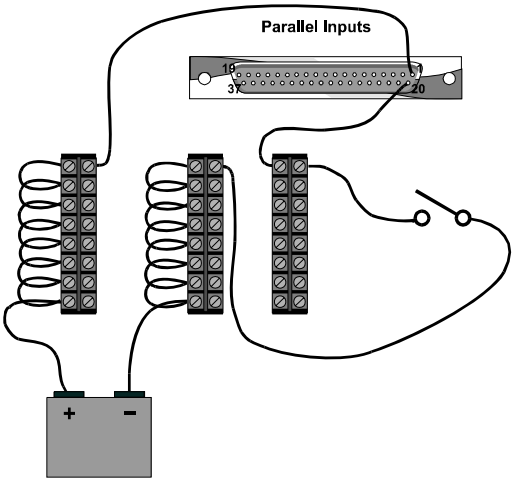


Figure 4 – Sample connection for a Voltage Input to Input1 of the Parallel Inputs connector. The terminal blocks are used for power bussing and modularization of the input signals.

➢ *Connecting a Contact Closure*

1. Locate DIP switches SW17, SW18, SW19, and SW20.
2. Verify that the appropriate switches are configured for Contact Closures.
3. Using a Female DB37, attach the appropriate wire from the Input signal pin (pin 1 for Input1, pin 2 for Input2, etc.) to one of the terminals of the external contact.
4. Connect the appropriate Input Return pin to the other terminal of the external contact (pin 20 for Input1, Pin 21 for Input2, etc.)

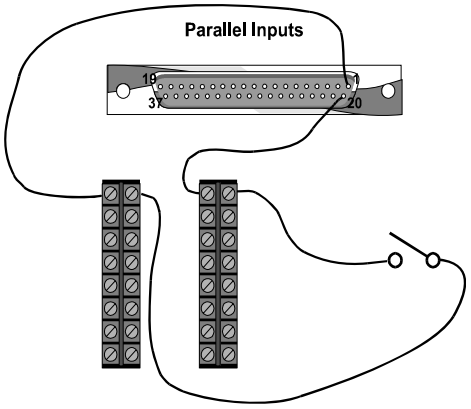


Figure 5 – Sample connection for a Contact Closure Input to Input1 of the Parallel Inputs connector.

Disabling Front Panel Buttons

The V16 provides 16 front panel buttons which duplicate the function of the 16 external inputs. This is convenient for test purposes, but it is often desirable to prevent the unintentional activation of these signals by the front panel. Any signals that should not be allowed front panel control should be assigned to inputs 9 through 16. These front panel switches may be individually disabled using DIP switch SW21.

➢ *Disabling front panel buttons 9-16*

1. For each button to be disabled, move the corresponding switch of SW21 to the "OFF" position (Switch 1 for Input9, Switch 2 for Input10, etc.)

Digital Outputs

Output Connector

In addition to discrete input, the V16+ provides 16 Dry-Contact Relay Outputs for discrete control.

Note The Relay Outputs are fused at 900mA using self-restoring polymer fuses. If an overload occurs, the fuse will open until the problem is corrected; then heal itself.

Pin	Connection	Pin	Connection
1	Output 1	20	Output 1 Return
2	Output 2	21	Output 2 Return
3	Output 3	22	Output 3 Return
4	Output 4	23	Output 4 Return
5	Output 5	24	Output 5 Return
6	Output 6	25	Output 6 Return
7	Output 7	26	Output 7 Return
8	Output 8	27	Output 8 Return
9	Output 9	28	Output 9 Return
10	Output 10	29	Output 10 Return
11	Output 11	30	Output 11 Return
12	Output 12	31	Output 12 Return
13	Output 13	32	Output 13 Return
14	Output 14	33	Output 14 Return
15	Output 15	34	Output 15 Return
16	Output 16	35	Output 16 Return
17	N/C	36	N/C
18	N/C	37	N/C
19	N/C		

Table 10 – Parallel Output connections.

Output Wiring

➢ *Connecting an output to a non-inductive load*

1. Using a DB37 Male connector, attach the appropriate Output pin (pin 1 for Output1, pin 2 for Output2, etc.) on the Parallel Outputs connector to the positive terminal of the external power supply.
2. Using the same DB37 Male connector, connect the corresponding Output Return pin (pin 20 for Output1, Pin 21 for Output2, etc.) to the positive terminal of the device that is receiving the output signal.
3. Connect the negative terminal of the device that is receiving the output signal to the negative terminal of the external power supply.

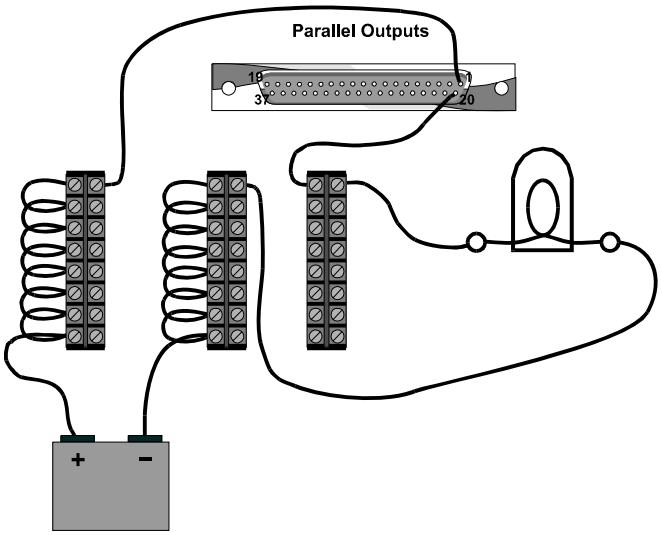


Figure 6 – An indicator lamp is a common example of a non-inductive load.

➢ *Connecting an output to an inductive load*

1. Using a DB37 Male connector, connect the appropriate Output pin (pin 1 for Output1, pin 2 for Output2, etc.) on the Parallel Outputs connector to the positive terminal of the external power supply.
2. Using the same DB37 Male connector, connect the corresponding Output Return pin (pin 20 for Output1, Pin 21 for Output2, etc.) to the positive terminal of the device that is receiving the output signal.
3. Connect the negative terminal of the device that is receiving the output signal to the negative terminal of the external power supply.
4. Connect an appropriate 1N4000-series (1N4001-1N4007) diode across the load.

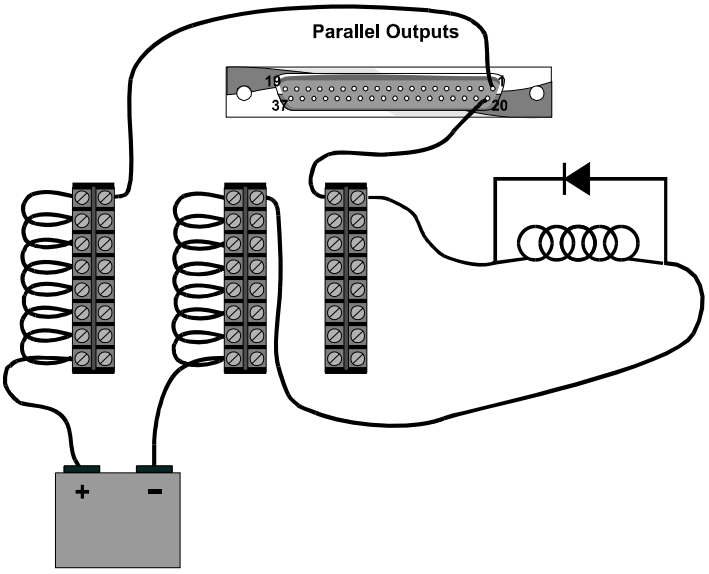


Figure 7 – A relay coil or solenoid is a common example of an inductive load and must have a 1N4000-Series snubber diode placed across it. Be sure to observe proper polarity (anode to negative side).

Video Synchronization

The V16+ is designed to extract the vertical frame clock from an external video sync signal. This signal should be NTSC or PAL composite video at the standard sync level of 4.1 volts peak-to-peak.

The sync signal is connected to the V16+ via a rear panel BNC connector. If additional devices are to be wired to the same sync signal, a BNC "T" may be used to daisy-chain the signal. If the V16+ is the last device in the chain, the internal 75-Ohm terminator should be connected *(factory default)*; otherwise it should be disconnected.

A common sync connection scheme is to use the "Gen" output of a Pioneer LD-V8000 laser disc player to drive the "C-Sync" inputs of another player, with the second "C-Sync" connector of that player connecting to a third, and so on. The final player's second "C-Sync" connector would go to the V16+, which should have its terminator enabled.

The V16+ may also work with "Black Burst Sync", if its level is high enough. Black burst sync is generally provided not at sync level, but at video level (approximately 0.7 volts peak-to-peak). Signals at this level should ***not*** be terminated with the 75-Ohm terminator. If you are trying to use a video level signal, have the terminator disconnected, and still can't get the sync to work reliably, it is possible to increase the V16+ input sensitivity by removing R16. Since this procedure is performed with wire cutters, it should not be undertaken lightly. It also voids the warranty. But if it's 3 AM in Abu Dhabi and your show opens at dawn, what the heck.

Sync Termination

Composite sync signals contain high frequency components. When the signal reaches the end of the line it has a tendency to reflect back toward the sync generator. This reflected signal is undesirable because it degrades the "real" signal. To prevent signal reflection, a terminating resistor is usually placed at the end of the line.

The V16+ provides an internal 75-Ohm terminating resistor. The unit is shipped from the factory with termination enabled (jumper installed).

➢ *Configuring sync termination*

1. If the V16+ is the last unit in the daisy-chain, verify that W3 is present.
2. If the V16+ is NOT the last unit on the daisy-chain, remove W3.

Power Supply

The V16+ includes an external universal power supply that allows connection to many domestic as well as international wall voltages (110VAC, 220VAC, 200VAC) without special configuration.

The power ratings for the V16+ external power supply are as follows:

Input: 100-250VAC; 50-60Hz; 0.7-0.3A

Output: +5V, 4.0A; +12V, 1.0A; -12V, 0.6A

Pin	Connection
1	Common
2	N/C
3	+5V
4	-12V
5	+12V

Table 11 – V16+ Power jack connections.

Note When connecting the V16+ to power, DO NOT insert the power connector into the MIDI In or MIDI Out jacks. This could damage the unit!

Firmware

The operating system that resides in the V16+ is called the "firmware". Periodic firmware upgrades are made in order to add new features, streamline operation, and fix bugs. For pricing and availability of firmware upgrades, contact Alcorn McBride.

Instead of purchasing your firmware upgrades, you can program them into EPROMs yourself. The latest firmware can be downloaded from Alcorn McBride's WWW site on the Internet. The address is **http://www.alcorn.com/**

➢ *Upgrading show control firmware*

1. Open the V16+ and locate socket U4 (It is labeled "OPERATING SYSTEM FIRMWARE").
2. Remove the old firmware EPROM from socket U4.
3. Install the new firmware EPROM into socket U4.

Show Memory

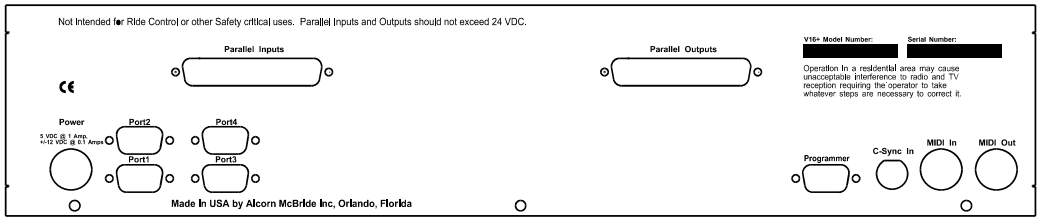
When scripts are compiled and downloaded to the V16+, the data is stored in the Show Memory. The V16+ comes standard with 32K of show memory, but for larger shows (>4000 events) the memory may be upgraded to 64K. For pricing and availability of show memory upgrades, contact Alcorn McBride.

➢ *Upgrading show memory*

Socket U8 contains the standard 32K EEPROM. Socket U15 is available for expansion memory.

1. Open the V16+ and locate chip sockets U8 and U15 (They are labeled "SHOW DATA EEPROM 1" and "SHOW DATA EEPROM 2").
2. To upgrade from 32K to 40K, install an 8K EEPROM (28C64) in U15.
3. To upgrade from 32K to 64K, install a 32K EEPROM (28C256) in U15.

V4+ Hardware Reference



The V4+ is smaller version of our original V16+ Show Controller. It is ideally suited for the control of small theaters, trade shows and multiple kiosks or interactive games. It provides four serial ports plus a MIDI port, and offers the largest possible show memory capacity.

Specifications

Size and Weight:	Standard 2U rack mount (3.5” x 19” x 6.5”), 10 lbs
Power:	100 to 250 VAC, 50 to 60 Hz, 25 watts maximum. UL listed Class 2 power adapter
Environment:	0 to 35 C (32 to 100 F) 0 to 90% relative humidity, non-condensing
Front Panel:	2x40 LCD Display Power LED Acknowledge (ACK) LED Error LED 4 Serial Activity LEDs 16 Input Status LEDs 16 Output Status LEDs 16 Pushbuttons
Rear Panel:	Programming Port DB-9M 4 Serial Ports DB-9M MIDI Input 5-pin DIN Female MIDI Output 5-pin DIN Female Discrete Inputs DB-37M Discrete Outputs DB-37F NTSC or PAL Sync Input BNC Power 5-pin DIN Female
Serial Ports:	(4) RS-232C 300 baud - 38.4 Kbaud 7, 8, or 9 Data Bits 1 or 2 Stop Bits All parity types 4 ports can be configured as RS-485/422 A fifth port is always MIDI
Opto Inputs:	(16) 24 VDC, 20 mA maximum Reconfigurable for voltages down to 5 VDC or for pure contact-closure operation. Trigger latency < 1 frame.
Relay Outputs:	(16) Contact Closures limited internally to 900 mA with self-restoring polymer fuses.
Show Memory:	32 Kbyte EEPROM, expandable to 64 Kbytes. Nonvolatile, robust memory retains show data permanently with no battery backup required.

Serial Ports

The V4+ provides five serial ports, which may be configured as shown below:

Port	Type	Description	Connector
0	RS-232	Programmer Port	DB9M
1	RS-232* / RS-485	Port 1	DB9M
2	RS-232* / RS-485	Port 2	DB9M
3	RS-232* / RS-485	Port 3	DB9M
4	RS-232* / RS-485	Port 4	DB9M
5	MIDI	Port 5	(2) 5 Pin DIN F

*Table 1 – V4+ Ports located on the Rear Panel. *Factory Default Setting*

Note RS-485 is used throughout this manual to denote ports that may be used for both RS-422 and RS-485 communication.

Programmer Port

The Programmer Port is an RS-232C serial port used to program the V4+.

Pin	Connection
2	RS-232 TXD
3	RS-232 RXD
5	GND
8	+12V Pull Up

Table 2 – Programmer port connections.

Ports 1-4: RS-232 or RS-485

Ports 1-4 are factory configured as RS-232C, but can be reconfigured as a group as RS-485. The V4+ includes internal 220-Ohm termination for RS-485, so an external terminator for the unit is not necessary. To configure ports 1-4 for RS-485/422 operation, the 1488 and 1499 RS-232 Driver and Receiver chips must be removed and 75174 and 75175 Driver and Receiver chips installed. (See the Appendices for manufacturer's part numbers.)

Pin	RS-232 Connection	RS-485 Connection
2	RS-232 RXD	RS-485 RX+
3	RS-232 TXD	RS-485 TX+
4	+12V Pull up	+12V Pull up
5	GND	GND
6	N/C	RS-485 RX-
7	+12V Pull up	+12V Pull up
9	N/C	RS-485 TX-

Table 3 – Ports 1-4 connections for RS-232 and RS-485 operation.

➢ *Configuring Ports 1-4 as RS-485*

1. Remove the 1489 chip from U49 and the 1488 chip from U54.
2. Install a 75174 chip in U46 and a 75175 RS-485 chip in U47.
3. Install a 10K R-Pack in RP12 and a 220 Ohm SIP in RP13.

➢ *Configuring Ports 1-4 as RS-232*

1. Remove the 75174 chip from U46 and the 75175 chip from U47.
2. Install a 1489 chip in U49 and a 1488 chip in U54.
3. Remove the resistor packs located in RP12 and RP13.

Port 5: MIDI

Port 5 is factory configured as a MIDI port. MIDI Input is received by the MIDI IN port, and MIDI Output is sent out the MIDI OUT port.

MIDI IN

Pin	Connection
4	MIDI RX+
5	MIDI RX-

Table 4 – MIDI IN connections.

MIDI OUT

Pin	Connection
2	GND
4	MIDI TX+
5	MIDI TX-

Table 5 – MIDI OUT connections.

LCD Display

The V4+ includes a standard 2x40 (80 character) Backlit LCD Display. An internal potentiometer is used to adjust the contrast (viewing angle) of the LCD.

➢ ***Adjusting the LCD contrast***

1. To make the display lighter, turn "CONTRAST" control R8 clockwise.
2. To make the display darker, turn R8 counter-clockwise.

Digital Inputs

Input Connector

The V4+ includes 16 Opto-isolated inputs that can control the show operation. These inputs can be activated by pressing the corresponding front panel button (button 1 corresponds with input 1, etc.) or by electrically activating the input through the Parallel Inputs connector located on the rear panel.

Pin	Connection	Pin	Connection
1	Input 1	20	Input 1 Return
2	Input 2	21	Input 2 Return
3	Input 3	22	Input 3 Return
4	Input 4	23	Input 4 Return
5	Input 5	24	Input 5 Return
6	Input 6	25	Input 6 Return
7	Input 7	26	Input 7 Return
8	Input 8	27	Input 8 Return
9	Input 9	28	Input 9 Return
10	Input 10	29	Input 10 Return
11	Input 11	30	Input 11 Return
12	Input 12	31	Input 12 Return
13	Input 13	32	Input 13 Return
14	Input 14	33	Input 14 Return
15	Input 15	34	Input 15 Return
16	Input 16	35	Input 16 Return
17	N/C	36	N/C
18	N/C	37	N/C
19	N/C		

Table 6 – Parallel Input connections.

Two forms of input signal can be applied to the Parallel Inputs connector: Voltage Inputs, and Contact Closures. When a specific input on the V4+ is configured for Voltage Inputs, power for the connection is provided by an external source (in-rack power supply, etc.), but when the input is configured as a Contact Closure, power is taken internally from the V4+.

Voltage Inputs vs. Contact Closures

There are many advantages to using Voltage Inputs over Contact Closures. First, a Contact Closure can only be located a short distance from the V4+. Second, Contact Closures use the V4+'s own power supply, so external wiring errors can damage the entire unit.

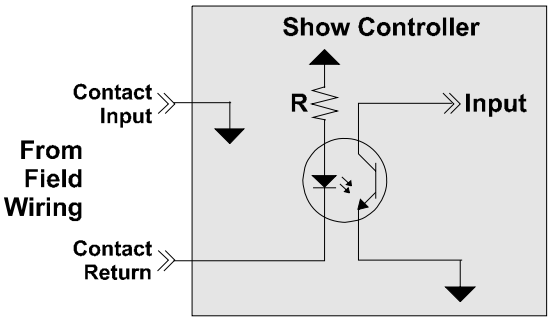


Figure 1 – Contact Closure Schematic.

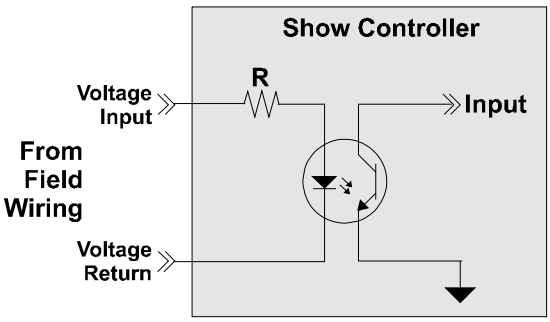


Figure 2 – Voltage Input Schematic.

Configuration	Maximum Distance
Contact Closures	10ft
Voltage Inputs	Limited only by wire gauge

Table 7 – Voltage Inputs are advantageous for many reasons, including the distance at which they are operational.

Input Configuration

Two sets of DIP switches on the main V4+ circuit board select the type of each input. Switches SW17 & SW18 configure Inputs 1-8, while switches SW19 & SW20 configure Inputs 9-16.

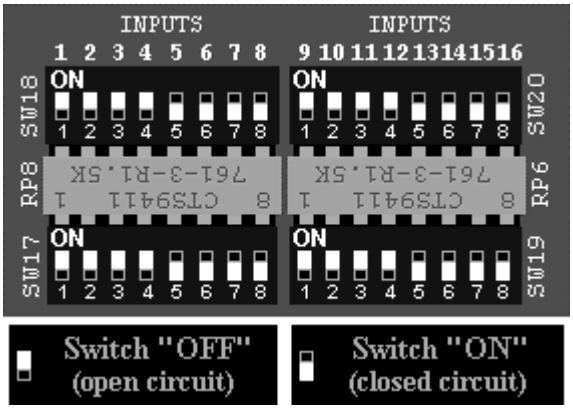


Figure 3 – Inputs 1-4 and 9-12 are Voltage Inputs. Inputs 5-9 and 13-16 are Contact Closures.

