



TSS

Multi Format Video Server

Operations Manual

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Preface

This manual provides installation, setup and operating instructions for 360 Systems' TSS Multi-Format Video Server. It is organized to provide quick access to topics of primary interest. An extensive Table of Contents is provided at the beginning, and a subject Index at the end, to assist in locating information.

If you have already used other video servers or VTRs, you may find discussion of the basic server to be covering familiar topics. However, it is strongly recommended that engineering managers and staff members operating the server read through this manual. Being familiar with its operation can prevent operational mistakes, and will make all users aware of important set-up and maintenance issues.

Software and Operations Manual Revisions

Software revisions are released from time-to-time that introduce new product features, or improve the performance of the product. When such revisions are shipped as a USB flash drive, printed operational notes are included. When revisions are introduced in the course of product production, an updated Operations Manual will be shipped with new servers.

The title page of an Operations Manual indicates its revision number, which should always match the software revision of the server with which it is used. Operations Manuals for the latest revision may be obtained from 360 Systems Customer Service, or from 360 Systems' web site.

Your comments are welcome. If anything in this manual seems unclear, please let us know by sending an email to support@360systems.com.

Typographical Conventions

The following typographical conventions are used to clarify meaning:

- Connector or indicator labeling that appears on the unit is shown in **Arial Narrow Bold**.
- GUI menu items are shown in **Arial Bold**.
- GUI sub-menu paths are shown by the > symbol.
- Text typed into the GUI and Key Commands are shown in **Courier Bold**.

Safety Notices

Safety Terms and Symbols

THE FOLLOWING WARNING SYMBOLS ARE USED IN THIS MANUAL:



| | |
|----------|--|
| ENGLISH | ATTENTION: REFER TO OWNER'S MANUAL FOR IMPORTANT INFORMATION. |
| FRANÇAIS | ATTENTION: VEUILLEZ VOUS RÉFÉRER AU MODE D'EMPLOI POUR UNE INFORMATION IMPORTANTE. |
| ITALIANO | ATTENZIONE: FATE RIFERIMENTO AL MANUALE PER INFORMAZIONI IMPORTANTI. |
| ESPAÑOL | ATENCIÓN: FAVOR DE REFERIR AL MANUAL DE OPERACION POR INFORMACION IMPORTANTE. |



| | |
|----------|--|
| ENGLISH | WARNING: ELECTRICAL SHOCK HAZARD. |
| FRANÇAIS | AVERTISSEMENT: DANGER DE CHOC ÉLECTRIQUE. |
| ITALIANO | AVVERTIMENTO: PERICOLO DI SHOCK ELETTRICO. |
| ESPAÑOL | ADVERTENCIA: PELIGRO DE CHOQUE ELECTRICO. |

General Safety Caution

- Heed the following important cautions regarding the server in order to avoid personal injury or equipment damage.
- Only qualified personnel should perform installation and service. Refer to appropriate sections of this product manual for instruction. Contact 360 Systems Customer Support for further explanation, or to clarify any uncertainty.
- Disconnect the power cord before removing the cover.

Personal Injury Precautions

To avoid electric shock, do not operate this product with covers removed.

To avoid risk of fire or electric shock, replace the power cord only with same type and rating as specified. Replace damaged power cords immediately.

This product is grounded through the grounding conductor of the power cord. To avoid electric shock, do not remove or modify the contacts on the plug.

Prevent the power cord from being walked on, pinched, or abraded.

To reduce the risk of fire or electric shock, do not expose this unit to rain or moisture.

Remove jewelry such as watches or metallic necklaces before servicing this equipment.

Important Safety Instructions

These instructions are required per applicable safety standards.

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Clean only with dry cloth.
7. Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
11. Only use attachments/accessories specified by the manufacturer.
12. Unplug this apparatus during lightning storms or when unused for long periods of time.
13. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
14. Where the MAINS plug or an appliance coupler is used as the disconnect device, the disconnect device shall remain readily operable.

Product Damage Precautions

- 360 Systems' TSS Multi Format Video Server contains hard disk drives and other fragile electronic and mechanical devices. While designed to be very reliable, it is still vulnerable to shock. Handle with care, and exercise caution not to drop or bump the server as damage to internal components may result. Always turn off power before moving the server.
- Do not obstruct air vents. Maintain an ambient temperature below 30°C (86°F).
- Clean only with a soft cloth dampened with water. Do not spray cleaners or solvents directly on the product.



CAUTION:

Replace the motherboard battery only with the same or equivalent battery type. Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the equipment manufacturer. Discard used batteries according to manufacturer's instructions. Follow all local laws regarding the disposal of BR and CR Lithium batteries. Batteries should be fully discharged prior to disposal.



CAUTION:

Never disconnect AC power to shutdown the server. Doing so may cause errors in the hard disk array. Should this happen, the array can be reinitialized without any data loss; however, the process may take several hours. Shutdown the system only by momentarily pressing the front panel power button, or through the On-Screen user interface.

Product Registration

Important: As the owner of new capital equipment, you will want to take advantage of product information, enhancements, upgrades, or notifications issued by 360 Systems. Please visit 360systems.com/support/register or send in your Name, Company Name, Address, Phone Number, Email, Model and Serial Number to support@360systems.com so 360 Systems may remain in contact with you. Mail or fax it to 360 Systems offices in the USA at the address provided below.