➢ *Configuring Inputs as Voltage Inputs*

1. Install the appropriate Resistor Pack in RP6 and RP8 (see table 9).
2. For each Input that is to be a voltage input, switch ***both*** corresponding DIP switches (one position on SW17 & SW18 for Inputs 1-8 or one position on SW19 & SW20 for inputs 9-16) to the "OFF" (or down) position. In the Figure, Inputs 1-4 and 9-12 have been configured as voltage inputs.

Voltage Level Used	Resistor Pack Value
5V	180 Ohm
12V	470 Ohm
24V	1.5K Ohm*

Table 8 – Recommended Resistor Pack values for Voltage Inputs.

** Factory Default Setting*

➢ *Configuring Inputs as Contact Closures*

1. For each Input that is to be a contact closure, switch ***both*** corresponding DIP switches (one position on SW17 & SW18 for Inputs 1-8 or one position on SW19 & SW20 for inputs 9-16) to the "ON" (or up) position. In the Figure, Inputs 5-8 and 13-16 have been configured as contact closures.

Input Wiring

➢ *Connecting a Voltage Input*

1. Verify that the appropriate Resistor Pack is installed in sockets RP6 and RP8 (see Table 9).
2. Locate DIP switches SW17, SW18, SW19, and SW20.
3. Verify that the appropriate switches are configured for Voltage Input.
4. Using a Female DB37 connector, attach the appropriate wire from the Input signal pin (pin 1 for Input1, pin 2 for Input2, etc.) to the positive terminal of the external power supply.
5. Connect the negative terminal of the external power supply to one of the terminals of the contact closure or push button.
6. Connect the appropriate Input Return pin to the other terminal of the contact closure (pin 20 for Input1, Pin 21 for Input2, etc.)

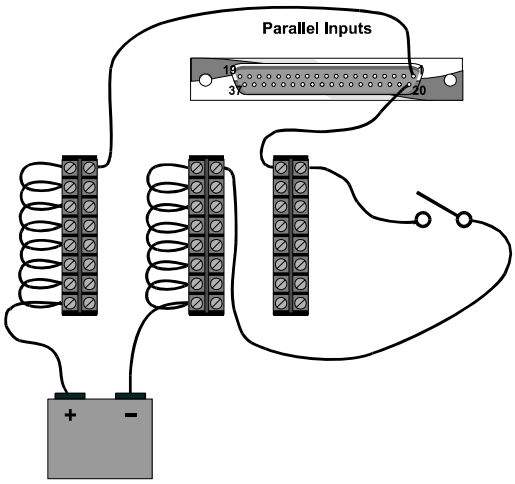


Figure 4 – Sample connection for a Voltage Input to Input1 of the Parallel Inputs connector. The terminal blocks are used for power bussing and modularization of the input signals.

➢ *Connecting a Contact Closure*

1. Locate DIP switches SW17, SW18, SW19, and SW20.
2. Verify that the appropriate switches are configured for Contact Closure.
3. Using a Female DB37, attach the appropriate wire from the Input signal pin (pin 1 for Input1, pin 2 for Input2, etc.) to one of the terminals of the external contact.
4. Connect the appropriate Input Return pin to the other terminal of the external contact (pin 20 for Input1, Pin 21 for Input2, etc.)

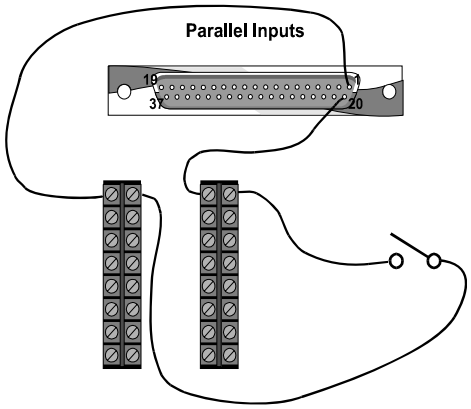


Figure 5 – Sample connection for a Contact Closure Input to Input1 of the Parallel Inputs connector.

Disabling Front Panel Buttons

The V4 provides 16 front panel buttons, which duplicate the function of the 16 external inputs. This is convenient for test purposes, but it is often desirable to prevent the unintentional activation of these signals by the front panel. Any signals that should not be allowed front panel control should be assigned to inputs 9 through 16. These front panel switches may be individually disabled using DIP switch SW21.

➢ *Disabling front panel buttons 9-16*

1. For each button to be disabled, move the corresponding switch of SW21 to the “OFF” position (Switch 1 for Input9, Switch 2 for Input10, etc.)

Digital Outputs

Output Connector

In addition to discrete input, the V4+ provides 16 Dry-Contact Relay Outputs for discrete control.

Note The Relay Outputs are fused at 900mA using self-restoring polymer fuses. If an overload occurs, the fuse will open until the problem is corrected; then heal itself.

Pin	Connection	Pin	Connection
1	Output 1	20	Output 1 Return
2	Output 2	21	Output 2 Return
3	Output 3	22	Output 3 Return
4	Output 4	23	Output 4 Return
5	Output 5	24	Output 5 Return
6	Output 6	25	Output 6 Return
7	Output 7	26	Output 7 Return
8	Output 8	27	Output 8 Return
9	Output 9	28	Output 9 Return
10	Output 10	29	Output 10 Return
11	Output 11	30	Output 11 Return
12	Output 12	31	Output 12 Return
13	Output 13	32	Output 13 Return
14	Output 14	33	Output 14 Return
15	Output 15	34	Output 15 Return
16	Output 16	35	Output 16 Return
17	N/C	36	N/C
18	N/C	37	N/C
19	N/C		

Table 9 – Parallel Output Connections.

Output Wiring

➢ *Connecting an output to a non-inductive load*

1. Using a DB37 Male connector, attach the appropriate Output pin (pin 1 for Output1, pin 2 for Output2, etc.) on the Parallel Outputs connector to the positive terminal of the external power supply .
2. Using the same DB37 Male connector, connect the corresponding Output Return pin (pin 20 for Output1, Pin 21 for Output2, etc.) to the positive terminal of the device that is receiving the output signal.
3. Connect the negative terminal of the device that is receiving the output signal to the negative terminal of the external power supply.

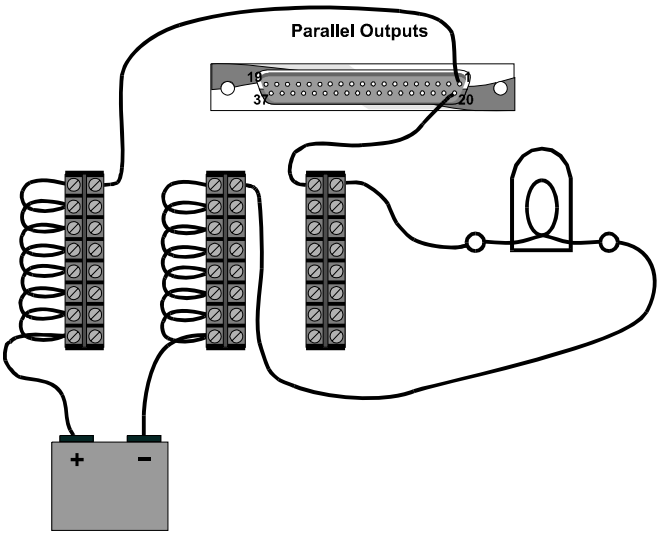


Figure 6 – An indicator lamp is a common example of a non-inductive load.

➢ *Connecting an output to an inductive load*

1. Using a DB37 Male connector, connect the appropriate Output pin (pin 1 for Output1, pin 2 for Output2, etc.) on the Parallel Outputs connector to the positive terminal of the external power supply.
2. Using the same DB37 Male connector, connect the corresponding Output Return pin (pin 20 for Output1, Pin 21 for Output2, etc.) to the positive terminal of the device that is receiving the output signal.
3. Connect the negative terminal of the device that is receiving the output signal to the negative terminal of the external power supply.
4. Connect an appropriate 1N4000-series (1N4001-1N4007) diode across the load.

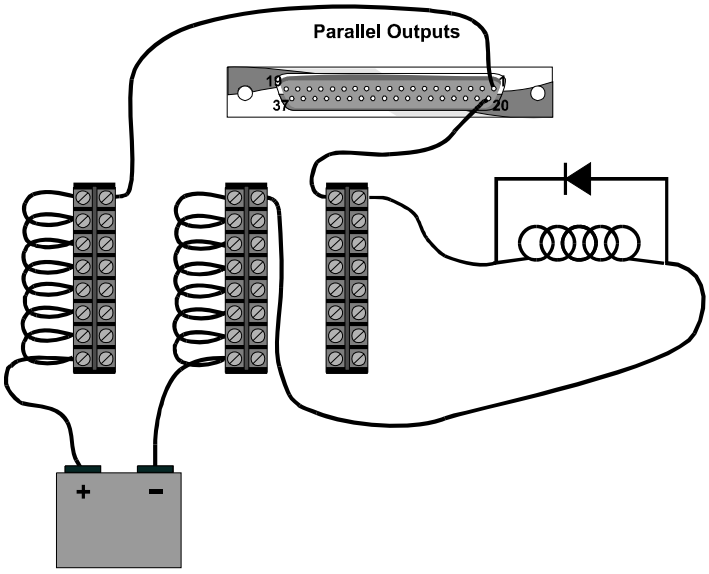


Figure 7 – A relay coil or solenoid is a common example of an inductive load and must have a 1N4000-Series snubber diode placed across it. Be sure to observe proper polarity (anode to negative side).

Video Synchronization

The V4+ is designed to extract the vertical frame clock from an external video sync signal. This signal should be NTSC or PAL composite video at the standard sync level of 4.1 volts peak-to-peak.

The sync signal is connected to the V4+ via a rear panel BNC connector. If additional devices are to be wired to the same sync signal, a BNC "T" may be used to daisy-chain the signal. If the V4+ is the last device in the chain, the internal 75-Ohm terminator should be connected *(factory default)*; otherwise it should be disconnected.

A common sync connection scheme is to use the "Gen" output of a Pioneer LD-V8000 laser disc player to drive the "C-Sync" inputs of another player, with the second "C-Sync" connector of that player connecting to a third, and so on. The final player's second "C-Sync" connector would go to the V4+, which needs to have its terminator enabled.

The V4+ may also work with "Black Burst Sync", if its level is high enough. Black burst sync is generally provided not at sync level, but at video level (approximately 0.7 volts peak-to-peak). Signals at this level should ***not*** be terminated with the 75-Ohm terminator. If you are trying to use a video level signal, have the terminator disconnected, and still can't get the sync to work reliably, it is possible to increase the V4+ input sensitivity by removing R16. Since this procedure is performed with wire cutters, it should not be undertaken lightly. It also voids the warranty. But if it's 3 AM in Abu Dhabi and your show opens at dawn, what the heck.

Sync Termination

Composite sync signals contain high frequency components. When the signal reaches the end of the line it has a tendency to reflect back toward the sync generator. This reflected signal is undesirable because it degrades the "real" signal. To prevent signal reflection, a terminating resistor is usually placed at the end of the line.

The V4+ provides an internal 75-Ohm terminating resistor. The unit is shipped from the factory with termination enabled (jumper installed).

➢ *Configuring sync termination*

1. If the V4+ is the last unit in the daisy-chain, verify that W3 is present.
2. If the V4+ is NOT the last unit on the daisy-chain, remove W3.

Power Supply

The V4+ includes an external universal power supply that allows connection to many domestic as well as international wall voltages (110VAC, 220VAC, 200VAC) without special configuration.

The power ratings for the V4+ external power supply are as follows:

Input: 100-250VAC; 50-60Hz; 0.7-0.3A

Output: +5V, 4.0A; +12V, 1.0A; -12V, 0.6A

Pin	Connection
1	Common
2	N/C
3	+5V
4	-12V
5	+12V

Table 10 – V4+ Power jack connections.

Note When connecting the V4+ to power, DO NOT insert the power connector into the MIDI In or MIDI Out jacks. This could damage the unit!

Firmware

The operating system that resides in the V4+ is called the "firmware". Periodic firmware upgrades are made in order to add new features, streamline operation, and fix bugs. For pricing and availability of firmware upgrades, contact Alcorn McBride.

Instead of purchasing your firmware upgrades, you can program them into EPROMs yourself. The latest firmware can be downloaded from Alcorn McBride's WWW site on the Internet. The address is **http://www.alcorn.com/**

➢ *Upgrading show control firmware*

1. Open the V4+ and locate socket U4 (It is labeled "OPERATING SYSTEM FIRMWARE").
2. Remove the old firmware EPROM from socket U4.
3. Install the new firmware EPROM into socket U4.

Show Memory

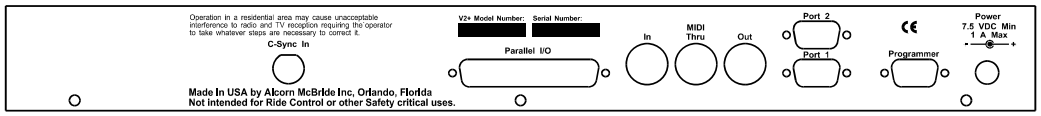
When scripts are compiled and downloaded to the V4+, the data is stored in the Show Memory. The V4+ comes standard with 32K of show memory, but for larger shows (>4000 events) the memory may be upgraded to 64K. For pricing and availability of show memory upgrades, contact Alcorn McBride.

➢ *Upgrading show memory*

Socket U8 contains the standard 32K EEPROM. Socket U15 is available for expansion memory.

1. Open the V4+ and locate chip sockets U8 and U15 (They are labeled "SHOW DATA EEPROM 1" and "SHOW DATA EEPROM 2").
2. To upgrade from 32K to 40K, install an 8K EEPROM (28C64) in U15.
3. To upgrade from 32K to 64K, install a 32K EEPROM (28C256) in U15.

V2+ Hardware Reference



The V2+ is the smallest of our "V" series controllers. It offers all of the same types of resources as our V4+ and V16+, just fewer of them. It is ideally suited for displays, trade shows and kiosks.

Specifications

Size and Weight:	Standard 1U rack mount (1.75” x 19” x 6.5”), 8 lbs
Power:	120 or 240 VAC (specify when ordering), 50 to 60 Hz 25 watts maximum. UL listed Class 2 power adapter
Environment:	0 to 35 C (32 to 100 F) 0 to 90% relative humidity, non-condensing
Front Panel:	2x16 LCD Display Power LED Acknowledge (ACK) LED Error LED 2 Serial Activity LEDs 8 Input Status LEDs 8 Output Status LEDs 8 Pushbuttons
Rear Panel:	Programming Port DB-9M 2 Serial Ports DB-9M MIDI Input 5-pin DIN Female MIDI Output 5-pin DIN Female Discrete I/O DB-37F NTSC or PAL Sync Input BNC Power Barrel Connector
Serial Ports:	(2) RS-232C 300 baud - 38.4 Kbaud 7, 8, or 9 Data Bits 1 or 2 Stop Bits All parity types 1 port can be configured as MIDI
Opto Inputs:	(8) 24 VDC, 20 mA maximum Reconfigurable for voltages down to 5 VDC or for pure contact-closure operation. Trigger latency < 1 frame.
Driver Outputs:	(8) Lamp drivers rated at 500mA each when used individually, 150mA each if all in use.
Show Memory:	24 Kbyte EEPROM. Nonvolatile, robust memory retains show data permanently with no battery backup required.

Serial Ports

The V2+ provides two serial ports which may be configured as shown below:

Port	Type	Description	Connector
0	RS-232	Programmer Port	DB9M
1	RS-232	Port 1	DB9M
2	RS-232* / MIDI	Port 2	DB9M / (2) 5 Pin DIN F

*Table 1 – V2+ Ports located on the Rear Panel. *Factory Default Setting*

Programmer Port

The Programmer Port is an RS-232C serial port used to program the V2+.

Pin	Connection
2	RS-232 TXD
3	RS-232 RXD
5	GND
8	+12V Pull Up

Table 2 – Programmer port connections.

Port 1: RS-232

Port 1 is permanently configured as RS-232C.

Pin	Connection
2	RS-232 RXD
3	RS-232 TXD
4	+12V Pull Up
5	GND
7	+12V Pull Up

Table 3 – Ports 1-15 connections for RS-232 operation.

Port 2: RS-232 or MIDI

Port 2 is factory configured as an RS-232C serial port, but can be reconfigured as a MIDI port. When reconfigured, MIDI Input is received by the MIDI IN port, and MIDI Output is sent out the MIDI OUT port. The MIDI Thru port echoes the data received on MIDI IN.

➢ *Configuring Port 2 as MIDI*

1. Place the jumper on W2 and W3 in the direction toward the "MIDI" text.
2. Configure Port 2 in WinScript as "MIDI"
3. Configure the baud rate of Port 2 in WinScript as 31250 baud

MIDI IN

Pin	Connection
4	MIDI RX+
5	MIDI RX-

Table 4 – MIDI IN connections.

MIDI OUT and THRU

Pin	Connection
2	GND
4	MIDI TX+
5	MIDI TX-

Table 5 – MIDI OUT and THRU connections.

➢ *Configuring Port 2 as RS-232*

1. Place the jumpers on W2 and W3 in the direction toward the "RS-232" text.

LCD Display

The V2+ includes a standard 2x16 (32 character) Backlit LCD Display. An internal potentiometer is used to adjust the contrast (viewing angle) of the LCD.

➢ *Adjusting the LCD contrast*

1. To make the display lighter, turn "CONTRAST" control VR1 clockwise.
2. To make the display darker, turn VR1 counter-clockwise.

Digital Inputs

The V2+ includes 16 inputs (8 button inputs and 8 Opto-isolated inputs) that can help control the flow of a show system. The button inputs are activated by pressing the corresponding front panel button (button 1 corresponds with input 1, etc.), and the Opto-isolated inputs are activated by electrically activating the input through the Parallel I/O connector located on the rear panel. The connections for the Parallel I/O connector are as follows:

Pin	Connection	Pin	Connection
1	**Voltage Input 9**	**20**	**Voltage Input 9 Return**
2	**Voltage Input 10**	**21**	**Voltage Input 10 Return**
3	**Voltage Input 11**	**22**	**Voltage Input 11 Return**
4	**Voltage Input 12**	**23**	**Voltage Input 12 Return**
5	**Voltage Input 13**	**24**	**Voltage Input 13 Return**
6	**Voltage Input 14**	**25**	**Voltage Input 14 Return**
7	**Voltage Input 15**	**26**	**Voltage Input 15 Return**
8	**Voltage Input 16**	**27**	**Voltage Input 16 Return**
9	Output 1	**28**	**Contact Closure Input 9**
10	Output 2	**29**	**Contact Closure Input 10**
11	Output 3	**30**	**Contact Closure Input 11**
12	Output 4	**31**	**Contact Closure Input 12**
13	Output 5	**32**	**Contact Closure Input 13**
14	Output 6	**33**	**Contact Closure Input 14**
15	Output 7	**34**	**Contact Closure Input 15**
16	Output 8	**35**	**Contact Closure Input 16**
17	Clamping Diodes	**36**	**GND**
18	N/C	**37**	**GND**
19	**GND**		

Table 6 – Parallel I/O connector Inputs.

Two forms of input signal can be applied to the Parallel I/O connector: Voltage Inputs, and Contact Closures. Voltage Inputs and Contact Closure Inputs, while activating the same input, are available on separate pins of the Parallel I/O connector. They are intended to be used separately. Applying both a Voltage and a Contact Closure to the same input simultaneously may damage the unit.

Voltage Inputs vs. Contact Closures

There are many advantages to using Voltage Inputs over Contact Closures. First, a Contact Closure can only be located a short distance from the V2+. Second, Contact Closures use the V2+'s own power supply, so external wiring errors can damage the entire unit.

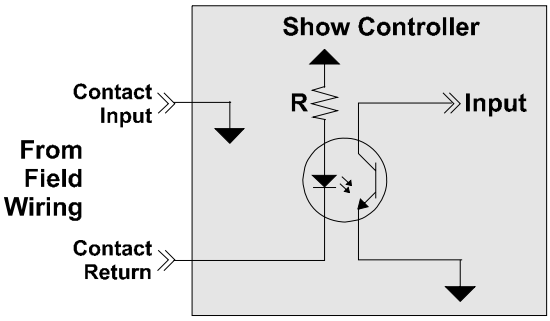


Figure 1 – Contact Closure Schematic.

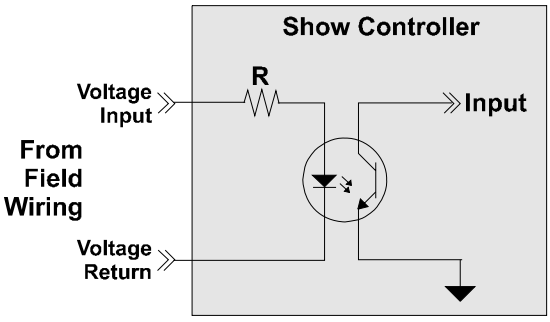


Figure 2 – Voltage Input Schematic.

Configuration	Maximum Distance
Contact Closures	10ft
Voltage Inputs	Limited only by wire gauge

Table 7 – Voltage Inputs are advantageous for many reasons, including the distance at which they are operational.