Product Improvements and Upgrades

360 Systems reserves the right to make changes and/or improvements to its products without incurring any obligation to incorporate such changes or improvements in units previously sold. Certain features mentioned in this document may not be present in all models. This product is not offered for sale in all countries.

Trademarks

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Video and Audio Copyright Reminder

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Introduction

360 Systems' TSS Multi Format Video Server is a multi-channel, multi-format high-definition / standard-definition video recorder/server designed for broadcast, production, and Pro A/V applications. It can play three independent video streams at once, and stores between 60 and 400 hours of HD/SD encoded video¹ with up to 16 audio channels per video stream. It occupies just 1¾ " of rack space. The server's extensive feature set makes it an excellent choice for VTR replacement, broadcast automation, remote trucks, corporate, educational, house-of-worship, and live entertainment presentations. Each TSS Multi Format Video Server input and output can be independently configured for standard definition or high definition at 720p or 1080i.

Seamless Installation in New Facilities

The TSS system smoothes installation in a new setting, providing both SD-SDI and HD-SDI video. Program file transfers are also available over Gigabit Ethernet. Its standard suite of H.264 and MPEG-2 codecs offer flexibility in file based workflows.

Up to 16 channels of Embedded audio are supported on each input and output (depending on formats in use).

The system's versatile video and audio I/O personality is unique among video servers, and provides a seamless fit in existing facilities, and as part of new build-outs.

Exceptional Storage Capacity

The system contains four 1- or 2-Terabyte drives in its compact enclosure, providing up to several hundreds of hours of storage with exceptional image quality. Storage time varies depending on the file encoding type, resolution and bit rate.

The server's RAID-5 disk array provides a high level of security for stored program content, by spreading parity information across all drives. The self maintaining array provides added uptime protection, even in the event of a drive failure. The multi-drive array generates data rates required for multiple streams of high definition video.

Compatibility with Automation Controllers

360 Systems' servers work with automation controllers from many different manufacturers, accepting VDCP, Odetics or BVW protocols for 9-pin control of each server channel. 360 Systems' business partners provide automation controllers for applications ranging from affordable systems for Pro-AV, up to large-scale broadcast solutions. Contact a 360 Systems application engineer or an automation provider for assistance with your requirements.

¹ At 80 Mb/sec data rate. Actual storage will vary depending on the video resolution and encoding format of the files.

Remote Controls

Hardware accessories are available from third-party manufacturers to perform transport control, instant clip replay, slow-mo, and automation. A table of tested controllers is provided elsewhere in this manual. Contact 360 Systems Sales Support team for assistance with a specific application. The optional CXP-5 Auxiliary Interface Module provides serial port interfaces for independent control of each channel. When using the VDCP protocol it can also support control of multiple channels from a single serial port.

With the optional CXP-5, the TSS Multi Format Video Server provides twelve GPI inputs for remote play, stop, and record capability from push-button panels or other GPI-controlled equipment. Twelve outputs are also provided; these may be used for command acknowledgement (to drive LEDs or logic inputs), or they can output at specific times programmed within a Playlist that is resident on the server.

The system also supports remote control over network using the 360 Systems Remote Workstation software. This is a free application that runs on a PC that allows control of multiple TSS Servers from a single PC, and multiple PCs can connect to and control a single server.

Audio Features

The system provides SDI Embedded audio on all inputs and outputs. Depending on the file format used, up to sixteen embedded audio channels are available for each video stream.

The Graphic User Interface

The TSS System incorporates a graphic user interface (GUI) which provides quick access to every server function. It is controlled by a standard keyboard and mouse (supplied) and requires only a SVGA display. The full GUI is also available from remote workstations installed on a PC platform.

The GUI displays a control panel for each server channel; these include transport control, clip management, head and tail trimming, and playlisting. The GUI can easily operate the server's channels without the need for other equipment.

System configuration is clear and straightforward through the GUI. It provides access to encoding parameters, audio options, and time-code settings. Whenever new server features are installed, new set-up parameters and user-interface features become immediately available.

The server comes with Remote Workstation Software, which allows it to be remotely operated from a standard PC over Ethernet; the GUI is replicated at each remote location. Separate work areas can be easily created within a building for ingest, trimming, playlisting, system monitoring or play-to-air.

File Transfers over Gigabit Ethernet

The TSS Multi Format Video Server goes beyond just base-band connections for video and audio. File transfers over Gigabit Ethernet allow the transfer of video content across the room, or across the country, at high speed and low cost. With Ethernet switches and broadband connections, the server's design enables low-cost networking of broadcast operations from ingest to storage, for editing, play-to-air and archiving.



Reliability Counts

360 Systems has over 40 years of experience manufacturing equipment for television broadcast and other industries that require high reliability. With more than 30,000 hard disk products in service around the world, we understand quality, reliability, and protecting your stored content.

Key Features and Benefits

The TSS Multi Format Video Server is designed to deliver outstanding performance and value as a multi-format capable broadcast server. The multi-channel, multi-format capabilities coupled with advanced features make it an excellent and affordable choice for the transition to high definition.

- Three simultaneous video outputs or one input and two outputs
 - HD-SDI or SD-SDI selectable video inputs and outputs
- Each input and output individually configurable for 1080i, 720p or SD operation.
- Automatic Up/Down/Cross conversion allows any clip to play seamlessly on any channel at the selected resolution.
- Up to sixteen channels of embedded audio available (depending on format selection)
- 4 or 8 Terabyte internal RAID-5 array with hot swappable drives for hours of storage
 - Slow-Motion playback forward and reverse
- Ganged frame accurate playback of paired Key-and-Fill or 3D video, or multi-screen presentation.
- Serial control via VDCP, BVW or Odetics protocols with optional CXP-5 Control Module
 - Compatible with leading broadcast automation systems
 - FTP transfers over Gigabit Ethernet
 - VITC or ATC time code
 - Closed Captions and other Ancillary Data
- Accurate head and tail trimming and program segmenting
- Advanced Playlisting: Build, edit, store, playback, and loop 3 simultaneous lists
- Looping of individual clips in Transport mode, or entire playlists in Playlist mode.
 - Keyboard shortcuts for control, file management and editing
 - Set-up and control with familiar Graphic User Interface (GUI)
 - Remote Workstation Software creates up to four remote worksites
- Compact 1-RU (1 ¾ ") [44 mm] enclosure, low power consumption
 - Redundant cooling and hot swappable power supplies
 - Affordably priced



Applications for 360 Systems Servers

The TSS Multi Format Video Server adds value to many applications in broadcasting, cable distribution, video production, Pro A/V, entertainment and sports. It provides immediate record and playback of any source, lending a spontaneous appearance to broadcasts, presentations and live events.

- News Production – Promos, teasers, intros, news segments, graphics, animation
 - Play-to-Air server – Playback under automation control
- Master Control – Program and commercial playout, station IDs, promos, teasers
- Program Ingest – Automated capture of satellite, tape, microwave, and fiber feeds
 - FTP File Delivery – Deliver news, promos, spots over broadband lines
- Program Store-and-Forward – Temporary storage for subsequent delivery
 - Commercial Insertion – Playout under automation control
- Instant Replay – Playback of sports plays, news clips, stills, and graphics
- Sports Shows and Events – Replay with Slow-motion playback, highlight packages, player bios, graphics, promos
 - Game Shows – Prizes, graphics, animations, promos
- Talk and Variety Shows – Promos, teasers, intros, outros, graphics, animations
 - Award Shows – Nominees, categories, promos, graphics, animations
 - Playback of graphics for on-set monitors.
- Theme Parks and Casinos – Playout for show backgrounds, event lists, kiosks
- Houses of Worship – Projection displays, program production, broadcasting, multi-campus services and time delay.
 - Colleges and Universities – On-campus networks, production, presentations
 - Digital Signage – drive projectors, flat-panel displays, kiosks
 - Entertainment Industry – Road show displays, projection
 - Mid-market Broadcasting – High performance at an attractive price
 - Synchronized two-channel playback for 3D video
- Synchronize 3 channels for multi-screen presentations and “virtual set” applications

Accessory Information

CXP-5 Control Module (optional – provides serial and GPIO)

This 1 RU module attaches directly to the server and provides 9 pin serial ports for each channel to allow for external control via VDCP or Odetics / BVW. Also provides 12 independent GPI's and GPO's for external triggering and control.

Maintenance Spares

360 Systems is committed to keeping your server on air. Having spare parts on hand in the event of a fault is a good practice in broadcast and other high-reliability applications. Hard disk spares are particularly important. Please consider these options at the time of your purchase, or shortly after.

- 1-TB or 2-TB server-grade hard drive
- Hot swap plug-in power supply module
- Spare center cooling fan

Installation

Unpacking

Your server has been carefully inspected and calibrated before shipment to allow immediate operation upon installation. Check all items for signs of visible damage which may have occurred during shipment. If any item is damaged, contact the carrier to file a claim.

Keep the packing materials in the event that a unit must be shipped to an alternate location. If the original packaging is not available, due to the product's weight it should be professionally packed for shipment, with particular attention to protecting the corners.

Package Contents

Confirm that all items on the packing list have been received. Contact 360 Systems if any item is missing.

- ✓ TSS Multi Format Video Server
- ✓ Keyboard
- ✓ 2-Button Scroll Mouse.
- ✓ HD-BNC to BNC adapter cables
- ✓ DVI to VGA adapter
- ✓ USB flash drive containing backup copy of software and utilities and operations manual.
- ✓ Rack mount side rails and hardware
- ✓ Power cords (2)

- Also, you may have the optional
- ✓ CXP serial control and GPI module
 - ✓ CXP interface cable

The server is not shipped with a video monitor. Select a compliant CRT or LCD monitor with a minimum refresh rate of 75 Hz and either a VGA or DVI connector. We recommend a minimum resolution of 1280 x 1024 but the system will auto adjust for most modern screen resolutions. **Connect to the DVI connector – the VGA connector should not be used in normal operation.** The monitor must be connected during boot up, if not the system will launch the GUI in a default resolution of 640 x 480. (This does not affect Remote Workstation operation.)