Input Wiring

➢ *Connecting a Voltage Input*

1. Open the V2+ and verify that the correct Resistor Pack is installed in RP5 (see table 8)
2. Connect the appropriate wire from the Voltage Input signal pin (pin 1 for Input9, pin 2 for Input10, etc.) to the positive terminal of the 24 VDC external power supply.
3. Connect the negative terminal of the external power supply to one of the terminals of the contact closure.
4. Connect the appropriate Voltage Input Return pin on the Parallel I/O connector to the other terminal of the contact closure (pin 20 for Input9, Pin 21 for Input10, etc.)

Voltage Level Used	Resistor Pack Value
5V	180 Ohm
12V	470 Ohm
24V	1.5K Ohm*

Table 8 – Recommended Resistor Pack values for Voltage Inputs.
** Factory Default Setting*

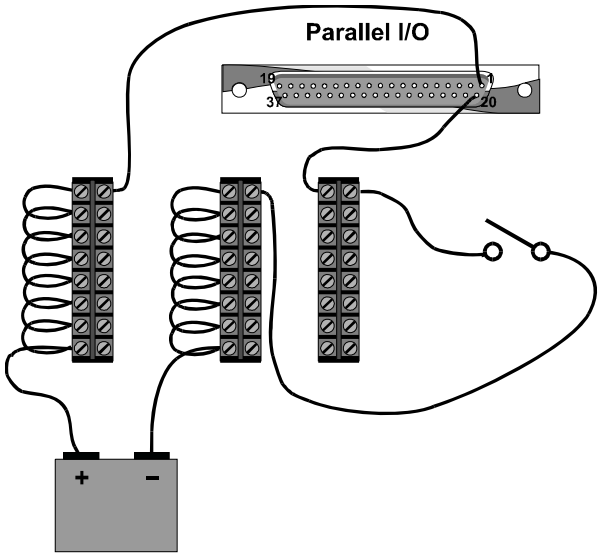


Figure 3 – Sample connection for a Voltage Input to Input9 of the Parallel I/O connector. The terminal blocks are used for power bussing and modularization of the input signals.

➢ *Connecting a Contact Closure*

1. Connect the appropriate wire from the Input signal pin (pin 28 for Input9, pin 29 for Input10, etc.) on the Parallel I/O connector to one of the terminals of the external contact.
2. Connect one of the GND pins on the Parallel I/O connector to the other terminal of the external contact.

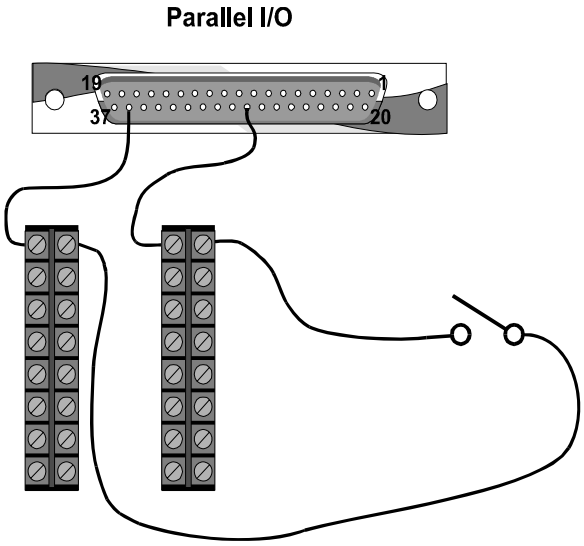


Figure 4 – Sample connection for a Contact Closure Input to Input9 of the Parallel I/O connector.

Digital Outputs

Output Connector

In addition to discrete inputs, the V2+ provides 8 transistor outputs (lamp drivers) for discrete control. These outputs are capable of sinking up to 500 mA each when used individually. The amount of current that each output can sink decreases when the number of outputs being used at the same time increases. For example: if all of the outputs are used at the same time they can only sink 150mA each.

The connections for the Parallel I/O connector are as follows:

Pin	Connection	Pin	Connection
1	Voltage Input 9	20	Voltage Input 9 Return
2	Voltage Input 10	21	Voltage Input 10 Return
3	Voltage Input 11	22	Voltage Input 11 Return
4	Voltage Input 12	23	Voltage Input 12 Return
5	Voltage Input 13	24	Voltage Input 13 Return
6	Voltage Input 14	25	Voltage Input 14 Return
7	Voltage Input 15	26	Voltage Input 15 Return
8	Voltage Input 16	27	Voltage Input 16 Return
9	**Output 1**	28	Contact Closure Input 9
10	**Output 2**	29	Contact Closure Input 10
11	**Output 3**	30	Contact Closure Input 11
12	**Output 4**	31	Contact Closure Input 12
13	**Output 5**	32	Contact Closure Input 13
14	**Output 6**	33	Contact Closure Input 14
15	**Output 7**	34	Contact Closure Input 15
16	**Output 8**	35	Contact Closure Input 16
17	**Clamping Diodes**	36	GND
18	N/C	37	GND
19	GND		

Table 9 – Parallel I/O connector Outputs.

Note When the outputs are used to drive inductive loads (relay coils, etc.), pin 17 can be connected to the powered side of the load to provide additional snubber diode protection.

External Connection

➢ *Connecting an output to a non-inductive load*

1. Connect the positive terminal of the external power supply to the positive terminal of the device that is receiving the signal.
2. Connect the negative terminal of the power supply to one of the GND pins on the Parallel I/O connector.
3. Connect the appropriate Output pin (pin 9 for Output1, pin 10 for Output2, etc.) on the Parallel I/O connector to the negative terminal of the device that is receiving the output signal

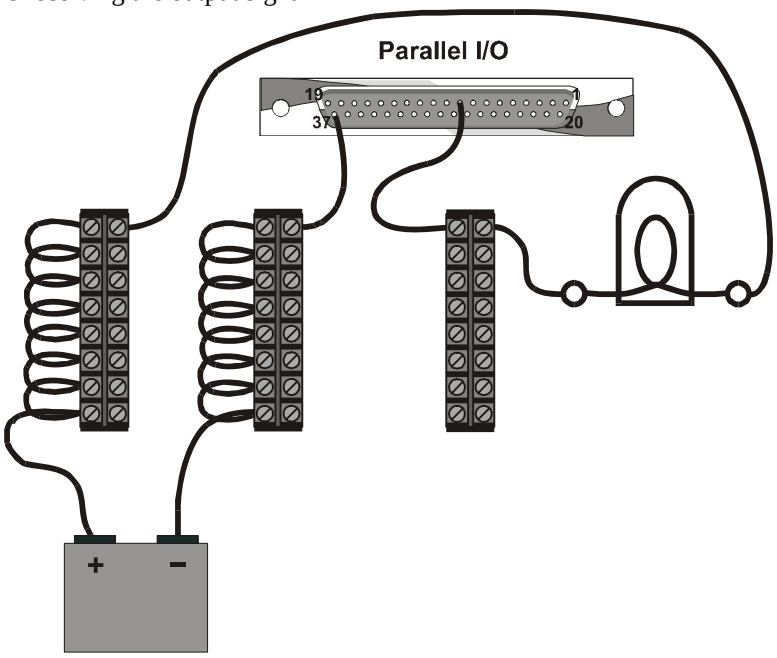


Figure 5 – An indicator lamp is a common example of a non-inductive load.

➢ *Connecting an output to an inductive load*

1. Connect the positive terminal of the external power supply to the positive terminal of the device that is receiving the signal.
2. If external snubber diodes are not used, connect the Clamping Diodes pin (pin 17) on the Parallel I/O connector to the positive terminal of the external power supply.
3. Connect the negative terminal of the power supply to one of the GND pins on the Parallel I/O connector..
4. Connect the appropriate Output pin (pin 9 for Output1, pin 10 for Output2, etc.) on the Parallel I/O connector to the negative terminal of the device that is receiving the output signal.

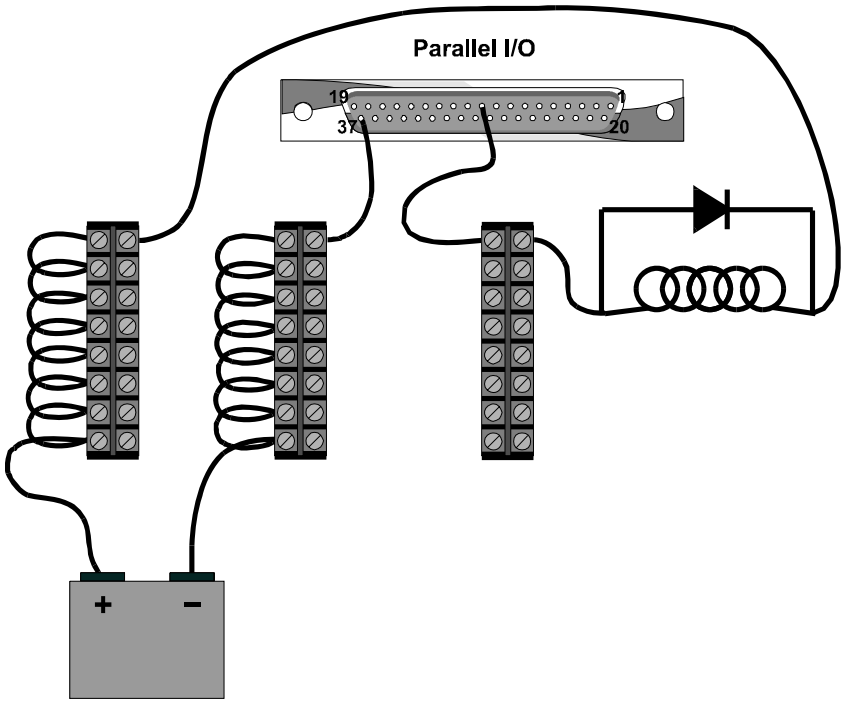


Figure 6 – A relay coil or solenoid is a common example of an inductive load and must have a 1N4000-Series snubber diode placed across it. Be sure to observe proper polarity (anode to negative side).

Video Synchronization

The V2+ is designed to extract the vertical frame clock from an external video sync signal. This signal should be NTSC or PAL composite video at the standard sync level of 4.1 volts peak-to-peak.

The sync signal is connected to the V2+ via a rear panel BNC connector. If additional devices are to be wired to the same sync signal, a BNC "T" may be used to daisy-chain the signal. If the V2+ is the last device in the chain, the internal 75-Ohm terminator should be connected *(factory default)*; otherwise it should be disconnected.

A common sync connection scheme is to use the "Gen" output of a Pioneer LD-V8000 laser disc player to drive the "C-Sync" inputs of another player, with the second "C-Sync" connector of that player connecting to a third, and so on. The final player's second "C-Sync" connector would go to the V2+, which needs to have its terminator enabled.

The V2+ may also work with "Black Burst Sync", if its level is high enough. Black burst sync is generally provided not at sync level, but at video level (approximately 0.7 volts peak-to-peak). Signals at this level should ***not*** be terminated with the 75-Ohm terminator. If you are trying to use a video level signal, have the terminator disconnected, and still can't get the sync to work reliably, it is possible to increase the V2+ input sensitivity by removing R23. Since this procedure is performed with wire cutters, it should not be undertaken lightly. It also voids the warranty. But if it's 3 AM in Abu Dhabi and your show opens at dawn, what the heck.

Sync Termination

Composite sync signals contain high frequency components. When the signal reaches the end of the line it has a tendency to reflect back toward the sync generator. This reflected signal is undesirable because it degrades the "real" signal. To prevent signal reflection, a terminating resistor is usually placed at the end of the line.

The V2+ provides an internal 75-Ohm terminating resistor. The unit is shipped from the factory with termination enabled (jumper installed).

➢ *Configuring sync termination*

1. If the V2+ is the last unit in the daisy-chain, verify that W6 is present.
2. If the V2+ is NOT the last unit on the daisy-chain, remove W6.

Power Supply

The V2+ includes an external power supply that allows connection to most domestic wall voltages (110VAC). A 220VAC model is available upon request.

The power ratings for the V2+ external power supply are as follows:

Input: 120 VAC; 60Hz; 15 watts max.

Output: 9 VDC; 1A

Note Make sure that any power supply used with the V2+ is the correct voltage and is configured correctly.

Firmware

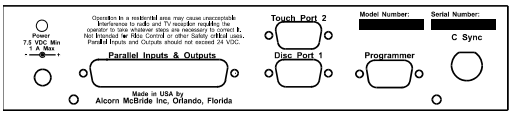
The operating system that resides in the V2+ is called the "firmware". Periodic firmware upgrades are made in order to add new features, streamline operation, and fix bugs. For pricing and availability of firmware upgrades, contact Alcorn McBride.

Instead of purchasing your firmware upgrades, you can program them into EPROMs yourself. The latest firmware can be downloaded from Alcorn McBride's WWW site on the Internet. The address is **http://www.alcorn.com/**

➢ *Upgrading show control firmware*

1. Open the V2+ and locate socket U1.
2. Remove the old firmware EPROM from socket U1.
3. Install the new firmware EPROM into socket U1.

InterActivator Hardware Reference



The InterActivator™ is the smallest of our show controllers. It offers similar serial and discrete I/O resources to our “V” series controllers, in a very compact and economical package. It is ideal for kiosks and displays.

Specifications

Size and Weight: :	½ Width 1U rack mount (1.75” x 8.5” x 8.5”), 3 lbs
Power:	120 or 240 VAC (specify when ordering), 50 to 60 Hz 25 watts maximum. UL listed Class 2 power adapter
Environment:	0 to 35 C (32 to 100 F) 0 to 90% relative humidity, non-condensing
Front Panel:	Power LED Acknowledge (ACK) LED Error LED 2 Serial Activity LEDs 8 Input Status LEDs 8 Output Status LEDs 8 Pushbuttons
Rear Panel:	Programming Port DB-9M 2 Serial Ports DB-9M Discrete I/O DB-37F NTSC or PAL Sync Input BNC Power Barrel Connector
Serial Ports:	(2) RS-232C 300 baud - 38.4 Kbaud 7, 8, or 9 Data Bits 1 or 2 Stop Bits All parity types
Opto Inputs:	(8) 24 VDC, 20 mA maximum Reconfigurable for voltages down to 5 VDC or for pure contact-closure operation. Trigger latency < 1 frame.
Driver Outputs:	(8) Lamp drivers rated at 500mA each when used individually, 150mA each if all in use.
Show Memory:	24 Kbyte EEPROM. Nonvolatile, robust memory retains show data permanently with no battery backup required.

Serial Ports

The InterActivator provides 2 serial ports which are permanently configured for RS-232 operation.

Port	Type	Description	Connector
0	RS-232	Programmer Port	DB9M
1	RS-232	Port 1	DB9M
2	RS-232	Port 2	DB9M

Table 1 – InterActivator Ports located on the Rear Panel.

Programmer Port

The Programmer Port is an RS-232C serial port used to program the InterActivator.

Pin	Connection
2	RS-232 TXD
3	RS-232 RXD
5	GND
8	+12V Pull Up

Table 2 – Programmer port connections.

Ports 1 and 2: RS-232

Ports 1 and 2 are permanently configured as RS-232C.

Pin	Connection
2	RS-232 RXD
3	RS-232 TXD
4	+12V Pull Up
5	GND
7	+12V Pull Up

Table 3 – Port 1 and 2 connections.

Digital Inputs

The InterActivator includes 16 inputs (8 button inputs and 8 Opto-isolated inputs) that can help control the flow of a show system. The button inputs are activated by pressing the corresponding front panel button (button 1 corresponds with input 1, etc.), and the Opto-isolated inputs are activated by electrically activating the input through the Parallel I/O connector located on the rear panel. The connections for the Parallel I/O connector are as follows:

Pin	Connection	Pin	Connection
1	**Voltage Input 9**	**20**	**Voltage Input 9 Return**
2	**Voltage Input 10**	**21**	**Voltage Input 10 Return**
3	**Voltage Input 11**	**22**	**Voltage Input 11 Return**
4	**Voltage Input 12**	**23**	**Voltage Input 12 Return**
5	**Voltage Input 13**	**24**	**Voltage Input 13 Return**
6	**Voltage Input 14**	**25**	**Voltage Input 14 Return**
7	**Voltage Input 15**	**26**	**Voltage Input 15 Return**
8	**Voltage Input 16**	**27**	**Voltage Input 16 Return**
9	Output 1	**28**	**Contact Closure Input 9**
10	Output 2	**29**	**Contact Closure Input 10**
11	Output 3	**30**	**Contact Closure Input 11**
12	Output 4	**31**	**Contact Closure Input 12**
13	Output 5	**32**	**Contact Closure Input 13**
14	Output 6	**33**	**Contact Closure Input 14**
15	Output 7	**34**	**Contact Closure Input 15**
16	Output 8	**35**	**Contact Closure Input 16**
17	Clamping Diodes	**36**	**GND**
18	N/C	**37**	**GND**
19	**GND**		

Table 4 – Parallel I/O connector Inputs.

Two forms of input signal can be applied to the Parallel I/O connector: Voltage Inputs, and Contact Closures. Voltage Inputs and Contact Closure Inputs, while activating the same input, are available on separate pins of the Parallel I/O connector. They are intended to be used separately.

Voltage Inputs vs. Contact Closures

There are many advantages to using Voltage Inputs over Contact Closures. First, a Contact Closure can only be located a short distance from the InterActivator. Second, Contact Closures use the InterActivator's own power supply, so external wiring errors can damage the entire unit.

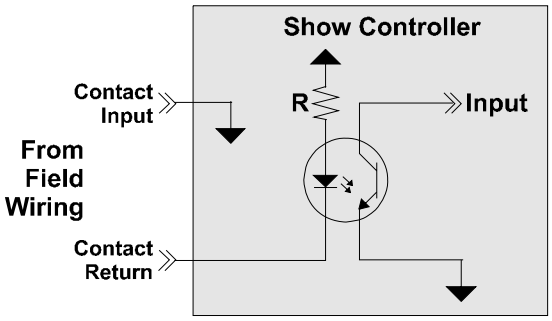


Figure 1 – Contact Closure Schematic.

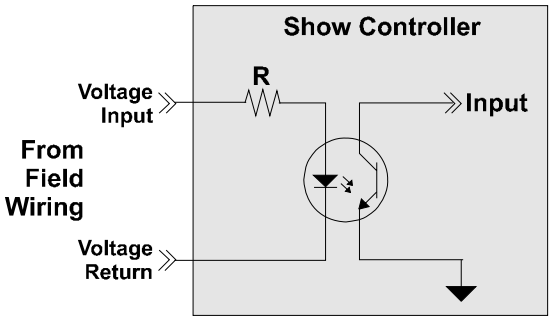


Figure 2 – Voltage Input Schematic.

Configuration	Maximum Distance
Contact Closures	10ft
Voltage Inputs	Limited only by wire gauge

Table 5 – Voltage Inputs are advantageous for many reasons, including the distance at which they are operational.

Input Wiring

➢ *Connecting a Voltage Input*

1. Open the InterActivator and verify that the correct Resistor Pack is installed in RP8 (see table 6).
2. Connect the appropriate wire from the Voltage Input signal pin (pin 1 for Input9, pin 2 for Input10, etc.) to the positive terminal of the 24 VDC external power supply.
3. Connect the negative terminal of the external power supply to one of the terminals of the contact closure.
4. Connect the appropriate Voltage Input Return pin on the Parallel I/O connector to the other terminal of the contact closure (pin 20 for Input9, Pin 21 for Input10, etc.)

Voltage Level Used	Resistor Pack Value
5V	180 Ohm
12V	470 Ohm
24V	1.5K Ohm*

Table 6 – Recommended Resistor Pack values for Voltage Inputs.
** Factory Default Setting*

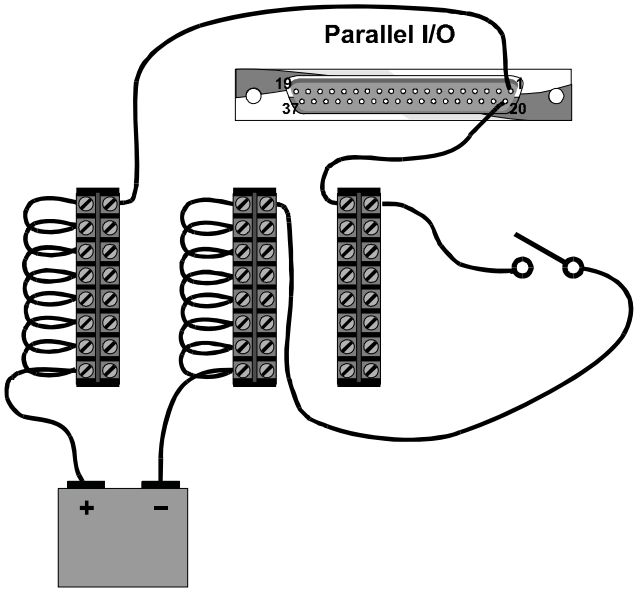


Figure 3 – Sample connection for a Voltage Input to Input9 of the Parallel I/O connector. The terminal blocks are used for power bussing and modularization of the input signals.

➢ *Connecting a Contact Closure*

1. Connect the appropriate wire from the Input signal pin (pin 28 for Input9, pin 29 for Input10, etc.) on the Parallel I/O connector to one of the terminals of the contact closure.
2. Connect one of the GND pins on the Parallel I/O connector to the other terminal of the contact closure.

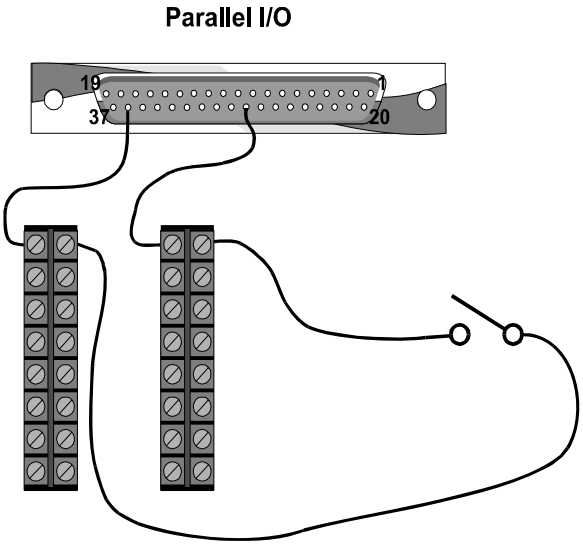


Figure 4 – Sample connection for a Contact Closure Input to Input9 of the Parallel I/O connector.

Digital Outputs

Output Connector

In addition to discrete inputs, the InterActivator provides 8 transistor outputs (lamp drivers) for discrete control. These outputs are capable of sinking up to 500 mA each when used individually. The amount of current that each output can sink decreases when the number of outputs being used at the same time increases. For example: if all of the outputs are used at the same time they can only sink 150 mA each.

The connections for the Parallel I/O connector are as follows:

Pin	Connection	Pin	Connection
1	Voltage Input 9	20	Voltage Input 9 Return
2	Voltage Input 10	21	Voltage Input 10 Return
3	Voltage Input 11	22	Voltage Input 11 Return
4	Voltage Input 12	23	Voltage Input 12 Return
5	Voltage Input 13	24	Voltage Input 13 Return
6	Voltage Input 14	25	Voltage Input 14 Return
7	Voltage Input 15	26	Voltage Input 15 Return
8	Voltage Input 16	27	Voltage Input 16 Return
9	**Output 1**	28	Contact Closure Input 9
10	**Output 2**	29	Contact Closure Input 10
11	**Output 3**	30	Contact Closure Input 11
12	**Output 4**	31	Contact Closure Input 12
13	**Output 5**	32	Contact Closure Input 13
14	**Output 6**	33	Contact Closure Input 14
15	**Output 7**	34	Contact Closure Input 15
16	**Output 8**	35	Contact Closure Input 16
17	**Clamping Diodes**	36	GND
18	N/C	37	GND
19	GND		

Table 7 – Parallel I/O connector Outputs.

Note When the outputs are used to drive inductive loads (relay coils, etc.), pin 17 can be connected to the powered side of the load to provide additional snubber diode protection.

External Connection

➢ *Connecting an output to a non-inductive load*

1. Connect the positive terminal of the external power supply to the positive terminal of the device that is receiving the signal.
2. Connect the negative terminal of the power supply to one of the GND pins on the Parallel I/O connector.
3. Connect the appropriate Output pin (pin 9 for Output1, pin 10 for Output2, etc.) on the Parallel I/O connector to the negative terminal of the device that is receiving the output signal.

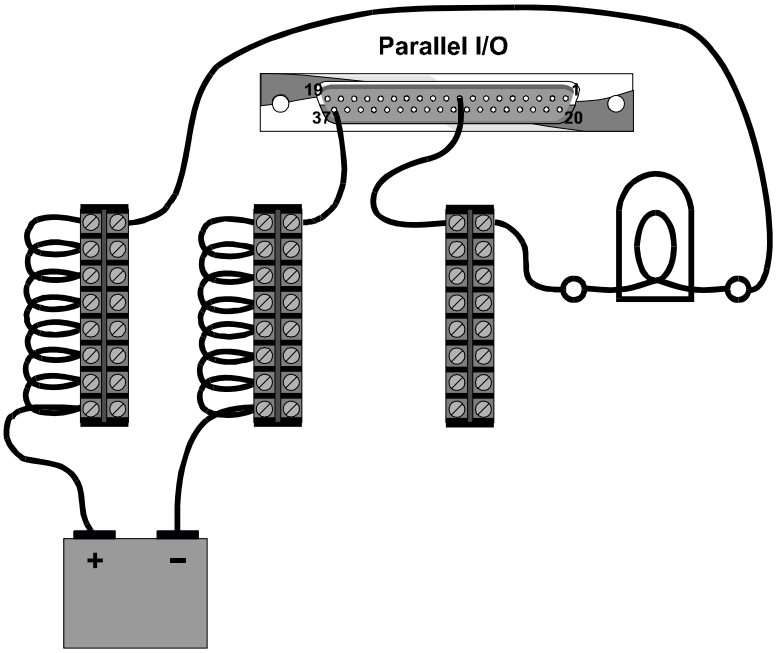


Figure 5 – An indicator lamp is a common example of a non-inductive load.

➢ *Connecting an output to an inductive load*

1. Connect the positive terminal of the external power supply to the positive terminal of the device that is receiving the signal.
2. If external snubber diodes are not used, connect the Clamping Diodes pin (pin 17) on the Parallel I/O connector to the positive terminal of the external power supply.
3. Connect the negative terminal of the power supply to one of the GND pins on the Parallel I/O connector.
4. Connect the appropriate Output pin (pin 9 for Output1, pin 10 for Output2, etc.) on the Parallel I/O connector to the negative terminal of the device that is receiving the output signal

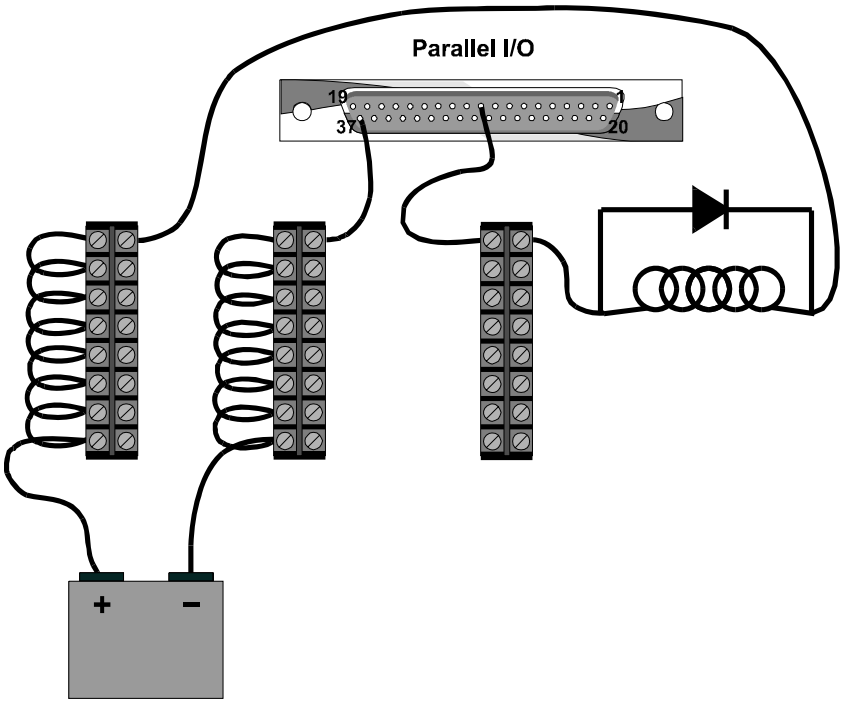


Figure 6 – A relay coil or solenoid is a common example of an inductive load and must have a 1N4000-Series snubber diode placed across it. Be sure to observe proper polarity (anode to negative side).

Video Synchronization

The InterActivator is designed to extract the vertical frame clock from an external video sync signal. This signal should be NTSC or PAL composite video at the standard sync level of 4.1 volts peak-to-peak.

The sync signal is connected to the InterActivator via a rear panel BNC connector. If additional devices are to be wired to the same sync signal, a BNC "T" may be used to daisy-chain the signal. If the InterActivator is the last device in the chain, the internal 75-Ohm terminator should be connected *(factory default)*; otherwise it should be disconnected.

A common sync connection scheme is to use the "Gen" output of a Pioneer LD-V8000 laser disc player to drive the "C-Sync" inputs of another player, with the second "C-Sync" connector of that player connecting to a third, and so on. The final player's second "C-Sync" connector would go to the InterActivator, which needs to have its terminator enabled.

The InterActivator may also work with "Black Burst Sync", if its level is high enough. Black burst sync is generally provided not at sync level, but at video level (approximately 0.7 volts peak-to-peak). Signals at this level should ***not*** be terminated with the 75-Ohm terminator. If you are trying to use a video level signal, have the terminator disconnected, and still can't get the sync to work reliably, it is possible to increase the InterActivator input sensitivity by removing R16. Since this procedure is performed with wire cutters, it should not be undertaken lightly. It also voids the warranty. But if it's 3 AM in Abu Dhabi and your show opens at dawn, what the heck.

Sync Termination

Composite sync signals contain high frequency components. When the signal reaches the end of the line it has a tendency to reflect back toward the sync generator. This reflected signal is undesirable because it degrades the "real" signal. To prevent signal reflection, a terminating resistor is usually placed at the end of the line.

The InterActivator provides an internal 75-Ohm terminating resistor. The unit is shipped from the factory with termination enabled (jumper installed).

➢ *Configuring sync termination*

1. If the InterActivator is the last unit in the daisy-chain, verify that W3 is present.
2. If the InterActivator is NOT the last unit on the daisy-chain, remove W3.

Power Supply

The InterActivator includes an external power supply that allows connection to most domestic wall voltages (110VAC). A 220VAC model is available upon request.

The power ratings for the InterActivator external power supply are as follows:

Input: 120 VAC; 60Hz; 15 watts max.

Output: 9 VDC; 1A

Note Make sure that any power supply used with the InterActivator is the correct voltage and is configured correctly.

Firmware

The operating system that resides in the InterActivator is called the "firmware". Periodic firmware upgrades are made in order to add new features, streamline operation, and fix bugs. For pricing and availability of firmware upgrades, contact Alcorn McBride.

Instead of purchasing your firmware upgrades, you can program them into EPROMs yourself. The latest firmware can be downloaded from Alcorn McBride's WWW site on the Internet. The address is **http://www.alcorn.com/**

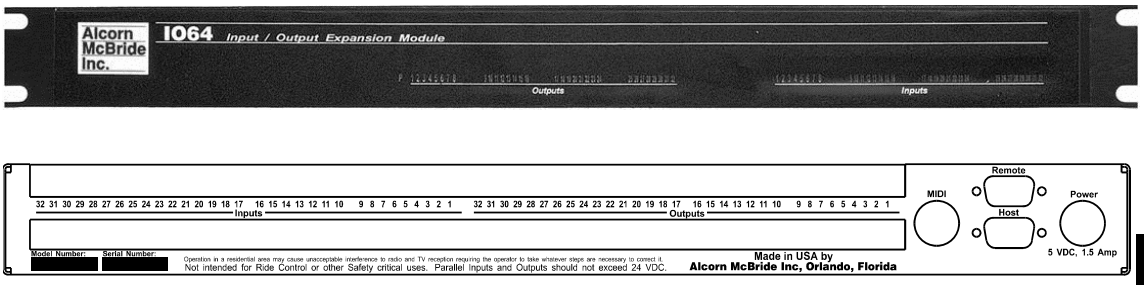
- ***Upgrading show control firmware***

1. Open the InterActivator and locate socket U4.
2. Remove the old firmware EPROM from socket U4.
3. Install the new firmware EPROM into socket U4.

Rack Mounting

The InterActivator may be rack mounted in a standard 19 inch equipment rack, either individually or in pairs. To mount a single InterActivator, order rack mount kit 230-100405. To rack mount a pair of InterActivators, order rack mount kit 230-100437.

IO64 Hardware Reference



The IO64 is an intelligent I/O expansion unit which may also be used as a stand-alone show controller. It provides a large number of inputs and outputs in a very small package, and features easy to use rear panel terminal blocks. It is ideal for I/O intensive applications such as process control.

Specifications

Size and Weight:	Standard 1U rack mount (1.75” x 19” x 5.5”), 3 lbs
Power:	100 to 250 VAC, 50 to 60 Hz, 25 watts maximum. UL listed Class 2 power adapter
Environment:	0 to 35 C (32 to 100 F) 0 to 90% relative humidity, non-condensing
Front Panel:	Power LED Acknowledge (ACK) LED Error LED 1 Serial Activity LED 32 Input Status LEDs 32 Output Status LEDs
Rear Panel:	Host (Programmer) Serial Port DB-9M Remote Serial Port DB-9M 5 Pin DIN MIDI Connector Discrete I/O Phoenix Type Connectors (Mating Connectors with Screw Terminals Included) 5 Pin DIN Power Connector
Serial Port:	RS-232C 300 baud - 38.4 Kbaud 7, 8, or 9 Data Bits 1 or 2 Stop Bits All parity types Port may also be configured for RS-422/485 or MIDI
Opto Inputs:	(32) 24 VDC, 20 mA maximum Reconfigurable for voltages down to 5 operation. Trigger latency < 1 frame.
Relay Outputs:	(32) Contact Closures limited internally to 900 mA with self-restoring polymer fuses.
Show Memory:	24 Kbyte EEPROM. Nonvolatile, robust memory retains show data permanently with no battery backup required.

Serial Ports

When used as an I/O expander, the IO64's "Host" port connects to one of our other show controllers (or any other serial port). When used as a show controller, its "Host" port becomes a programming port.

The remote port may be configured for RS-232, RS-422/485 or MIDI operation.

Port	Type	Description	Connector
0	RS-232	Host Port	DB9M
1	RS-232* / 485 / MIDI	Remote Port	DB9M / 5 Pin DIN F

*Table 1 – IO64 Ports located on the Rear Panel. *Factory Default Setting*

Note RS-485 is used throughout this manual to denote ports that may be used for both RS-422 and RS-485 communication.

Host Port

The Host Port is an RS-232C serial port used to program the IO64.

Pin	Connection
2	RS-232 TXD
3	RS-232 RXD
5	GND

Table 2 – Programmer port connections

Remote Port: RS-232, RS-485, MIDI

The Remote Port is factory configured as an RS-232C serial port, but can be reconfigured as an RS-485 or MIDI port. When reconfigured as a MIDI port, MIDI Input and Output is received on and sent out the MIDI connector.

Pin	RS-232 Connection	RS-485 Connection
1	N/C	N/C
2	RS-232 RXD	N/C
3	RS-232 TXD	N/C
4	N/C	N/C
5	GND	GND
6	N/C	RS-485 TX+
7	N/C	RS-485 TX-
8	N/C	RS-485 RX+
9	N/C	RS-485 RX-

Table 3 – Remote Port connections for RS-232 and RS-485 operation

➢ *Configuring the Remote Port as RS-485*

1. Set jumper W1 to the "RS-485" position.
2. Set Jumper W3 to the RS-232 position. (This selects normal rather than MIDI baud rates.)
3. It is often desirable to terminate RS-422 and RS-485 signals at the receiving end. To terminate the line at the IO64 end, connect a 220 Ohm resistor between pin 8 and pin 9 of Remote Port cable's connector inside the housing. To terminate the receiver at the remote end, connect a 220 Ohm resistor across the RXD pins of the remote equipment.

➢ *Configuring the Remote Port as MIDI*

1. Set jumper W1 to the "MIDI" position.
2. Set Jumper W3 to the MIDI position.

➢ *Configuring the Remote Port as RS-232*

1. Set jumper W1 to the "RS-232" position
2. Set Jumper W3 to the RS-232 position.

MIDI Input/Output Cable

The IO64's rear panel MIDI connector may be directly connected to a device that sends MIDI data. In order to both send and receive MIDI Show Control messages at the same time, a special MIDI I/O cable must be made to allow MIDI Input and MIDI Output jacks to be available. The cable should look like this:

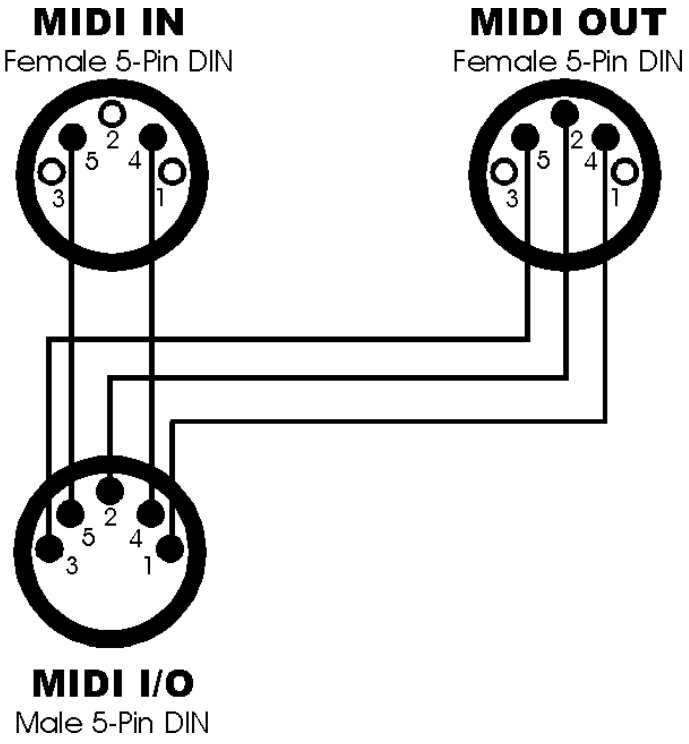


Figure 1 – IO64 MIDI Input/Output Cable.

In addition, jumper W2 should be installed to provide the shield for the MIDI output cable.

Digital Inputs

The IO64 includes 32 Opto-isolated inputs that can help control the flow of a show system. These inputs can be activated through the Phoenix Type Input Connectors located on the rear panel.

Note The Opto-Inputs on the IO64 are polarity-sensitive. For a specific input to be correctly connected, positive voltage must be connected to the top socket of the Phoenix connector, and negative voltage must be connected to the bottom socket.

➢ *Connecting an Input*

1. Verify that the appropriate Resistor Pack is installed in each of the sockets (see Tables 4 and 5 below)
2. Using a Male Phoenix connector, connect the appropriate wire from the Input signal pin (top pin 1 for Input1, top pin 2 for Input2, etc.) to the positive terminal of the external power supply.
3. Connect the negative terminal of the external power supply to one of the terminals of the contact closure
4. Connect the appropriate Input Return pin to the other terminal of the contact closure (bottom pin 1 for Input1, bottom pin 2 for Input2, etc.)

Example: External Switch

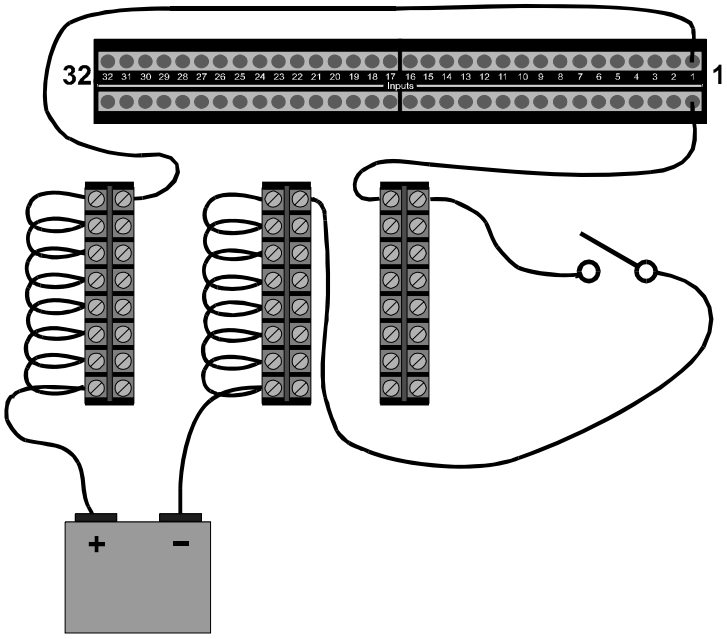


Figure 2 – An external switch or button is used to activate Input1.

Resistor Pack	Inputs
RP8	1-8
RP6	9-16
RP12	17-24
RP10	25-32

Table 4 – Inputs that are affected by particular Resistor Pack values

Voltage Level Used	Resistor Pack Value
5V	180 Ohm
12V	470 Ohm
24V	1.5K Ohm*

Table 5 – Recommended Resistor Pack values.
**Factory Default Setting*

Digital Outputs

The IO64 provides 32 Dry-Contact Relay Outputs for discrete control.

Note: The Relay Outputs on the IO64 are not polarity-sensitive; therefore, positive and negative voltages may both be connected to either the top or bottom socket of the Phoenix connector.

The Relay Outputs are fused at 900mA using self-restoring polymer fuses. If an overload occurs, the fuse will open until the problem is corrected; then heal itself.

➢ *Connecting an output to a non-inductive load*

1. Using a Male Phoenix Connector, connect the appropriate Output pin (top pin 1 for Output1, top pin 2 for Output2, etc.) on the Outputs Phoenix Connector to the positive terminal of the external power supply.
2. Using a Phoenix Connector, connect the corresponding Output Return pin (bottom pin 1 for Output1, bottom pin 2 for Output2, etc.) to the positive terminal of the device that is receiving the output signal.
3. Connect the negative terminal of the device that is receiving the output signal to the negative terminal of the external power supply.