If you own more than one server, it may be appropriate to use a single keyboard, monitor, and mouse with a KVM switch to select between servers. Not all KVM switching systems are compatible. Depending on the KVM used, it may be necessary for the KVM switch to supply an active signal to the server at all times, even when switched away from it. When first powering up the server, make certain that the KVM is actively displaying its output from the

DVI connector. Failure to do so will cause the system to launch the GUI in a default resolution of 640 x 480. Thoroughly test the KVM switch system that will be used before installation is completed.

The server can use USB connected keyboard and mouse, or use the older PS-2 style connections. **NOTE: If PS-2 mouse and keyboard connections are interchanged, the server may not start up properly.** Be especially cautious when using extender cables.

Important Installation Notes

System Cooling

Optimal server operational temperature is between 68 and 71 degrees Fahrenheit. Although servers can tolerate temperatures up to 86 degrees Fahrenheit, a lower operating temperature will make equipment operate more reliably, and prolong useful life. In the extreme case, excessive temperatures cause rapid equipment failure, and damage which can be difficult and expensive to repair. When many pieces of equipment are mounted in an equipment rack, a considerable amount of heat may be produced, which must be removed efficiently.

Heat in an equipment rack must be removed by forced air. Temperature controlled rooms with independent HVAC units are the most common way to achieve consistent, optimal temperature control. When possible, cold air should be ducted into the bottom of the rack and warm air drawn out of the top.

Check These Points

- Are the ventilation holes in the server free of obstruction?
- Can blowers or HVAC system adequately remove heat from the equipment rack?
- Have you measured the actual temperature inside the rack? Do this near the top.
- Verify that the HVAC system is not on a timer that can shut off on weekends or holidays.
- What procedures are in place to protect the equipment when the HVAC system fails?

Power Conditioning

It is good practice to operate an on-air video server from an Uninterruptible Power Source (UPS). All utility power systems experience occasional transient events, including brownouts and dropouts, which are capable of taking a server off the air. It is the station operator's job to plan for and overcome such contingencies.

The minimum requirement for the 360 Systems video servers is 3 amps.

UPS units designed for handling short-term power line problems come in two varieties:

Change-over UPS Design

This design senses drop-outs and low line voltage, and switches its output to an internal inverter operating from a battery. This UPS is low in cost, and is most often used in non-critical applications such as desk-top computers. A disadvantage is that it may create its own power transients when switching between utility power and its inverter supply. For this reason, 360 Systems does not recommend this type for use with a broadcast server.

Continuous Conversion UPS Design

This improved design, sometimes called 'double conversion' continuously converts utility power to DC, stores it in a battery, then produces isolated AC power from an inverter. It never switches back and forth to utility power, and has better immunity to input transients, brownouts, and blackouts. Models are available with batteries of almost any size, making

the continuous-conversion UPS suitable for transient suppression or long-term operating power in the absence of utility power.

Server Operating Environment

A video server is one of the most critical elements in a broadcast operation. Its installation should safeguard it from every external event that can interfere with it doing the task expected of it. 360 Systems' engineers have experience with thousands of installations, and have become aware of a number of environmental factors that can adversely affect performance. Two of these have already been discussed: power conditioning and inadequate cooling. Two others, less obvious, should also be considered:

RF Interference by Cell Phones

Many people are not aware that cell phones produce a very high instantaneous power output, even when no conversation is taking place. You may have experienced the effect of a cell phone interfering with a common desk phone placed nearby. Carrying a cell phone into a machine room where it is in close proximity to broadcast equipment and its associated wiring is unwise. Cell phones can interfere with serial control commands, video synchronization, and in some cases can crash the CPU in equipment.

Some major broadcasters prohibit the presence of cell phones in certain equipment areas. 360 Systems believes that the risk of undesired equipment behavior from their RF fields is very real.

Static Discharge

Static electricity discharge is accepted by most people as an inevitable consequence of living in a dry area. It is also a result of floor coverings that may enhance appearances, but are inappropriate for use around critical broadcast equipment. Static discharge can do two adverse things:

- Discharge into a connector can—and will—destroy internal circuitry of equipment. The result will usually be difficult to diagnose.
- Discharge to equipment frames or wiring can crash a CPU and take the station off the air. The event may seem random or unrelated to static, but it is clearly a catastrophic event—and one that can repeat indefinitely.

Several steps can be taken to protect equipment from static discharge:

- Do not install critical broadcast equipment (video servers) in a room with carpeting.
- Connect equipment racks directly to the utility safety ground with a heavy copper conductor.
- Do not operate equipment which has a lifted safety ground (green frame ground wire).
- Consider installing a humidifier to reduce the likelihood of static discharge.

About Server Software

The TSS Multi Format Video Server is shipped with its application programs and operating system installed. The first time that it is started, it must be connected to a keyboard, monitor and mouse. The server will ask you to accept the Software Licensing Agreement before it will operate. This screen will only appear during the initial startup. Refer to the Maintenance chapter of this manual if it becomes necessary to reinstall software.

Rack Mounting

In North America, the server will usually be mounted in a 19" rack enclosure having 10-32 tapped holes. In countries with metric standards, the user will need to supply appropriate fasteners.

Remove the front panel to expose the rack screw slots. Fasten the server into the rack using the #10 flat-head Phillips screws (provided for North America). Replace the front panel and tighten its access screws until just snug.