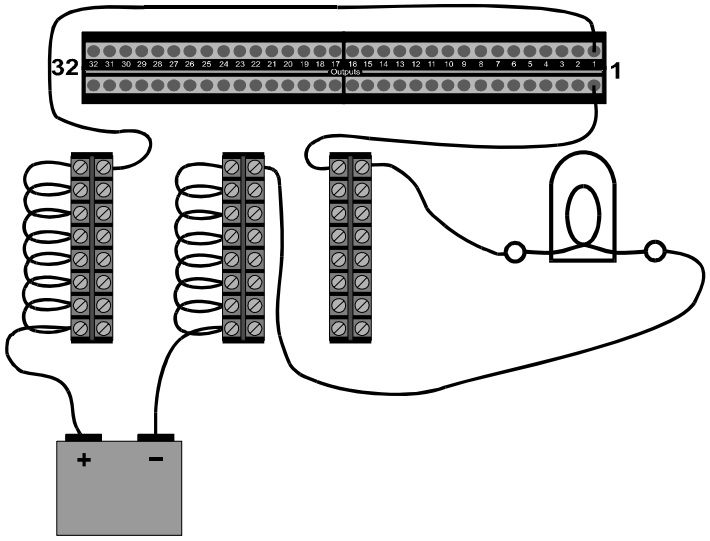


Figure 3 – An indicator lamp is a common example of a non-inductive load.

➢ *Connecting an output to an inductive load*

1. Using a Male Phoenix Connector, connect the appropriate Output pin (top pin 1 for Output1, top pin 2 for Output2, etc.) on the Outputs Phoenix Connector to the positive terminal of the external power supply.
2. Using a Phoenix Connector, connect the corresponding Output Return pin (bottom pin 1 for Output1, bottom pin 2 for Output2, etc.) to the positive terminal of the device that is receiving the output signal.
3. Connect the negative terminal of the device that is receiving the output signal to the negative terminal of the external power supply.
4. Connect an appropriate 1N4000-series (1N4001-1N4007) diode across the load.

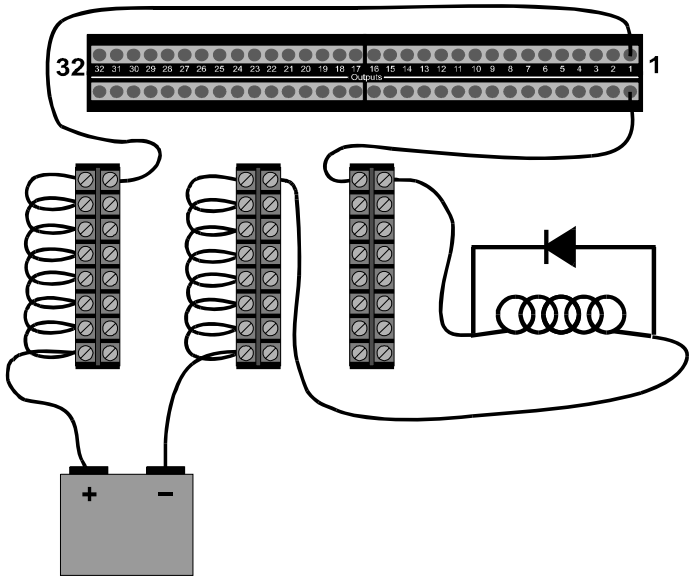


Figure 4 – A relay or solenoid is a common example of an inductive load and must have a 1N4000-Series snubber diode placed across it. Be sure to observe proper polarity (anode to negative side).

Power Supply

The IO64 includes an external universal power supply that allows connection to many domestic as well as international wall voltages (110VAC, 220VAC, 200VAC) without special configuration.

The power ratings for the IO64 external power supply are as follows:

Input: 100-250VAC; 50-60Hz; 50 watts max

Output: +5V, 4.0A; +12V, 1.0A; -12V, 0.6A

Pin	Connection
1	Common
2	N/C
3	+5V
4	-12V
5	+12V

Table 6 – IO64 Power jack connections

Note When connecting the IO64 to power, DO NOT insert the power connector into the MIDI jack. This could damage the unit!

Firmware

The operating system that resides in the IO64 is called the "firmware". Periodic firmware upgrades are made in order to add new features, streamline operation, and fix bugs. For pricing and availability of firmware upgrades, contact Alcorn McBride.

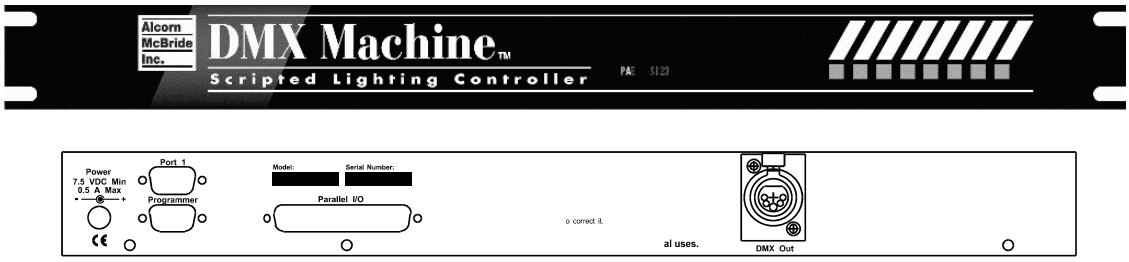
Instead of purchasing your firmware upgrades, you can program them into EPROMs yourself. The latest firmware can be downloaded from Alcorn McBride's WWW site on the Internet. The address is **http://www.alcorn.com/**

➢ *Upgrading show control firmware*

1. Remove the old firmware EPROM from socket U4.
2. Install the new firmware EPROM into socket U4.

.

DMX Machine Hardware Reference



The DMX Machine™ is a complete stand-alone lighting controller. It is ideal as a slave to another controller, or can be used by itself for small shows or elaborate kiosks.

Specifications

Size and Weight:	Standard 1U rack mount (1.75” x 19” x 6.5”), 8 lbs
Power:	120 or 240 VAC (specify when ordering), 50 to 60 Hz 25 watts maximum. UL listed Class 2 power adapter
Environment:	0 to 35 C (32 to 100 F) 0 to 90% relative humidity, non-condensing
Front Panel:	Power LED Acknowledge (ACK) LED Error LED Serial Activity LED 8 Pushbuttons
Rear Panel:	Programming Port DB-9M 1 Serial Port DB-9M 1 DMX Output 5-pin XLR Female Discrete Inputs DB-37F Power Barrel Connector
Serial Port:	RS-232C 300 baud - 38.4 Kbaud 7, 8, or 9 Data Bits 1 or 2 Stop Bits All parity types
DMX Port:	DMX-512 (1990) standard
Inputs:	(16) TTL inputs, internally pulled up to +5 VDC, suitable for contact-closure operation. Trigger latency < 1 frame.
Show Memory:	32 Kbyte EEPROM. Nonvolatile, robust memory retains show data permanently with no battery backup required.

Serial Ports

The DMX Machine provides serial ports which are configured as shown below:

Port	Type	Description	Connector
0	RS-232	Programmer Port	DB9M
1	RS-232	Port 1	DB9M

Table 1 – DMX Machine Ports located on the Rear Panel

Programmer Port

The Programmer Port is an RS-232C serial port used to program the DMX Machine.

Pin	Connection
2	RS-232 TXD
3	RS-232 RXD
5	GND

Table 2 – Programmer port connections

Port 1: RS-232

Port 1 is permanently configured as RS-232C.

Pin	Connection
2	RS-232 RXD
3	RS-232 TXD
5	GND

Table 3 – Ports 1 connections for RS-232 operation

DMX Output Port

The DMX Output port connections are as follows:

Pin	Connection
1	Common (Shield)
2	DMX TX-
3	DMX TX+
4	N/C
5	N/C

Table 4 – DMX Out connections

The DMX line is a differential communications signal which conforms to RS-485 standards. This means that it utilizes both positive and negative lines to transmit a signal, thereby reducing is susceptibility to external noise. Even though the DMX signals are well protected from external noise, they must be protected from INTERNAL noise as well. When the DMX controller sends a DMX signal down the line, that signal has a tendency to reflect back toward the DMX unit once it reaches the end of the line. This "reflected" signal is harmful because it can degrade the quality of real signals.

To prevent signal reflection, a 120 Ohm terminating resistor should be placed across the positive and negative receive terminals (RXD+ and RXD-) of the LAST receiver on the line. Placing the resistor across the pins will effectively terminate the signal at the last unit while still allowing the last dimmer to receive the signal. Many dimmer packs provide a built in resistor and switch for such termination. Otherwise you will need a discrete resistor.

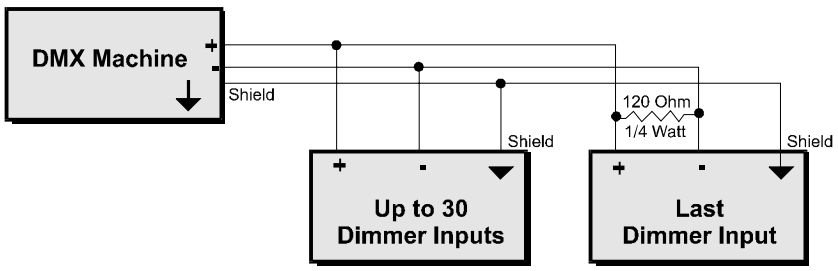


Figure 1 – A 120-Ohm Terminating Resistor is placed across the RXD+ and RXD- lines of the Last Receiver.

Note Some DMX Dimmers provide a switch or jumper to activate internal termination. If your Dimmers include this feature, do not place the terminating resistor across the receive terminals.

Digital Inputs

The DMX Machine includes 16 contact closure inputs that can help control the flow of a show system. These inputs are activated by connecting a contact closure from the input pins on the rear panel Parallel Input connector to ground. (The eight front panel buttons duplicate the function of the first eight contact closure inputs – button 1 corresponds with input 1, etc.) The connections for the Parallel Input connector are as follows:

Pin	Connection	Pin	Connection
1	**Contact Closure Input 1**	**20**	**GND**
2	**Contact Closure Input 2**	**21**	**GND**
3	**Contact Closure Input 3**	**22**	**GND**
4	**Contact Closure Input 4**	**23**	**GND**
5	**Contact Closure Input 5**	**24**	**GND**
6	**Contact Closure Input 6**	**25**	**GND**
7	**Contact Closure Input 7**	**26**	**GND**
8	**Contact Closure Input 8**	**27**	**GND**
9	**Contact Closure Input 9**	**28**	**GND**
10	**Contact Closure Input 10**	**29**	**GND**
11	**Contact Closure Input 11**	**30**	**GND**
12	**Contact Closure Input 12**	**31**	**GND**
13	**Contact Closure Input 13**	**32**	**GND**
14	**Contact Closure Input 14**	**33**	**GND**
15	**Contact Closure Input 15**	**34**	**GND**
16	**Contact Closure Input 16**	**35**	**GND**
17	N/C	36	N/C
18	N/C	37	N/C
19	N/C		

Table 5 – Parallel Input connector Inputs

Input Wiring

➢ *Connecting a Contact Closure*

1. Connect the appropriate wire from the Input signal pin (pin 1 for Input1, pin 2 for Input2, etc.) on the Parallel I/O connector to one of the terminals of the contact closure.
2. Connect one of the GND pins on the Parallel I/O connector to the other terminal of the contact closure.

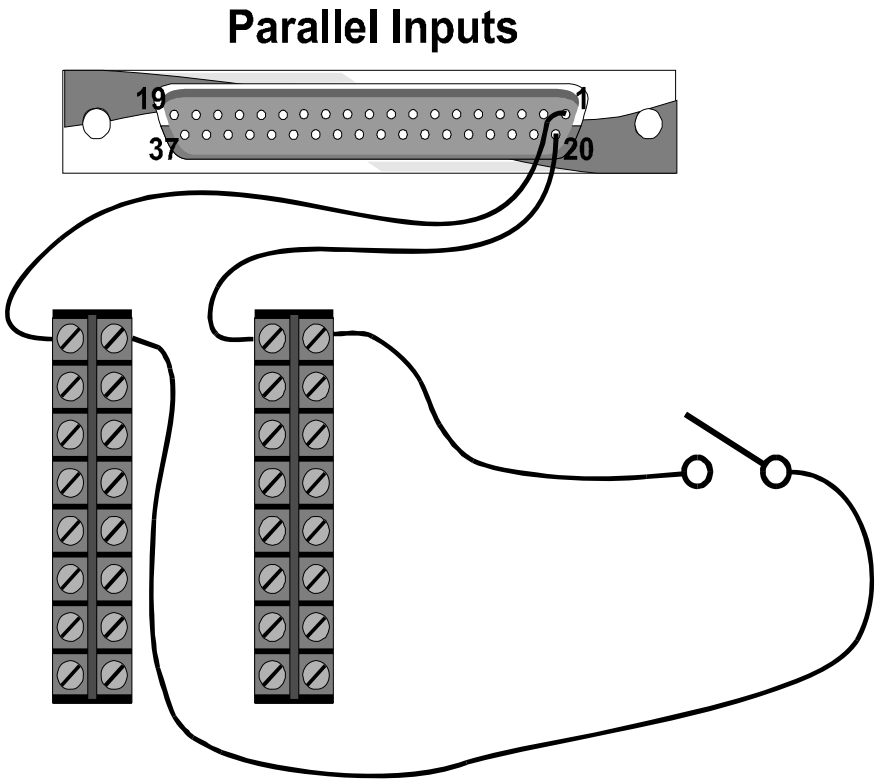


Figure 2 – Sample connection for a Contact Closure connected to Input1 of the Parallel Inputs connector

Power Supply

The DMX Machine includes an external power supply that allows connection to most domestic wall voltages (110VAC). A 220VAC model is available upon request.

The power ratings for the DMX Machine external power supply are as follows:

Input: 120 VAC; 60Hz; 15 watts max.

Output: 9 VDC; 1A

Note Make sure that any power supply used with the DMX Machine is the correct voltage and is configured correctly.

Firmware

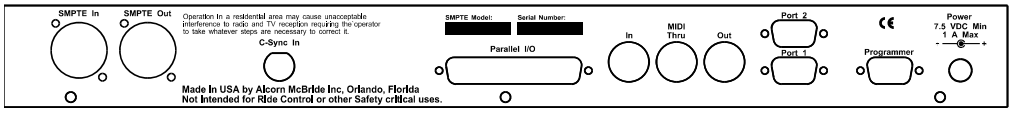
The operating system that resides in the DMX Machine is called the "firmware". Periodic firmware upgrades are made in order to add new features, streamline operation, and fix bugs. For pricing and availability of firmware upgrades, contact Alcorn McBride.

Instead of purchasing your firmware upgrades, you can program them into EPROMs yourself. The latest firmware can be downloaded from Alcorn McBride's WWW site on the Internet. The address is **http://www.alcorn.com/**

➢ *Upgrading show control firmware*

1. Open the DMX Machine and locate socket U1
2. Remove the old firmware EPROM from socket U1
3. Install the new firmware EPROM into socket U1

SMPTE Machine Hardware Reference



The SMPTE Machine™ provides SMPTE reading and generation capabilities to all Alcorn McBride show controllers. It allows any sequences to be triggered at predefined timecodes.

The SMPTE Machine is ideal for installations where timecode is used to synchronize many disparate pieces of equipment.

Specifications

Size and Weight:	Standard 1U rack mount (1.75” x 19” x 6.5”), 8 lbs
Power:	120 or 240 VAC (specify when ordering), 50 to 60 Hz 25 watts maximum. UL listed Class 2 power adapter
Environment:	0 to 35 C (32 to 100 F) 0 to 90% relative humidity, non-condensing
Front Panel:	2x16 LCD Display Power LED Fault LED Lock LED Generate LED 3 Pushbuttons
Rear Panel:	Programming Port DB-9M 2 Serial Ports DB-9M MIDI Input 5-pin DIN Female MIDI Output 5-pin DIN Female MIDI Thru 5-pin DIN Female Discrete I/O DB-37F NTSC or PAL Sync Input BNC Power Barrel Connector
Serial Ports:	(2) RS-232C 300 baud - 38.4 Kbaud 7, 8, or 9 Data Bits 1 or 2 Stop Bits All parity types 1 port can be configured as MIDI
Opto Inputs:	(4) 24 VDC, 20 mA maximum Reconfigurable for voltages down to 5 VDC or for pure contact-closure operation. Trigger latency < 1 frame.
Driver Outputs:	(3) Lamp drivers rated at 500mA each when used individually, 150mA each if all in use.
SMPTE Output:	4V p-p max into 600 ohms (adjustable).
Trigger Memory:	Nonvolatile, robust EEPROM memory retains trigger data permanently with no battery backup required.

Serial Ports

The SMPTE Machine provides two serial ports, which may be configured as shown below:

Port	Type	Description	Connector
0	RS-232	Programmer Port	DB9M
1	RS-232	Control Port	DB9M
2	RS-232 / MIDI*	Control Port	DB9M / (2) 5 Pin DIN F

*Table 1 – SMPTE Machine Ports located on the Rear Panel. *Factory Default Setting*

Programmer Port

The Programmer Port is an RS-232C serial port used to program the SMPTE Machine.

Pin	Connection
2	RS-232 TXD
3	RS-232 RXD
5	GND
8	+12V Pull Up

Table 2 – Programmer port connections.

Port 1: RS-232

Port 1 is factory configured as an RS-232C serial port.

Pin	Connection
2	RS-232 RXD
3	RS-232 TXD
4	+12V Pull Up
5	GND
7	+12V Pull Up

Table 3 – Port 2 connections for RS-232 operation.

Port 2: RS-232 or MIDI

Port 2 is factory configured as a MIDI port, but can be reconfigured as an RS-232C serial port. For RS-232 use the connections are provided on a male DB-9 connector. For MIDI, they are provided on three 5-pin DIN connectors. When configured for MIDI, MIDI Input is received by the MIDI IN port, and MIDI Output is sent out the MIDI OUT port. The MIDI Thru port echoes the data received on MIDI IN.

➢ *Configuring Port 2 as RS-232*

1. Place the jumpers on W2 and W3 in the direction toward the "RS-232" text.

Pin	Connection
2	RS-232 RXD
3	RS-232 TXD
4	+12V Pull Up
5	GND
7	+12V Pull Up

Table 4 – Port 2 connections for RS-232 operation.

➢ *Configuring Port 2 as MIDI*

1. Place the jumper on W2 and W3 in the direction toward the "MIDI" text.

MIDI IN

Pin	Connection
4	MIDI RX+
5	MIDI RX-

Table 5 – MIDI IN connections.

MIDI OUT and THRU

Pin	Connection
2	GND
4	MIDI TX+
5	MIDI TX-

Table 6 – MIDI OUT and THRU connections.

SMPTE

The SMPTE Machine reads SMPTE using a 3 pin XLR female connector, and generates it through a 3 pin XLR male.

SMPTE IN

Pin	Connection
1	GND
2	Signal +
3	Signal -

Table 7 – SMPTE IN connections.

SMPTE OUT

Pin	Connection
1	GND
2	Signal +
3	Signal -

Table 8 – SMPTE OUT.

SMPTE Output Signal Level

Switch SW9 selects the SMPTE Output Signal Level. Only one position of the switch should be set to "ON" at a time.

SMPTE OUTPUT LEVEL SW9

Position	Output Level (volts peak-to-peak)
1	4.0
2	3.5
3	3.0
4	2.5
5	2.0

Table 9 – SMPTE Output Level Adjustment.
Values shown assume a 600-Ohm balanced load.

SMPTE Read/Generate Sync Source

Jumper W1 Selects the SMPTE Sync Source. When reading SMPTE, this jumper connects the incoming SMPTE signal to the SMPTE Machine. This is the factory default position for W1. When generating SMPTE this jumper needs to be changed if the generated SMPTE is to lock to external video sync. If the generated SMPTE does not need to be video-locked, the position of this jumper doesn't matter.

- ***Selecting Incoming SMPTE as a Sync Source (Reading Only)***

1. Set Jumper W1 to the "SMPTE" position to read external SMPTE signal.

- ***Selecting Video Sync as a Sync Source (Generating Only)***

2. Set Jumper W1 to the "VIDEO" position to lock generated SMPTE to a composite video sync signal.

LCD Display

The SMPTE Machine includes a standard 2x16 (32 character) Backlit LCD Display. An internal potentiometer is used to adjust the contrast (viewing angle) of the LCD.

- ***Adjusting the LCD contrast***

1. To make the display lighter, turn "CONTRAST" control VR1 clockwise.
2. To make the display darker, turn VR1 counter-clockwise.

Digital Inputs

The SMPTE Machine includes 3 front panel buttons and 8 Opto-isolated inputs that control the unit's behavior. The buttons start, pause and reset the SMPTE timecode. The Opto-isolated inputs are activated by electrically activating the input through the Parallel I/O connector located on the rear panel.

The connections for the Parallel I/O connector are as follows:

Pin	Connection	Pin	Connection
1	**"Start" Voltage Input**	**20**	**"Start" Voltage Input Return**
2	**"Pause" Voltage Input**	**21**	**"Pause" Voltage Input Return**
3	**"Reset" Voltage Input**	**22**	**"Reset" Voltage Input Return**
4	Not Used	23	Not Used
5	**"Idle" Voltage Input**	**24**	**"Idle" Voltage Input 12 Return**
6	Not Used	25	Not Used
7	Not Used	26	Not Used
8	Not Used	27	Not Used
9	"Running" Output	**28**	**"Start" Contact Closure Input**
10	"Fault" Output	**29**	**"Pause" Contact Closure Input**
11	"Ready" Output	**30**	**"Reset" Contact Closure Input**
12	Not Used	31	Not Used
13	Not Used	**32**	**"Idle" Contact Closure Input**
14	Not Used	33	Not Used
15	Not Used	34	Not Used
16	Not Used	35	Not Used
17	Clamping Diodes	**36**	**GND**
18	N/C	**37**	**GND**
19	**GND**		

Table 10 – Parallel I/O connector Inputs.