Cables attached to the rear of the server should be supported by the rack mounting rails. Do not support substantial cable weight from the server.

Mounting the Control Module (CXP-5)

The optional CXP-5 module may be rack mounted above or below the TSS Multi Format Video Server, on the front or rear of the rack. Four elongated screw holes are provided to facilitate rack mounting of the CXP-5 Module. The CXP-5 module is connected to the server using the supplied USB cable. Connect one end of the cable to the mating connector on the rear of the CXP-5 Module. Connect the other end to either of the USB connectors on the rear panel of the server. Refer to

Figure 2 on page 28 for information about connecting GPI and automation signals to the CXP-5 Module.

NOTE: Do not connect the CXP-5 module through a USB hub. If using a USB keyboard and mouse, these may be connected using a USB hub.

Connecting the Monitor, Mouse and Keyboard

The TSS Multi Format Video Server is not shipped with a video monitor. Select a compliant CRT or LCD monitor with a minimum refresh rate of 75 Hz and either a VGA or DVI connector. We recommend a minimum resolution of 1280 x 1024 but the system will auto adjust for most modern screen resolutions. Note that the system may not start correctly if an unsuitable monitor is connected. Connect the monitor to the DVI port on the rear of the unit using either a DVI cable from the monitor or KVM or by using the included DVI to VGA adapter for monitors with a VGA cable. Refer to **Figure 1**.

Connect the keyboard and mouse to either the appropriate PS-2 ports on the rear of the unit or the available USB posts. Refer to **Figure 1**.

NOTE: If the PS-2 mouse and keyboard connections are interchanged, the TSS System may not boot up properly. Be especially careful about this when using extender cables.

NOTE: If using a CXP-5 control module, along with a USB keyboard and mouse it may be necessary to connect the USB keyboard and mouse to a USB hub first. Do not connect the CXP-5 control module to any USB hub.

If you own more than one TSS Server, it may be appropriate to use a single keyboard, monitor, and mouse with a KVM switch to select between servers. Not all KVM switching systems are compatible. The KVM switch must supply an active signal to the server at all times, even when switched away from it. When first powering up the system, it is advisable use only the supplied keyboard and mouse directly connected. Then test the KVM switch system that will be used thoroughly before installation is completed.

Occasionally some KVMs will cause the mouse to stop responding or to behave erratically. Mouse operation can be reset by the keyboard sequence Control + Alt + F12 (the screen will go black) followed by Control + Alt + F7.

Rear Panel Connections

Figure 1 indicates the Rear Panel connections on TSS Multi Format Video Server. Each connection is described briefly in the following text. Make all connections appropriate to other equipment before applying power to the system.

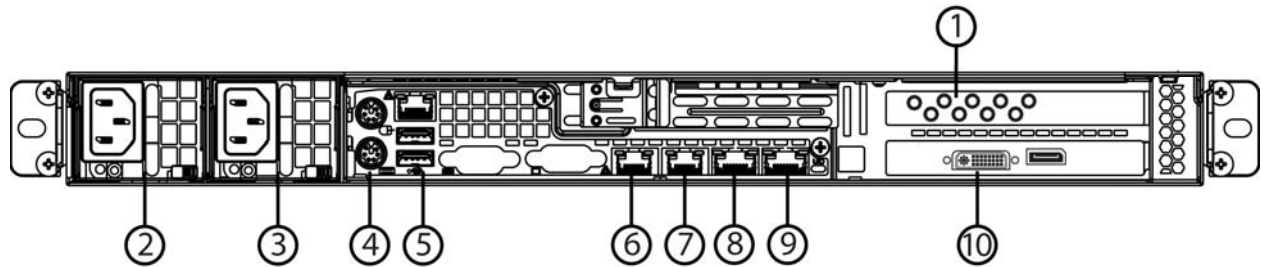


Figure 1 - Rear Panel Detail

Rear Panel Connections to the TSS Multi Format Video Server

1. SDI Video I/O
2. Power Supply Module 1
3. Power Supply Module 2
4. PS2 Keyboard / Mouse ports
5. USB ports
6. Gigabit Ethernet port 1
7. Gigabit Ethernet port 2
8. 10 Gigabit Ethernet port 1
9. 10 Gigabit Ethernet port 2
10. DVI Video monitor output

The motherboard VGA and Serial ports are not used.

SDI Video Inputs

TSS Servers with input channel(s) will record digital video through the assigned HD-BNC input(s) (High Density BNC) for either HD-SDI (serial digital per SMPTE 292M) or SD-SDI (per SMPTE 259M).

Video Outputs

TSS Servers with output channel(s) have assigned HD-BNC connections that can be configured for HD-SDI operation (per SMPTE 292M) or SD-SDI operation (per SMPTE 259M).

Genlock Sync Reference

The TSS Multi Format Video Server is designed to be referenced to an external genlock source in the form of RS-170 black/burst, or Tri-level sync. The GENLOCK input provides a fixed 75-ohm termination. An internal crystal reference is also provided so that the server can be used as a stand-alone player.

Gigabit Ethernet Port

A Gigabit Ethernet port is provided. Ports 1 and 2 may be used to access the server for the transfer or retrieval of files. The 10GB Ports 1 and 2 are reserved for future use.