Two forms of input signal can be applied to the Parallel I/O connector: Voltage Inputs, and contact closures. Voltage Inputs and contact closure inputs, while activating the same input, are available on separate pins of the Parallel I/O connector. We do not recommend using both types of input simultaneously.

Voltage Inputs vs. Contact Closures

There are many advantages to using Voltage Inputs over Contact Closures. First, a Contact Closure can only be located a short distance from the SMPTE Machine. Second, Contact Closures use the SMPTE Machine's own power supply, so external wiring errors can damage the entire unit.

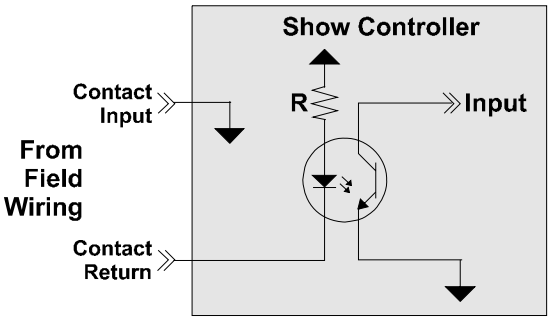


Figure 1 – Contact Closure Schematic.

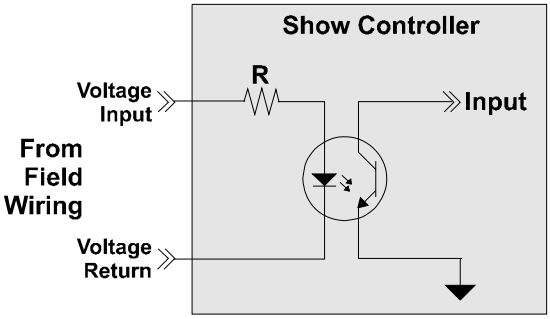


Figure 2 – Voltage Input Schematic.

Configuration	Maximum Distance
Contact Closures	10ft
Voltage Inputs	Limited only by wire gauge

Table 11 – Voltage Inputs are advantageous for many reasons, including the distance at which they are operational.

Input Wiring

➢ *Connecting a Voltage Input*

1. Open the SMPTE Machine and verify that the correct Resistor Pack is installed in RP5 (see table 11).
2. Connect the appropriate wire from the Voltage Input signal pin (pin 1 for "Start", pin 3 for "Reset", etc.) to the positive terminal of the 24 VDC external power supply.
3. Connect the negative terminal of the external power supply to one of the terminals of the contact closure.
4. Connect the appropriate Voltage Input Return pin on the Parallel I/O connector to the other terminal of the contact closure (pin 20 for "Start", Pin 22 for "Reset", etc.)

Voltage Level Used	Resistor Pack Value
5V	180 Ohm
12V	470 Ohm
24V	1.5K Ohm*

Table 12 – Recommended Resistor Pack values for Voltage Inputs.
** Factory Default Setting*

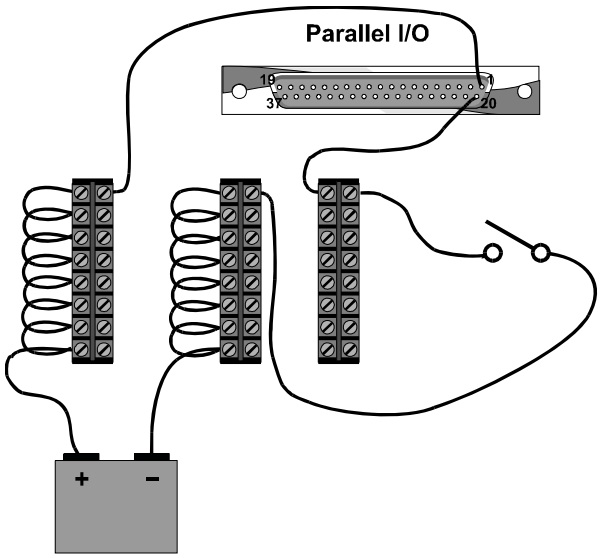


Figure 3 – Sample connection for a Voltage Input to the "Start" input of the Parallel I/O connector. The terminal blocks are used for power bussing and modularization of the input signals.

➢ *Connecting a Contact Closure*

1. Connect the appropriate wire from the Input signal pin (pin 28 for "Start", pin 30 for "Reset", etc.) on the Parallel I/O connector to one of the terminals of the contact closure.
2. Connect one of the GND pins on the Parallel I/O connector to the other terminal of the contact closure.

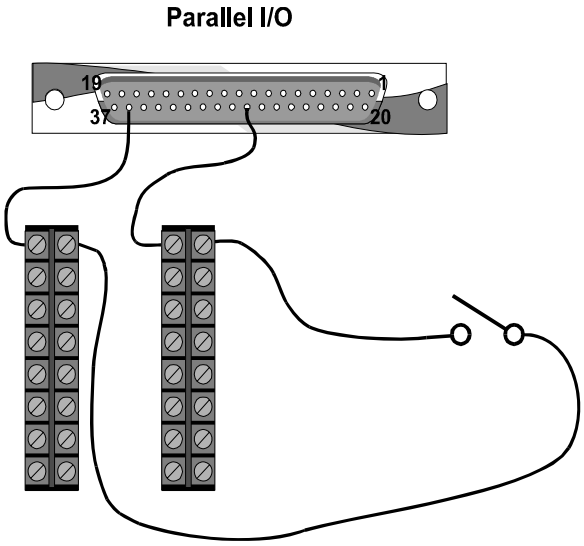


Figure 4 – Sample connection for a Contact Closure Input to the "Start" input of the Parallel I/O connector

Digital Outputs

Output Connector

In addition to discrete inputs, the SMPTE Machine provides transistor outputs (lamp drivers) that indicate the unit's state. These outputs are capable of sinking up to 500 mA each.

The connections for the Parallel I/O connector are as follows:

Pin	Connection	Pin	Connection
1	"Start" Voltage Input	20	"Start" Voltage Input Return
2	"Pause" Voltage Input	21	"Pause" Voltage Input Return
3	"Reset" Voltage Input	22	"Reset" Voltage Input Return
4	Not Used	23	Not Used
5	"Idle" Voltage Input	24	"Idle" Voltage Input 12 Return
6	Not Used	25	Not Used
7	Not Used	26	Not Used
8	Not Used	27	Not Used
9	**"Running" Output**	28	"Start" Contact Closure Input
10	**"Fault" Output**	29	"Pause" Contact Closure Input
11	**"Ready" Output**	30	"Reset" Contact Closure Input
12	Not Used	31	Not Used
13	Not Used	32	"Idle" Contact Closure Input
14	Not Used	33	Not Used
15	Not Used	34	Not Used
16	Not Used	35	Not Used
17	**Clamping Diodes**	**36**	**GND**
18	N/C	**37**	**GND**
19	**GND**		

Table 13 – Parallel I/O connector Outputs

Note When the outputs are used to drive inductive loads (relay coils, etc.), pin 17 can be connected to the powered side of the load to provide additional snubber diode protection.

External Connection

➢ *Connecting an output to a non-inductive load*

1. Connect the positive terminal of the external power supply to the positive terminal of the device that is receiving the signal.
2. Connect the negative terminal of the power supply to one of the GND pins on the Parallel I/O connector.
3. Connect the appropriate Output pin (pin 9 for “Running”, pin 10 for “Fault”, etc.) on the Parallel I/O connector to the negative terminal of the device that is receiving the output signal.

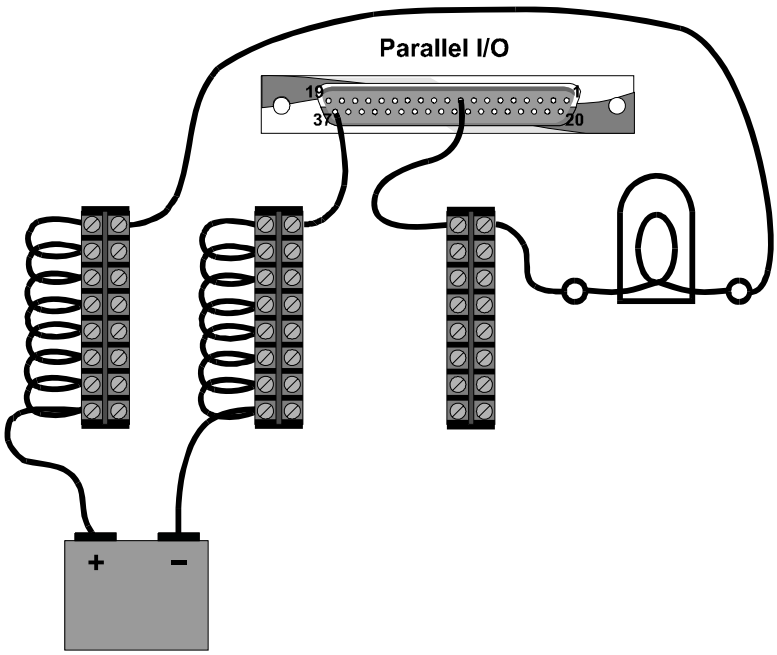


Figure 5 – An indicator lamp is a common example of a non-inductive load. This one is connected to the “Running” output.

➢ *Connecting an output to an inductive load*

1. Connect the positive terminal of the external power supply to the positive terminal of the device that is receiving the signal.
2. Connect the negative terminal of the power supply to one of the GND pins on the Parallel I/O connector.
3. Connect the appropriate Output pin (pin 9 for “Running”, pin 10 for “Fault”, etc.) on the Parallel I/O connector to the negative terminal of the device that is receiving the output signal.

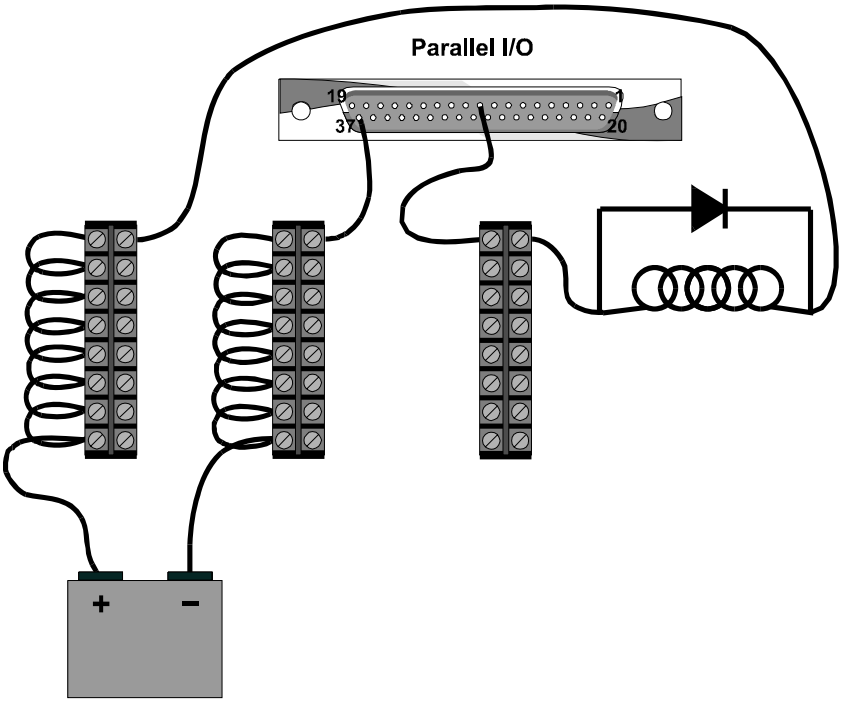


Figure 6 – A relay coil or solenoid is a common example of an inductive load and must have a 1N4000-Series snubber diode placed across it. Be sure to observe proper polarity (anode to negative side).

Video Synchronization

The SMPTE Machine is designed to extract the vertical frame clock from an external video sync signal. This feature is only used when generating SMPTE and locking the generated signal to Video sync. This signal should be NTSC or PAL composite video at the standard sync level of 4.1 volts peak-to-peak.

The sync signal is connected to the SMPTE Machine via a rear panel BNC connector. If additional devices are to be wired to the same sync signal, a BNC "T" may be used to daisy-chain the signal. If the SMPTE Machine is the last device in the chain, the internal 75-Ohm terminator should be connected *(factory default)*; otherwise it should be disconnected.

A common sync connection scheme is to use the "Gen" output of a Pioneer LD-V8000 laser disc player to drive the "C-Sync" inputs of another player, with the second "C-Sync" connector of that player connecting to a third, and so on. The final player's second "C-Sync" connector would go to the SMPTE Machine, which needs to have its terminator enabled.

The SMPTE Machine may also work with "Black Burst Sync", if its level is high enough. Black burst sync is generally provided not at sync level, but at video level (approximately 0.7 volts peak-to-peak). Signals at this level should ***not*** be terminated with the 75-Ohm terminator. If you are trying to use a video level signal, have the terminator disconnected, and still can't get the sync to work reliably, it is possible to increase the SMPTE Machine input sensitivity by removing R23. Since this procedure is performed with wire cutters, it should not be undertaken lightly. It also voids the warranty. But if it's 3 AM in Abu Dhabi and your show opens at dawn, what the heck.

Sync Termination

Composite sync signals contain high frequency components. When the signal reaches the end of the line it has a tendency to reflect back toward the sync generator. This reflected signal is undesirable because it degrades the "real" signal. To prevent signal reflection, a terminating resistor is usually placed at the end of the line.

The SMPTE Machine provides an internal 75-Ohm terminating resistor. The unit is shipped from the factory with termination enabled (jumper installed).

➢ *Configuring sync termination*

1. If the SMPTE Machine is the last unit in the daisy-chain, verify that W6 is present.
2. If the SMPTE Machine is NOT the last unit on the daisy-chain, remove W6.

Power Supply

The SMPTE Machine includes an external power supply that allows connection to most domestic wall voltages (110VAC). A 220VAC model is available upon request.

The power ratings for the SMPTE Machine external power supply are as follows:

Input: 120 VAC; 60Hz; 15 watts max.

Output: 9 VDC; 1A

Note Make sure that any power supply used with the SMPTE Machine is the correct voltage and is configured correctly.

Firmware

The operating system that resides in the SMPTE Machine is called the "firmware". Periodic firmware upgrades are made in order to add new features, streamline operation, and fix bugs. For pricing and availability of firmware upgrades, contact Alcorn McBride.

Instead of purchasing your firmware upgrades, you can program them into EPROMs yourself. The latest firmware can be downloaded from Alcorn McBride's WWW site on the Internet. The address is **http://www.alcorn.com/**

- ***Upgrading show control firmware***

  1. Open the SMPTE Machine and locate socket U1.
  2. Remove the old firmware EPROM from socket U1.
  3. Install the new firmware EPROM into socket U1.

Appendix A – Adding User-Defined Serial Protocols

Alcorn McBride Show Controllers can communicate with countless types of serial devices. Information on how these devices communicate is located in "Protocol Files".

Protocol Files for many devices are included with WinScript and allow you to program your show quickly and easily by using device-specific events that are built into serial messages and sent to the device at the specified time.

The real power of Protocol Files is that you can create your own. You can create events with up to four parameters that are automatically built into a valid serial message by WinScript and sent by your Show Controller.

If you come up with a great new Protocol File, send it to us! Users are constantly raising the bar on Alcorn McBride Show Controllers, so your Protocol File could be valuable to other users. Good Luck!

In this section you will find:

- Instructions for creating your own Protocol File

Creating Your Own Protocol File

Protocol files can be created or edited on any non-document mode word processor including DOS Edit and Notepad. Word processors such as Word, WordPad, and Word Perfect can be used as long as the files are exported to non-rich, straight ASCII text.

IMPORTANT The WinScript Compiler will not give error messages if your PCL file contains bad syntax. It is your responsibility to check your events thoroughly. If there is bad syntax in an event, the WinScript Compiler will omit some or all of the bytes.

Note The Protocol file AMIEVNTS.PCL is a special Protocol file. It provides commands that Show Controllers can use internally. It should not be renamed, edited, or changed in any way.

The Device Header

The file consists of a device header section named **Device** and then all of the commands the device is capable of receiving. A device header has the following example appearance:

```
[Device]
Version=1.0
Date=10/20/95
Author=Jeff Long
Maker=Pioneer
Model=LD-V8000
Supported=5.00
Type=Laserdisc Players
Interface=Serial
DataBits=8
StopBits=1
Parity=N
BaudRate=9600,4800,1200
Protocol=Laserdisc
Description=Pioneer LDV-8000 LaserDisc player
```

The **Version**, **Date**, and **Author** fields are for information only. If you create a new Protocol file, set the **Version** to 1.0, the **Date** to the current date, and the **Author** to your name. If you modify and existing Protocol file, add one tenth to the version number if it is a minor change, or one if it is a major change; change the **Date** to the current date; and add your name to the **Author** field, separating the names by commas.

The **Maker** and **Model** fields will appear in WinScript together when you select a protocol. If the Protocol file is a generic protocol file, leave the **Model** field blank.

The **Supported** field indicates what firmware revision this protocol will work under. Most protocols, especially straight ASCII ones intended for laserdisc or CD players will work since rev 5.00. If the device requires firmware modification to work, the **Protocol** field will be changed to that new type, and the rev number of the **Supported** field will indicate that version of firmware. If a user attempts to use this protocol, and downloads to a Show Controller with firmware prior to this field, a compile/download error will alert the user that this unit will not support these commands.

The **Type** field is currently for information only, but will eventually be used as a description when a user right clicks on a protocol and selects "Properties". Try to match this field with other similar devices in other Protocol files. There is no right or wrong text to put here.

The **Interface** field determines what kind of device it is, and what kinds of fields will follow. The two current possible choices for ***Interface*** are *Serial* and *SCSI*. If the **Interface** is *Serial*, then the **DataBits**, **StopBits**, **Parity**, and **BaudRate** fields should follow. If the interface is *SCSI*, then the **Address** field should follow.

The **DataBits** field (for Serial only) determines the number of bits in the serial data frame used for data. The three possible choices for **DataBits** are *7*, *8*, and *9*. If the device supports multiple types, then separate them by commas.

The **StopBits** field (for Serial only) determines the number of bits in the serial data frame used as an end-of-frame marker. The two possible choices for **StopBits** are *1* and *2*. . If the device supports both types, then separate them by commas.

The **Parity** field (for Serial only) determines whether or not a parity bit exists in the serial data frame used for parity checking, and if so, whether it is even or odd parity. The three possible choices for **Parity** are *N*, *E*, and *O*. If the device supports multiple types, then separate them by commas.

The **BaudRate** field (for Serial only) determines the speed of transmission of the serial frame bits in bits per second. The possible choices for **BaudRate** are *300*, *1200*, *2400*, *4800*, *9600*, *19200*, and *38400*. In the case of a MIDI serial port, the only possible choice is *31250*. If the device supports multiple types, then separate them by commas.

The **Address** field (for SCSI only) determines what address the SCSI device is set to. The possible choices for **Address** are *0*, *1*, *2*, *3*, *4*, *5*, *6*, and *7*. If the device supports multiple types, then separate them by commas.

The **Protocol** field determines what method the Show Controller uses to send out the bytes. For example,

the *Alcorn9* protocol type tells the Show Controller to turn on the ninth bit on the first and last bytes of each message. The possible choices for **Protocol** are *Alcorn9*, *Alcorn8*, *Custom*, *ReproBus*, *Laserdisc*, *MIDI*, *ESERTC*, and *SonyCDROM*. Only one of these should be selected here. In general, most users will choose the *Laserdisc*, *Custom*, or *MIDI* protocol type. The only difference between *LaserDisc* and *Custom* is that the Show Controller expects to have tight communication with the device, and often expect Acknowledges back from the device.

Device-Specific Events

Device-specific events are the meat of the Protocol file and can be quite complicated. These events take what the user entered in WinScript's event editor and convert the entered "Data" column information into data the protocol will send out the port to the device. The **MessageOut** event is the only event that is generally found in all Protocol files. This event ensures that the user can—without changing the Protocol file—at least send out bytes to the device. Here is the **MessageOut** event exactly as it could appear in your Protocol File:

```
[MessageOut]
description=Sends a user-defined message out the port
param1=port, "A valid Port"
param2=datastring|string, "A valid Data or local String"
message=@string(param2)
```

Making Events Efficient and Compact

Other than learning how to create each event using correct syntax, there are a few basic guidelines that you should follow in creating events.

- Create event names that comply or are similar to existing WinScript events. The events that are used for most media players are **Spinup**, **Spindown**, **Search**, **Play**, **Still**, **Mute**, etc. If you have some other device like a matrix switcher, a **Patch** event name is appropriate. If your device is unique, and no other Protocol file exists with a similar device/event set, then you can choose your own name.
- Choose event names that are short, to the point, and fit into context. A **DoYourStuff** event name leaves much to be desired.
- Try to orchestrate parameters of events so that their order makes logical sense and requires the fewest events.
- Create multiple variations of the same event if the arguments for the same operation are mutually exclusive. Also create multiple variations of the same event if some parameters are optional.

Creating New Events

Here is a simple **Play** event:

```
[Play:UntilFrame]
description=Plays from the current location to a frame number
supported=5.00
param1=port, "A valid Port"
param2=framestring, "A valid Frame number"
message=h02 "OPL:F" @string(param2) h03
retries=1
timeout=18000
completionack=h06
```

The name of the event is in brackets [**Play**:UntilFrame]. The sub-name is the optional name following the colon in the brackets [Play:**UntilFrame**]. This

sub-name is required only when you have several versions of the same event. This sub-name should be unique from other sub-names of this same event, and should also be as meaningful as possible. In this case [**Play:UntilFrame**] means play the disc until a certain frame is reached (which is an argument to the event). The colon is only required when a sub-name is included.

The **Description** field becomes the explanatory text that is displayed in Event Wizard.

The **Supported** field has the same purpose as it does in the [Device] header except for it applies to the event itself. Therefore it is possible to have a Protocol file that is defined to be supported under firmware revision 5.30, but some of the events only work under revision 5.50 and later. The compiler first checks the Protocol, and then the individual event. Under most circumstances, the **Supported** field is not needed in each event for user defined protocols, and can be omitted.

The **Param** fields of the event have four purposes:

- Qualify the data, making sure it conforms to the requested type
- Translate the actual data the user entered into a particular format in the compiler's temporary buffer.
- Describe an error message to display if the data does not qualify correctly
- Describe the correct parameter to enter in the field (used by Event Wizard)

```
param1=port, "A valid Port"
param2=framestring, "A valid Frame number"
```

In this case, the first parameter must be a valid port name. The compiler looks up the text put into the first parameter and verifies that there is a valid port with that name in the **Configuration | Ports** window. If there is no port with that name, the compiler will display the error following the qualifier. If there is, the compiler will stuff one byte into the compiler's temporary buffer—which will be the index of the port in question. The second parameter must be a valid frame number-- the compiler confirms that the text entered is all digits, and less than the maximum number of frames. If it is, it stuffs the frame number in ASCII into the compiler's temporary buffer. If it isn't, the error message will be displayed.

Note WinScript does not require parameters to be in specific column numbers, as long as multiple parameters are placed in order. If the event requires two parameters for example, the data can be put into column 2 and 4 (leaving 1 and 3 blank) as long as the data in column 1 matches the first parameter, and column 4 matches the second parameter.

Param fields are important because of the fact that they *perform an operation* as well as qualify the data. They take the data the user enters and puts it in a format the message field can take and perform another operation on. The *combination* of the **param** and **message** field processes are what make the serial messages come out correctly.

Here are the possible **param** field choices: *input*, *output*, *flag*, *var*, *port*, *datastring*, *lcdstring*, *string*, *seq*, *byte*, *word*, *bytelabel*, *bytetime*, *framestring*, *timestring*, *trackstring*, and *contains*. In all cases, if the compiler does not qualify the data, then the corresponding message is displayed if it exists. If the compiler does qualify the data, the compiler performs different operations on the parameter, depending on what the **param** field is. The following is a description of each of the following **param** types:

- **input** – Must match the name of an input in the Configuration | Inputs window. Puts one byte in the compiler buffer which is the index of that input.
- **output** – Must match the name of an output in the Configuration | Outputs window. Puts one byte in the compiler buffer which is the index of that output.
- **flag** – Must match the name of a flag in the Configuration | Flags window. Puts one byte in the compiler buffer which is the index of that flag.
- **var** – Must match the name of a variable in the Configuration | Variables window. Puts one byte in the compiler buffer which is the index of that variable.
- **port** – Must match the name of a port in the Configuration | Ports window. Puts one byte in the compiler buffer which is the index of that port.
- **sequence** – Must match the name of a sequence in the Sequence List window. Puts one byte in the compiler buffer which is the index of that sequence.
- **remoteinput** – Must match the name of an input in the Configuration | Inputs window of the remote script connected to a porttyperemote as param1. Puts one byte in the compiler buffer which is the index of that input.
- **remoteoutput** – Must match the name of an output in the Configuration | Outputs window of the remote script connected to a porttyperemote as param1. Puts one byte in the compiler buffer which is the index of that output.

- **remoteflag** – Must match the name of a flag in the in the Configuration | Flags window of the remote script connected to a porttyperemote as param1. Puts one byte in the compiler buffer which is the index of that flag.
- **remotevar** – Must match the name of a variable in the Configuration | Variables window of the remote script connected to a porttyperemote as param1. Puts one byte in the compiler buffer which is the index of that variable.
- **remoteport** – Must match the name of a port in the Configuration | Ports window of the remote script connected to a porttyperemote as param1. Puts one byte in the compiler buffer which is the index of that port.
- **remotesequence** – Must match the name of a sequence in the Sequence List window of the remote script connected to a porttyperemote as param1. Puts one byte in the compiler buffer which is the index of that sequence.
- **porttyperemote** – Must be a valid local Alcorn 9 Bit Control port with a valid Script attached to it.
- **bytelabel** – Must match the name of a label in the Events window, and fit into a single byte. The label must be less than 128 events away from the current event. Puts one byte in the compiler buffer which is the offset in bytes to that label.
- **bytetime** – Must be a valid time that fits into one byte. Any time (whether entered in absolute frames FFF, or time SS.FF) is acceptable, up to 255 frames. The maximum time varies depending on the frame rate selected in the Show Controller. For example, with a running frame rate of 30fps, the maximum time is 8 seconds, 15 frames. Puts one byte in the compiler buffer which is the number of frames specified.
- **byte** – Must be a valid number between 0 and 255 inclusive. The number can be entered in decimal, hexadecimal, or percentage. For example, the number 128 could be entered as **128** for decimal, **0x80**, **h80**, or **80h** for hexadecimal, or **50%** for percentage. Puts one byte in the compiler buffer which is the number entered.

Note The **param** *byte* may have an optional argument which is a tighter specification on the number. For example, **paramX=byte(15,32)** would require the number entered to be larger than 14 and smaller than 33 to be valid.

- **word**– Must be a valid number between 0 and 65535 inclusive. The number can be entered in decimal, hexadecimal, or percentage. For example, the number 49152 could be entered as **49152** for decimal, **0xC000**, **hC000**, or **EC000h** for hexadecimal, or **75%** for percentage. Puts two bytes in the compiler buffer which is the number entered.

Note As in *byte*, the **param** *word* may have an optional argument which is a tighter specification on the number.

- **string** – Accepts any correctly formatted string. The string can consist of any combination of decimal, hex, or percentage numbers, and text data. For

example, the string ***"HELLO" 0xAA 50 0 "GOODBYE" h2E*** is perfectly valid. The compiler changes all the characters in quotes into ASCII bytes, and puts the entire string into the compiler buffer.

- **"*literal*"** – Accepts a string which is *exactly* what is specified, non-case sensitive. For example, if the user entered "bAnK1" for the parameter, and the **param** field is **ParamX="bank1"** the parameter will validate. The compiler changes all the characters in quotes into ASCII bytes, and puts the entire string into the compiler buffer.
- **datastring** – Must match the name of a data string in the **Configuration | Data Strings** window. The data string must conform to the same restrictions as string. Puts the entire string into the compiler buffer.
- **lcdstring** – Must match the name of an LCD string in the **Configuration | LCD Strings** window. The LCD string must conform to the same restrictions as string. Puts the entire string into the compiler buffer.
- **framestring** – Must be a number between 0 and 999999 inclusive. Puts the entire string into the compiler buffer.
- **timestring** – Must be a valid time in the form **HH:MM:SS.FF**. HH must be a number between 0 and 23 inclusive. MM must be a number between 0 and 59 inclusive. SS must be a number between 0 and 59 inclusive. FF must be a number between 0 and 29 inclusive. Puts the entire string without the colons or period into the compiler buffer. If the hour, minute, second, or frame values are less than 10, a leading zero is put into the message for that byte. For example, a time of **2:04:16.09** would get put into the buffer as **02041609**.
- **trackstring** – Must be a valid track and index in the form TT-II. TT must be a number between 0 and 99 inclusive, and II must be a number between 0 and 99 inclusive. Puts the entire string without the hyphen into the compiler buffer. If the track or index values are less than 10, a leading zero is put into the message for that byte. For example, a track index of **1-3** would get put into the buffer as **0103**.
- **contains** – This **param** has a required argument which is the byte that the text must contain to be valid. For example, **paramX=contains(Q)** means that the parameter must contain the letter 'Q' (not case sensitive) in order to be valid. The compiler removes the argument from the parameter, and puts the entire string without it into the compiler buffer. For example, the parameter *equipment* would result in the string *equipment* being put into the compiler buffer.

The *contains* **param** has an optional argument, which is designed to replace the found byte. The required argument and optional argument are separated by a colon.

```
ParamX=contains(Q:h41)
```

In this example, the parameter is validated if a 'Q' was found in the parameter. If it was, the compiler removes the 'Q', but since the optional argument is in

place, instead of just removing the 'Q', the compiler *replaces* it with the optional byte h41 ("A"). For example, the parameter *equipment* would result in the string *equipment* being put into the compiler buffer.

Since validation of a parameter is key to compiling what is truly desired, several different types of validation can be performed on a parameter. To facilitate this, allowing different types of data to validate is possible using the OR operator |, and forcing multiple validations on the same data is possible using the AND operator &.

This is an example of the OR operator. In this case, if *either* an output or a flag was found as parameter 1 the validation for this event passes:

```
param1=output|flag,"A valid Output or Flag was not found as parameter 1"
```

Whichever type of validation succeeds, that is the validation type that is used to process the parameter, and to put the data into the compilers buffer. If multiple validations would pass, the first one to pass is the one that's used.

This is an example of the AND operator. If *both* validations pass, the validation for the overall event passes. Both validation processes are performed, in order, from left to right. In this case, the parameter must contain the letter 'R" and the data that remains after the letter "R" is removed must be a byte in size, no smaller than 1 and no larger than 16.

```
param2=contains(r) & byte(1,16), "No valid reproducer card
       number was found as parameter 2"
```

OR and AND operators can be combined. There can be up to 5 OR operators. For each OR operator, there can be up to 3 AND operators. The following is a generic example:

```
paramX= validationA1 & validationA2 & validationA3 |
        validationB1 & validateionB2 & validationB3 |
        validationC1 & validationC2 & validationC3, "error message"
```


The first OR operator that passes validation is used. In order for OR validation *B* to pass, *validationB1*, *validationB2*, and *validationB3* all have to pass, and remember that *validationB1* uses the actual parameter as data, *validationB2* uses the result of *validationB1* as data, and *validationB3* uses the result of *validationB2* as data. The result, what is put into the compiler buffer, would be the result of *validationB3*.

The **Message** field specifies what bytes are sent out the port for this event. The message can range from very easy to very complex. Our *PlayUntil* event has a very simple message field, but still illustrates two of the three different concepts that can help make up the **message** field. Possible types of data that can be put into a **message** field are *literal* data, *parameters*, and *functions*.

Literal data are bytes that are specified in the message field directly, and can be a decimal number, hexadecimal number, or string.

Here are four different ways of representing the same three literal bytes:

Type	Representation
String	"ABC"
Decimal	65 66 67
Hex	h41 h42 h43
Combination	"A" h42 67

The bolded text below is literal data:

```
message=h02 "OPL:F" @string(param2) h03
```

Parameters specify a parameter to be directly entered into the message. the bolded text below is parameter data:

```
message=h00 h02 param1
```

Parameters take the first byte out of the compiler buffer and put it into the message. The following bolded text uses a *byte* function to exactly duplicate the functionality of a parameter:

```
message=h00 h02 @byte(param1)
```

Functions allow many different operations which allow data to be put into the message. Typically these functions take data from what the user entered and convert it into a usable format for the message.

The bolded text below is function data

```
message=h02 "OPL:F" @string(param2) h03
```

Functions

All functions begin with an @ sign, and have parenthesis around their arguments. Functions can have multiple arguments, separated by commas, but typically only have one. In this case this function takes whatever data is in the compilers temporary buffer, and puts it into the message, regardless of it's length, and does not convert it whatsoever.

It is important to realize that **param** fields take whatever the user entered, qualify it, and then place it into the compilers buffer in a *pre-parsed* format. Functions take that pre-parsed and convert it into a useful format in the actual message. The *combination* of these two processes is what allows a **message** field to work. For example, a *timestring* **param** field takes a valid time in the

format **HH:MM:SS.FF**, and converts it to the format **HHMMSSFF** when putting it into the compiler buffer. The function *@string* takes whatever is in the buffer and puts it into the message to be sent out. This technique successfully works for several laserdisc players. If an *@byte* function was used by mistake, only the tens place of the hours of the time **HH** would get put into the message.

Here are all of the possible function types, and their descriptions.

- **@byte** – Takes the first byte of the compiler buffer and puts it into the message.
- **@word** – Takes the first two bytes of the compiler buffer and puts them into the message.
- **@length** – Takes the length (how many bytes there are) in the compiler buffer and puts the byte into the message.
- **@string** – Takes however many bytes there are in the compiler buffer and puts them all into the message.
- **@decstring** – Takes the first two bytes of the compiler buffer (a word) and puts them in the message as three decimal ASCII bytes. If the number is less than three digits in size, the message has leading zeros.

For example, if the two bytes in the buffer are h9D h03, which yield the word h039D, which is the number 925 in decimal, @decstring will put "925" (or in hex h39 h32 h35) in the message.

If the two bytes in the buffer are h62 h00 (the word h0062), which is 98 in decimal, "098" (or h30 h39 h38) will be put in the buffer.

- **@hextring** – Takes the first two bytes of the compiler buffer (a word) and puts them in the message as two hexadecimal ASCII bytes. If the number is less than two digits in size, the message has leading zeros.

For example, if the two bytes in the buffer are hFA h00, which yield the word h00FA, which is the number FA in hex, @hexstring will put "FA" (or in hex h46 h41) in the message.

If the two bytes in the buffer are h0D h00 (the word h000D), which is 0D in hex, "0D" (or h30 h0D) will be put in the buffer.

- **@index** – Takes the first byte of the compiler buffer, subtracts one from it, and puts it into the message. This provides zero-indexed data to be entered. In other words, when you want the user to put in a number, say 1 to 10, but the device you're sending to requires 0 to 9, this function will allow that without much effort.
- **@hour** – This function takes the first two bytes of the compiler buffer as an ASCII representation of one byte (the hour of a time), and puts it in the message as one byte. This function assumes you had a **param** field of *timestring*, which stores **HHMMSSFF** in the compiler buffer.
- **@minute** – This function takes the third and fourth bytes of the compiler buffer as an ASCII representation of one byte (the minute of a time), and puts it in the message as one byte. This function assumes you had a **param** field of *timestring*, which stores **HHMMSSFF** in the compiler buffer.

- **@second** – This function takes the fifth and sixth bytes of the compiler buffer as an ASCII representation of one byte (the second of a time), and puts it in the message as one byte. This function assumes you had a **param** field of *timestring*, which stores **HHMMSSFF** in the compiler buffer.
- **@frame** – This function takes the seventh and eighth bytes of the compiler buffer as an ASCII representation of one byte (the frame of a time), and puts it in the message as one byte. This function assumes you had a **param** field of *timestring*, which stores **HHMMSSFF** in the compiler buffer.
- **@track** – This function takes the first two bytes of the compiler buffer as an ASCII representation of one byte (the track of a track-index), and puts it in the message as one byte. This function assumes you had a **param** field of *trackstring*, which stores **TTII** in the compiler buffer.
- **@trackindex** – This function takes the third and fourth bytes of the compiler buffer as an ASCII representation of one byte (the index of a track-index), and puts it in the message as one byte. This function assumes you had a **param** field of *trackstring*, which stores **TTII** in the compiler buffer.
- **@checksum** – This function calculates an eight-bit checksum of all bytes in the range specified as its parameters (e.g. `@checksum(1,5)`)
- **@msg** – This function returns the byte designated by the index parameter (e.g. `@msg(1)`)
- **@msgposition** – This function returns the current position within the message.
- **@complex** – This function allows mathematical operations to be performed upon the data specified. It is not for the novice user.

Let's abandon our *PlayUntil* event for a moment, in favor of a event that uses an @complex function. This event is a *Search* event for a Denon CD player.

```
[Search:Time]
description="Search to a Time (MM:SS.FF)"
param1=port, "A valid Port"
param2=timestring, "A valid Time"
byte1=((@minute(param2) / 10 ) << 4 ) | ( @minute(param2) % 10 )
byte2=((@second(param2) / 10 ) << 4 ) | ( @second(param2) % 10 )
byte3=((@frame(param2) / 10 ) << 4 ) | ( @frame(param2) % 10 )
message="C" @complex(byte1) @complex(byte2) @complex(byte3)
retries=1
timeout=60
completionack="A"
```

Pay close attention to the **message** field and the previously unexplained **byte** field. The **byte** field is only used when *@complex* functions are used, and defines what this byte should be in the message. The argument for an *@complex* function is always a reference to a **byte** field.

Regardless of the complexity of this function, the compiler reduces the mathematical expression in the **byte** field specified to one byte, and that *one byte* is put into the message as a result of an *@complex* function.

The **Byte** field specifies how the byte will be created. There can be up to 20 **byte** fields. Literal decimal and hex values can be used, as well as functions that result in a byte or word. The *@complex* function can not be used. Currently, 11 operators can be used on the data. They are the following:

Operator	Function
+	Add
-	Subtract
*	Multiply
/	Divide
%	Mod (returns remainder from division)
>>	Shift Right
<<	Shift Left
&	Bitwise AND
|	Bitwise OR
~	Bitwise NOT

Note Unlike C language or other ways of expressing mathematical algorithms, there is no operator precedence. Operations are performed from left to right. If you wish to specify what operand an operator is to work on, use parenthesis to group the operand.

Let's look at our complex *Search:Time* event as an example. Here is the pertinent information:

```
param2=timestring, "A valid Time"
byte1=((@minute(param2) / 10 ) << 4 ) | ( @minute(param2) % 10 )
byte2=((@second(param2) / 10 ) << 4 ) | ( @second(param2) % 10 )
byte3=((@frame(param2) / 10 ) << 4 ) | ( @frame(param2) % 10 )
message="C" @complex(byte1) @complex(byte2) @complex(byte3)
```


The Search to a Time event for a Denon player sends the ASCII byte "C" followed by a BCD (binary coded decimal) representation of the minute, then the second, then the frame to be searched to.

First, the *timestring* **param** field takes what the user entered (let's say **23:12.15**), and puts **00231215** in the compiler buffer. The **message** field directly puts a "C" (h43) into the message, followed by three bytes which are defined by **byte1**, **byte2**, and **byte3**.

Byte1 takes the third and fourth byte of the compiler buffer, retrieves the number 23, and puts that into one byte. It then divides that number by 10 and gets 2. It then shifts left four bits and gets 32 (h20). It then takes that same minute byte 23, and divides by 10, saving the remainder, not the quotient, which

is 3. It then ORs the two results together h20 and h03, to get h23, which is the binary coded decimal equivalent of 23 decimal.

Byte2 and **Byte3** work similarly, except they work on the fifth and sixth bytes, and the seventh and eighth bytes respectively.

Note The compiler uses a word size for the result of each operation, and then finally put the LSB byte into the message as the final result. This is to help produce accurate answers in intermediate stages of math operations.

Byte fields allow for 128 operands and 32 total sets of parenthesis. *Not thirty-two levels deep*, but thirty-two total sets.

```
retries=1
timeout=60
completionack="A"
```

The **Retries** field allows for how many times a message will be sent out if the correct acknowledgment is not received back, specified by the **Messageack** and **Completionack** fields. If the Show Controller receives nothing, or the incorrect response for a given event, then the Show Controller will try to send the message again. For example, if **retries** is 1, the Show Controller will try one more time to send the event. If the correct response is not received the second time, the Sequence specified in Configuration | Ports for an Error Sequence is executed, and the Show Controller does not attempt the event again. The range for the **retries** field is 0 to 255. If **retries** is not specified, the Show Controller assumes 0 retries, and will start the Error Sequence after the **timeout** period after the message is sent out the first time.

The **Timeout** field specifies how long the Show Controller is to wait for an acknowledge for a message sent out. It is specified in frames. For example, if **timeout** is set to 60, the Show Controller will send out the message, and then wait 60 frames before assuming that there was no response. The **timeout** should be long enough to allow for *both* the **messageack** and the **completionack** data to come back in a worst case (longest) scenario, is a normally operating device. The range for the **timeout** field is 0 to 65535. If **timeout** is not specified, the Show Controller assumes 0 **timeout**, and will retry or start the Error Sequence immediately after the message is sent out, without waiting for a response.

The **Messageack** field specifies what the device should send back to the Show Controller immediately after receiving the message. This is used to say "Yes I received what you just sent, and I understood it". **Messageack** is defined exactly as the **message** field, and can use functions, including *@complex*. If the **messageack** field is not specified, the Show Controller assumes there is no response immediately after the message is sent.

The **Completionack** field specifies what the device should send back to the Show Controller when it is finished executing the event it just received. This is used to say "Ok, the event you requested is completed". **Completionack** is defined exactly as the **message** field, and can use functions, including

@complex. If the **completionack** field is not specified, the Show Controller assumes there is no response after the event is completed.