Keyboard

Attach the keyboard to the purple 5-pin PS-2 connector or USB port depending on your keyboard type.

Mouse

A two-button scroll mouse is provided with the system. Plug the mouse into the green 5-pin PS-2 port or USB port depending on your mouse type. Mouse operation can be reset by the keyboard sequence Control + Alt + F12 (the screen will go black) followed by Control + Alt + F7.

Monitor

A compliant computer monitor may be connected to the DVI video port either directly using a DVI cable or to a VGA cable with the included adapter. The resolution is automatically determined by the monitor connection. NOTE: The monitor must be turned on and active before booting the server. If no monitor is detected, the default screen resolution of 640 x 480 will be used. The GUI is best-viewed on 19-inch or larger monitors. 360 Systems does not provide monitors for the server.

Serial and VGA Ports

The rear panel serial port is not used. Make no connection. The VGA port is not active in normal operation; make no connection unless directed by 360 Systems support.

USB Ports

The rear panel USB ports may be used to connect a keyboard, mouse or CXP-5 module. In the event all USB ports are used, a USB hub may be used for the keyboard and mouse. Do not use a USB hub to operate the CXP-5 module.

Power Switch (not shown in Figure 2)

Shutdown the system only by momentarily pressing the front panel power button, or through the SHUTDOWN command on the On-Screen user interface.

PRESSING THE FRONT PANEL POWER BUTTON FOR FOUR SECONDS WILL FORCE A SHUTDOWN. USE THIS METHOD ONLY IF THE UNIT IS NOT RESPONDING AS DAMAGE TO THE DATA ON THE RAID SYSTEM MAY RESULT.

Serial Control Ports for Channels

Each of the four 9-pin "D" connectors on the CXP-5 module provides independent control of the assigned video channel(s). They accept serial commands in VDCP, BVW or Odetics

protocol. The multiple serial ports allow simultaneous connection of an automation controller and a desktop controller. See the chapter on Automation Control for further details.

Most broadcast automation systems and some remote control panels employ VDCP protocol. Many controllers used for transport, instant replay, and edit control employ BVW or Odetics protocol.

Note that the server does not respond or provide status for all messages that are specific to tape machines. As such it may not operate with editing systems designed for use with tape machines.

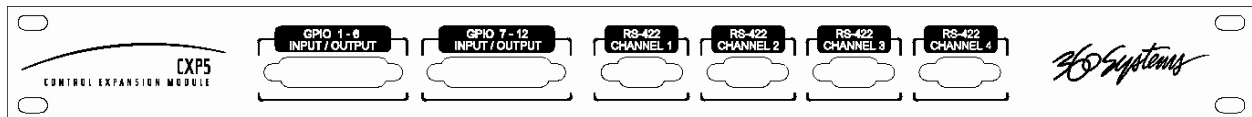


Figure 2 – CXP-5 Module Connectors

GPIO Control

The CXP-5 module provides twelve GPIO inputs for control of machine functions, which appear on two 25-pin **GPIO** connectors. These “General Purpose Inputs” can be connected to switch contacts or to an open-collector transistor output. GPI inputs are programmable, and can provide machine control such as **PLAY**, **STOP**, or **RECORD** through simple external switches.

The CXP-5 also provides twelve GPIO Outputs which may be used to confirm that a command has been received, to trigger operations on external equipment, or provide warning indications for system errors. The function of these open-collector outputs is programmable; they may be used to operate an LED, or they can drive a suitable logic input. The pin-out for the GPIO connectors will be found in APPENDIX A.

Basic Operations

This section introduces the Graphic User Interface (GUI), its menus and operating controls.

The graphic user interface is the primary way to manage server operations. With it, you can control recording and playout, set up video and audio parameters, configure the network and remote control ports, edit clips and make playlists.

The GUI is operated with a keyboard, mouse, and monitor connected to the server rear panel.

During the first power on the system must be connected to a keyboard, monitor and mouse.

The server will ask you to accept the Software Licensing Agreement before it will operate. This screen will only appear during the initial startup.

The Server Desktop

The server desktop is similar to many computer graphic interfaces. A task bar and start menu appear at the bottom of the screen. Use the Start menu button to launch applications, manage the system or to shut down the server.

Launching the Graphic User Interface

The GUI launches automatically during start up. If it has been closed, click **Start**, then **TSS GUI** to re-launch it. The GUI window can be moved or minimized as desired.

Shutting Down the Server

Click **Start**, then **Shutdown**, to begin an orderly shutdown, or **Full Restart** to do an orderly shutdown and restart (without a full power down).

Alternatively, momentarily pressing the front panel power button will cause the system to begin an orderly shutdown. The server will acknowledge the button press with an audible beep and the front panel lights will begin to flash together. Any operation in progress will be halted, and any unsaved work will be lost.

In most cases the power will shut off automatically. However, if the front panel lights begin to blink, it means that the file system has been properly closed, and it is safe to force the power off by holding the front panel button in for 4 seconds.

If the system has stopped responding to commands and will not reset by pressing the front panel button, press and hold the button for four seconds to force a power down. Wait 5 seconds, and then the system may be restarted with another press of this button.

DO NOT disconnect AC power to shutdown the server. Doing so may cause loss of unsaved data, and may require the RAID drive array to re-synchronize – a process that could take several hours. Shutdown the system *only* by momentarily pressing the front panel **Power** button, or through the GUI.

The **Quick Restart** option in the **Start** menu allows the GUI and video playback application to be restarted without restarting the entire operating system.

Graphic User Interface Overview

Once the server has successfully powered up, the VGA monitor will display the GUI of **Figure 3**. This view provides:

- A main System Menu bar for configuration operations
- A Status Bar that displays various system messages
- Three or four (Model dependent) VTR-like transport controls, one for each video channel

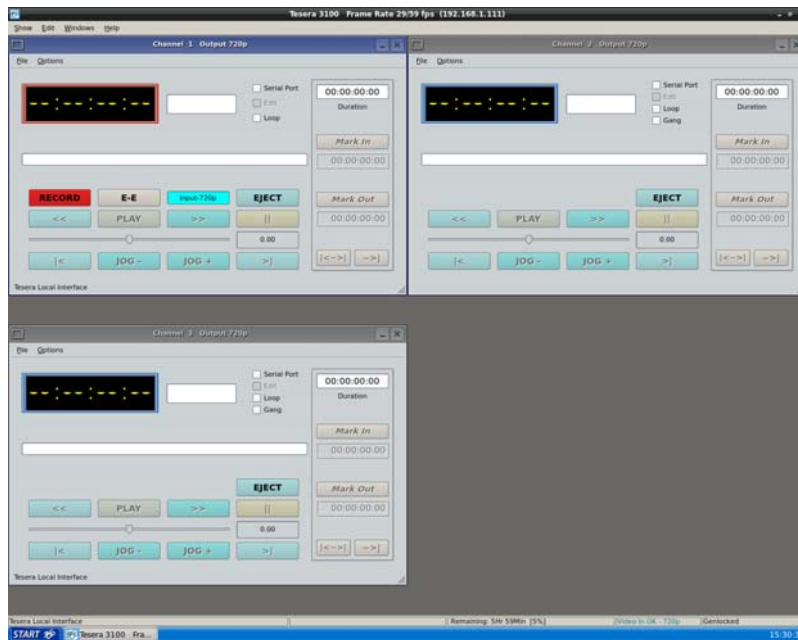


Figure 3: Graphic User Interface with Clip Transport Windows

The input monitor will read Video In OK and display the received video resolution: 1080i, 720p, SD or **NO INPUT**.

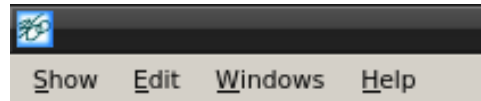
When using the mouse, all buttons of all channels will operate immediately, without first selecting a window to activate it. (Channel 1 is active in the illustration above, indicated by its blue title bar.)

When using key commands, the active window is the only transport that will respond. Use the **CTRL+TAB** key combination to change the active window in rotation, or use the mouse to activate the desired window by clicking anywhere in it.

Windows can be moved, resized and overlapped by dragging the title bar, window edges, or the resize tab at the lower right corner of a window. The **CTRL+TAB** key combination will also place the activated window in front of all other windows.

System Menu Bar

The System Menu bar contains four menus: Show, Edit, Windows and Help.



Show Menu

Contains selections for the Three or Four (Model dependent) Channels and the clip management windows.

Channel Window Selection

Channel 1

Channel 2

Channel 3

Channel 4 (Model dependent)

Opens the specified window if it is closed, brings it to the top and activates it.

Key Commands – **F1, F2, F3, F4**

Clip List

Opens the Clip List window if it is closed, brings it to the top and activates it. See page **Error! Bookmark not defined..**

Key Command – **Ctrl+L**.

Find Clips

Opens the Clip Locator dialog. See page **Error! Bookmark not defined..**

Key Command – **Ctrl+F**.

Edit Menu

Contains a single selection, **Configuration**. This opens the main System Configuration dialog. See page **Error! Bookmark not defined..**

Windows Menu

Choices in this menu change the way the windows are displayed. Use the **CTRL+TAB** key combination to change the active window in rotation, or use the mouse to activate a specific window.

Cascade

Arranges all open windows so that they are overlapping, but offset. It is useful as a starting point to rearrange the windows. This choice is especially useful with small monitors.

Tile

Arranges all open windows so that each is fully visible. This choice is especially useful with larger monitors. In case Windows do not tile as expected, select Cascade to restore their original size and order, then select Tile.

In addition, there are selections for each open transport window. Selecting one of these brings that transport to the top of the display and makes it the active window.

Help Menu

Contains a single item, **About**, which displays the server software versions, serial number and Unit ID.

The Status Bar

A status bar appears at the bottom of the window that provides system information including Server Status, GENLOCK, VIDEO INPUT, and TIME REMAINING—PERCENT FULL. Messages such as CONNECTED TO HOST or CONNECTION TO HOST REFUSED are also displayed as diagnostics. Error and status messages from the RAID system can also be displayed here.

Channel 1 can Record or Play video content. Channel 2 may Record or Play or may be play only, depending upon model. Channel 3 and Channel 4 (If equipped) only play content. All channels may be used at the same time.

Each channel can be controlled in two different views.