If the **messageack** and **completionack** fields are *both* not specified, the Show Controller assumes there is no response whatsoever from the device, and it ignores both the **retries** and **timeout** fields. The message is simply sent out, and that's it.

Multiple Variations of the Same Event

In many cases the same operation could take several different arguments. For example, the **Search** event often has multiple variations, because many devices support multiple ways of searching. On most LaserDiscs, you can search to a *specific time* or a *specific frame number*. Rather than make two different events, like **SearchTime** and **SearchFrame**, it makes more sense to *overlap* the two events. The following two events are an example of this:

```
[Search:Frame]
param1=port, "A valid Port"
param2=framestring, "A valid Frame number"
message="FR" @string(param2) "SE" h0d
retries=1
timeout=120
completionack="R" h0d

[Search:Time]
param1=port, "A valid Port"
param2=timestring, "A valid Time"
message="TM" @string(param2) "SE" h0d
retries=1
timeout=120
completionack="R" h0d
```

The compiler will attempt to compiler *all variations of the same event* before giving an error. The first event that successfully validates all parameters is used. Using the above two events, if a user enters a frame number as the second parameter, the first event validates, and compilation continues. If the user enters a time as the second parameter, the first event does not validate, but the second one does, so compilation continues. If the user enters the Date as parameter 2, both events do not validate, and compilation fails on this event.

Multiple variations can also be used when a event has optional parameters.

```
[Play:UntilFrame]
param1=port, "A valid Port"
param2=framestring, "A valid Frame number"
message="FR" @string(param2) "PL" h0D
retries=1
timeout=65534
completionack="R" h0d
```

```
[Play:Continuous]
param1=port, "A valid Port"
message="PL" h0d
retries=1
timeout=60
completionack="R" h0d
```

In this case, the **Play** event has an optional parameter, which is the frame to stop at when reached. If the user enters a frame number as parameter 2, the first event is compiled. If the user enters nothing as parameter 2, or something that is not a frame number, the second event will compile, yielding a play forever. If it is important that the parameter is empty, and not that the user entered invalid information, this parameter validation could be used in the second event.

```
param2="", "The PlayContinuous event does not have a parameter 2"
```

This validation compares what the user entered to an empty string. This forces the user to leave parameter 2 blank in order to compile.

The important thing to remember with multiple variations of the same event is that the compiler chooses the first event to pass validation, so you should choose which variation goes before which variation. In the **Play** event variations above, it would not work for the **Play:Continuous** variation to come first. This variation would always be chosen, even if the user entered a valid frame number in parameter 2. This would not be the case if the comparison to an empty string validation was put into the **Play:Continuous** variation, but you should always be careful of the ordering regardless.

Using Variables in your protocol messages

If your show controller has the latest firmware installed you have the ability to include variable values in your serial messages. Here are some good examples that show how to implement this feature for a DVM2:

```
[SelectClip:ByNumber]
description=Stops playback and preloads new clip
supported=5.00
retries=1
timeout=60
completionack="R" h0d
param1=port, "A valid Port"
param2=framestring, "A valid clip number (1-99999)"
message=@string(param2) "SE" h0d


[SelectClip:ByVariable]
description=Stops playback and preloads new clip using a variable
supported=6.40
retries=1
timeout=60
completionack="R" h0d
```

```
param1=port, "A valid Port"
param2=var, "A valid variable representing a clip number"
byte1=(@byte(param2) + 1)
message=hF3 @complex(Byte1) "SE" h0d
```

First you must make sure that the "Supported" field is set to 6.40. WinScript uses this information to determine whether variables can be sent, and then compiles the command accordingly. As you can see, the message field in the Variable version contains an hF3 and a @complex function. The hF3 signifies that an ASCII representation will be transmitted. There are other modifiers like hF3 and you can learn how they function in the **Built-In Serial Events** section. The @complex function is required since the variable is zero-indexed (starts at 0 rather than 1). Since the show controller expecting a number that is not zero-indexed, 1 must be added in the previous byte command. Overall, the [SelectClip:ByVariable] command sends out the same basic result as [SelectClip:ByNumber], only that data does not have to be hard-coded into your script. As you can see, this is a very powerful feature as it gives you more flexibility in your scripts.

Appendix B – Alcorn McBride Serial Control Protocols

Any device can serially control an Alcorn McBride Show Controller by using one of three protocols: Alcorn 9 Bit Control, Alcorn 8 Bit Control, or MIDI. PCs and other Show Controllers that can support Mark or Space parity over an RS-232 serial connection can use either Alcorn 8 or 9 Bit Control. Other devices, such as MIDI based show systems, can use the MIDI protocol.

There are several pluses and minuses to each protocol, but each provides great flexibility by allowing sequence starts, output activation, and more.

In this section you will find:

- Examples of Start Sequence and On/Off Output messages in any of the three supported Show Control Protocols.
- A complete AMI Protocol reference

The Basics of Alcorn Control

Alcorn Control protocols use a very basic message structure consisting of several similar components: source address, target address, command byte, and data bytes.

Note This appendix uses the prefix **0x** to indicate a hexadecimal number.

Source and Target Address

The Source and Target addresses are derived from the Show Controller's "Unit Address" which is a one byte address from **0x00** – **0x79**. The source address is the address of the unit where the message originated. The target address is the address of the unit that should receive and process the message.

Note The source address of an external device, such as a PC, that is controlling a Show Controller or group of Show Controllers should be **0xFF**.

Command and Data Bytes

A "command opcode" is a term used by programmers to describe a single byte in a serial message that stands for what is to be done. Alcorn Control messages can turn on and off Outputs and Flags, start Sequences change Variables, and even remotely display messages on the LCD Display. Each of these functions requires a different command.

Some command opcodes require additional "data" bytes that further describe what is to be done in the Show Controller. These data bytes can take the form of an Output, Flag, Sequence, Port, or State Variable index; DMX or Analog values; or a message to display on the LCD or send out a Serial Port. The following table lists the indices of Show Controller resources:

Resource	Index
Output	0x00 – 0x3F
Flag	0x40 – 0x7F
State Variable	0x00 – 0x1F
Serial Port	0x00 – 0x11
Sequence	0x00 – 0xFF
Output or Flag Bank	0x00 – 0x01

Note All resource indices in a Show Controller are zero-based.

The following table lists all Alcorn Control command opcodes (and corresponding data bytes) that can be used to control resources in an Alcorn McBride Show Controller.

Note For a full description of each command, see Chapter 6.

Command	Opcode	Data Byte 1	Data Byte 2	Data Byte 3	Data Byte 4
Nop	0x01	N/A	N/A	N/A	N/A
On	0x02	<output or flag index>	N/A	N/A	N/A
Off	0x03	<output or flag index>	N/A	N/A	N/A
Blink	0x04	<output index>	<blink period>**	N/A	N/A
Pulse	0x05	<output index>	<pulse duration>**	N/A	N/A
Toggle	0x06	<output or flag index>	N/A	N/A	N/A
AnalogSet	0x07	<analog channel>	<value to attain>	N/A	N/A
DMXSet (1-256)	0x07	<DMX channel>	<value to attain>	N/A	N/A
DMXRamp (1-256)	0x08	<DMX channel>	<value to attain>	<ramp duration, low byte>***	<ramp duration, high byte>***
DMXRamp (1-256)	0x09	<DMX channel>	<value to attain>	<ramp duration>**	N/A
AnalogRamp	0x09	<analog channel>	<value to attain>	<ramp duration>**	N/A
Display	0x0C	<message length>*	<bytes 1..n to display>	N/A	N/A
MessageOut	0x0D	<serial port index>	<message length>	<bytes 1..n of message>	N/A
SendVar	0x13	<serial port index>	<var index>	N/A	N/A
SendVarEx	0x14	<serial port index>	<var index>	<formatting>****	N/A
PutVar	0x15	<remote unit address>	<local var index>	<remote var index>	N/A
Start	0x18	<sequence index>	N/A	N/A	N/A
Stop	0x19	<sequence index>	N/A	N/A	N/A
Pause	0x1A	<sequence index>	N/A	N/A	N/A
Reset	0x1B	<sequence index>	N/A	N/A	N/A
ShowFlags	0x1C	<flag bank index>	N/A	N/A	N/A
DMXSet (257-512)	0x1D	<DMX channel>	<value to attain>	N/A	N/A
DMXRamp (257-512)	0x1E	<DMX channel>	<value to attain>	<ramp duration, low byte>***	<ramp duration, high byte>***

DMXRamp (257-512)	0x1F	<DMX channel>	<value to attain>	<ramp duration>**	N/A
Outport	0x20	<output bank index>	<value to attain>	N/A	N/A
SetVarEQ	0x28	<variable index>	<value>	N/A	N/A
AddVar	0x2F	<variable index>	<value>	N/A	N/A
SubVar	0x30	<variable index>	<value>	N/A	N/A
SetVarEQ	0x31	<variable index>	<variable index>	N/A	N/A
AddVar	0x38	<variable index>	<variable index>	N/A	N/A
SubVar	0x39	<variable index>	<variable index>	N/A	N/A
ShowVar	0x3A	<variable index>	N/A	N/A	N/A
SendVersion	0x42	N/A	N/A	N/A	N/A
DMXSet (1-256)	0x51	<variable index, for channel>	<variable index, for value to attain>	N/A	N/A
DMXSet (257-512)	0x52	<variable index, for channel>	<variable index, for value to attain>	N/A	N/A
DMXRamp (1-256)	0x53	<variable index, for channel>	<variable index, for value to attain>	<variable index, for ramp duration>	N/A
DMXRamp (257-512)	0x54	<variable index, for channel>	<variable index, for value to attain>	<variable index, for ramp duration>	N/A
DMXRamp (1-256)	0x55	<variable index, for channel>	<variable index, for value to attain>	<ramp duration, low byte>***	<ramp duration, high byte>***
DMXRamp (257-512)	0x56	<variable index, for channel>	<variable index, for value to attain>	<ramp duration, low byte>***	<ramp duration, high byte>***
DMXRampSec (1-256)	0x57	<variable index, for channel>	<variable index, for value to attain>	< variable index, for ramp duration, in seconds	N/A
DMXRampSec (257-512)	0x58	<variable index, for channel>	<variable index, for value to attain>	< variable index, for ramp duration, in seconds	N/A
DMXSet (1-256)	0x59	<DMX channel>	<variable index, for value to attain>	N/A	N/A
DMXSet (257-512)	0x5A	<DMX channel>	<variable index, for value to attain>	N/A	N/A
DMXRamp (1-256)	0x5B	<DMX channel>	<variable index, for value to attain>	<variable index, for ramp duration>	N/A
DMXRamp (257-512)	0x5C	<DMX channel>	<variable index, for value to attain>	<variable index, for ramp duration>	N/A
DMXRamp (1-256)	0x5D	<DMX channel>	<variable index, for value to attain>	<ramp duration, low byte>***	<ramp duration, high byte>***

DMXRamp (257-512)	0x5E	<DMX channel>	<variable index, for value to attain>	<ramp duration, low byte>***	<ramp duration, high byte>***
DMXRampSec (1-256)	0x5F	<DMX channel>	<variable index, for value to attain>	< variable index, for ramp duration, in seconds	N/A
DMXRampSec (257-512)	0x61	<DMX channel>	<variable index, for value to attain>	< variable index, for ramp duration, in seconds	N/A

* *In Bytes (0x00-0xFF)*

** *In Frames (0x00-0xFF)*

*** *In Frames (0x0000-0xFFFF)*

**** *Byte takes the following form:*

Bits	Definition
7 and 6	Not Used
5, 4, and 3	Text Formatting Code: 000 – Send only significant characters (“7”) 001 – Send leading zeros (“007”) 010 – Send leading spaces (“ 7”) 011 – Send trailing spaces (“7 ”)
2, 1, and 0	Numerical Type Code: 000 – ASCII Decimal (“000” thru “255”) 001 – ASCII Hexadecimal (“00” thru “FF”) 010 – ASCII Octal (“000 thru “377”) 011 – Straight binary

Alcorn 9 Bit Control

Advantage: Bullet-proof messaging

Disadvantage: Difficult to program

Resources: C++ Programming Library available free to developers.

Alcorn 9 Bit Control uses Mark and Space parity bits to create a start of message and end of message delimiter. When Mark parity is used, we say that the byte has its ninth bit set. When Space parity is used, we say that the byte does not have its ninth bit set.

Note An asterisk (*) indicates that a byte has its ninth bit set (Mark Parity), and two asterisks (**) indicate that a byte has both the eighth and ninth bits set.

The Show Controller sends a response byte of **0xAA** to indicate that it received a valid command or **0x55** to indicate that it received an invalid command.

Here is the general form of an Alcorn 9 Bit Control message:

```
<source address>** <target address> <command opcode> <data bytes 1..n> <checksum>*
```

The <checksum> byte is the 8-bit sum of all previous bytes in the message shifted right once. For example, if the sum of all bytes in the message is 0x5D (or 01011101 in binary), shifting it right once will produce 0x2E (or 00101110 in binary). This byte is used for error detection and will cause the entire message to be ignored if it is incorrect.

Here is an example Start Sequence #2 message sent from a PC (address 0xFF) to a Show Controller whose address is 0x00:

0xFF* 0x00 0x18 0x01 0x0C*

Alcorn 8 Bit Control

Advantage: Easy to program

Disadvantage: Not bullet-proof

Resources: C++ Programming Library available free to developers.

Alcorn 8 Bit Control uses the byte 0xF5 as a start of message delimiter. There is no Mark or Space parity and any byte could have bit eight set high or low.

Here is the general form of an Alcorn 8 Bit Control message:

```
0xF5 <target address> <response> <length> <command opcode> <data bytes 1..n> <checksum>
```

The <response> byte tells the Show Controller what kind of response to send back to the originating device. The response byte can take the following forms:

- **0x00** – Send no response back to the sender.
- **0x01** – Send a **0xAA** (ACK) or **0x55** (NACK).
- **0x02** – Send the entire message back to the sender followed by an ACK or NACK.

The <length> byte tells the Show Controller how many command and data bytes are in the message.

The <checksum> byte is the 8-bit sum of all previous bytes in the message (except the **0xF5**).

Here is an example Start Sequence #2 message (no response) sent from a PC (address 0xFF) to a Show Controller whose address is 0x00:

0xF5 0x00 0x00 0x02 0x18 0x01 0x1B

Note: **Alcorn 8-bit control cannot be operated at a baud rate greater than 19,200 baud.**

MIDI Control

Advantage: Supported by most MIDI devices

Disadvantage: Not bullet-proof

Alcorn McBride Show Controllers with a MIDI IN port can also be controlled by the MIDI Control messages SYSEX, NOTE ON, and NOTE OFF.

Start a Sequence with SYSEX "GO CUE"

The SYSEX "GO CUE" message can be used to start a sequence. Here is the general form:

```
0xF0 0x7F <target address> 0x02 0x7F 0x01 <data #1> <data #2> <data #3> 0xF7
```

The `<data #1>` byte is the ASCII hundreds digit of the sequence number (sequence index + 1). For example, if you were starting sequence #104, the `<data #1>` byte is 0x31 (or "1").

The `<data #2>` byte is the ASCII tens digit of the sequence number (sequence index + 1). For example, if you were starting sequence #104, the `<data #2>` byte is 0x30 (or "0").

The `<data #3>` byte is the ASCII ones digit of the sequence number (sequence index + 1). For example, if you were starting sequence #104, the `<data #3>` byte is 0x34 (or "4").

Here is an example Start Sequence #4 message sent from an Amiga (address 0xFF) to a Show Controller whose address is 0x00:

0xF0 0x7F 0x00 0x02 0x7F 0x01 0x30 0x30 0x34 0xF7

Set a State Variable with SYSEX "SET"

The SYSEX "SET" message can be used to set the value of a State Variable. Here is the general form:

```
0xF0 0x7F <target address> 0x02 0x7F 0x06 <data #1> 0x00 <data #2> <data #3> 0xF7
```

The `<data #1>` byte is the state variable index number. For example, if you were setting variable #3, the `<data #1>` byte would be 0x03.

The `<data #2>` byte represents bits 0-6 of the desired value. For example, if the desired value were 0x8E, `<data #2>` would be 0x0E.

The `<data #3>` byte represents the MSB (or bit 7) of the desired value. For example, if the desired value were 0x8E, `<data #3>` would be 0x01.

Here is an example "Set Var #3 to 8E" message sent from an Amiga (address 0xFF) to a Show Controller whose address is 0x00:

0xF0 0x7F 0x00 0x02 0x7F 0x06 0x03 0x00 0x0E 0x01 0xF7

Turn on an Output with NOTE ON

The NOTE ON message can be used to turn on an output:

```
<target address + 0x90> <output index + 0x3C> 0x40
```

Here is an example “On Output #1” message sent from an Amiga (address 0xFF) to a Show Controller whose address is 0x00:

0x90 0x3C 0x40

Turn off an Output with NOTE OFF

The NOTE OFF message can be used to turn off an output:

```
<target address + 0x80> <output index + 0x3C> 0x40
```

Here is an example “Off Output #5” message sent from an Amiga (address 0xFF) to a Show Controller whose address is 0x00:

0x80 0x3C 0x40

Appendix C – Cable Reference

Common Show Control Cable Pinouts

This appendix gives the pinouts for many common show control cables. You can make these cables yourself, or you may purchase them from Alcorn McBride by contacting our Sales Department at (407) 296-5800.

- ***Programming Cable***

DB9F #1 Pin	DB9F #2 Pin
2	2
3	3
5 (shield)	5 (shield)

Also used to connect a master controller's serial port to a slave's programming port.

- ***Show Control I/O Expansion (Null Modem)***

DB9F #1 Pin	DB9F #2 Pin
2	3
3	2
5 (shield)	5 (shield)

Used to interconnect two serial ports.

- ***Pioneer and Panasonic Laser Disc Players***

DB9F Pin	DB15M Pin
2	2
3	3
4	5
5 (shield)	1 (shield)
8	4

- ***Sony Laser Disc and Video Tape Players***

DB9F Pin	DB25M Pin
2	2
3	3
5 (shield)	7 (shield)
N/C	Short Pins 5, 6, and 20

Appendix D – Available Accessories

Components

The following table lists commonly used Alcorn McBride Show Controller accessories, their manufacturers' part numbers, and our stock number. All parts are available from Alcorn McBride by next day FedEx shipment.

Part Description	Mfg	Part No.	Stock No.
DB37 Female, Solder Cup	Amp	747917-2	642-000166
DB37 Male, Solder Cup	Amp	747916-2	642-000151
DB37 Housing Assembly	Amp	748676-4	642-000631
DB9 Female, Solder Cup	Amp	747905-2	642-000167
DB9 Male, Solder Cup	Amp	747904-2	642-000168
DB9 Housing Assembly	Amp	748676-1	642-000630
5 Pin DIN (MIDI) Connector, Male	Switchcraft	05GM5M	643-000632
BNC (Sync) Connector (RG-59 coax)	Amp	413589-2/3	641-000628
1488 RS-232 Driver	National	DS1488AN	720-000364
1489 RS-232 Receiver	National	DS1489AN	720-000356
75174 RS-422 Driver	TI	SN75174N	720-000359
75175 RS-422 Receiver	TI	SN75175N	720-000360
DIP Resistor, 16 Pin Discrete, 180 Ohm	Bourns	4116R-001-181	635-000126
DIP Resistor, 16 Pin Discrete, 1.5K	Bourns	4116R-001-152	635-000125
DIP Resistor, 16 Pin Discrete, 10K	Bourns	4116R-001-103	635-000625
SIP Resistor, 10 Pin Discrete, 220 Ohm	Bourns	4610X-002-221	634-000624
EEPROM, Show Memory, 32K	Atmel	AT28C256-20PC	731-000374
Alcorn McBride Field Kit 1 An assortment of the above, plus spare screws, labels, markers, and a screwdriver, all in a carrying case.	Alcorn		230-100435

Manufactured Cables

The following table lists commonly used Alcorn McBride Show Controller cables. All cables are available from Alcorn McBride by next day Fedex shipment.

Part Description	Stock Number
Cable, DB9F/DB9F, Program, 10 foot	699-000288
Cable, DB9F/DB9F, Program, 25 foot	699-000294
Cable, DB9F/DB9F, Null Modem, 2 foot	699-000295
Cable, Pioneer/Panasonic, 10 foot	699-000286
Cable, Pioneer/Panasonic, 25 foot	699-000293
Cable, Sony, 10 foot	699-000287
Cable, Sony, 25 foot	699-000292

Third Party Equipment

➢ *Serial Countdown Clocks*

Applied Technical Systems manufactures a line of serially-controlled countdown clocks that are useful for preshows and queue lines.

Applied Technical Systems
Contact: Jim Reccelli
Tel: (800) 444-7161
Fax: (318) 631-7613

➢ *Real Time Clocks*

Sometimes it is desirable to trigger a show or activity at a preset time of day.

ESE makes several Real Time Clock modules that may be connected directly to Alcorn McBride Show Controllers using a serial cable. Their models ES-225 and 194A are a frequently used combination.

ESE
Web: www.ese-web.com
Tel: (310) 322-2136
Fax: (310) 322-8127

Chrontrol makes Real Time Clocks used to automate radio stations using contact closure outputs.

Chrontrol Corp
Contact: Jim Durham
Tel: (619) 566-5656
Fax: (619) 566-0140

Index

A

B

C

D

E

F

I

L

M

N

O

P

R

S

T

U

V

W