- The Transport View
- The Playlist View

The Transport Channel View

The Transport Channel View is shown in Figure 4. This is the default view of each channel. Basic transport operations such as **play**, **stop**, **record**, and **head/tail trimming** appear in the Clip Transport window for each channel. These operate in familiar VTR fashion.

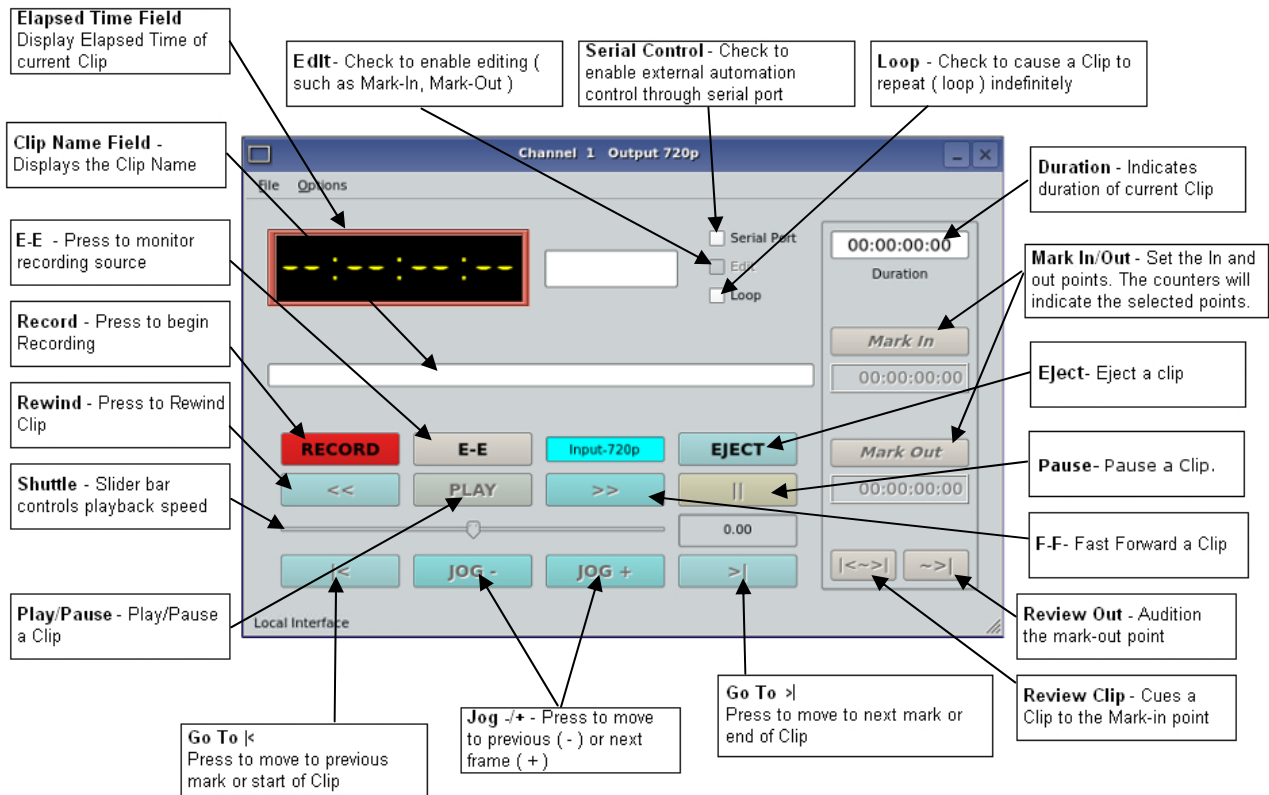


Figure 4 - Transport Channel View

Transport Menu Bar

There are two menus, **File** and **Options**.

File Menu

New

Record capable channels only (Channel 1 and in some models Channel 2). Opens the Clip List to allow naming of a new clip, then prepares channel 1 or 2 for recording. See page **Error! Bookmark not defined.**

Key Command – **Ctrl+N**.

Open

Opens the Clip List to allow choosing a clip to load into the transport.

Key Command – **Ctrl+O**.

Save

Saves an edited clip using its existing file name.

Key Command – **Ctrl+S**.

Save As

Opens the Clip List to allow saving an edited version of the clip with a new name. This allows making alternate versions of a clip or making multiple segments of a master clip.

Key Command – **Ctrl+A**.

Playlist

Switches from Transport View to Playlist View.

Close

Closes the Transport window. This has the same effect as the Close box in the upper right corner of the window. Note that this will not stop playback or eject a loaded clip.

Options Menu

This menu contains two selections.

Take Control

Takes control of the video channel from another user (the Serial Control, a Remote Workstation, or if you are using a Remote Workstation possibly the local GUI.) This item is grayed out when the window has control.

Key Command – **Ctrl+T**.

Configure

Opens the video channel's Configuration dialog. See page **Error! Bookmark not defined..**

Key Command – **Ctrl+C**.

Go To

Opens the video channel's Frame Locator. See page **Error! Bookmark not defined..**

Key Command – **Ctrl+G**.

The Playlist Channel View

The Playlist Channel View is shown in Figure 5. This view allows multiple clips to be loaded in a Playlist for sequential playback.

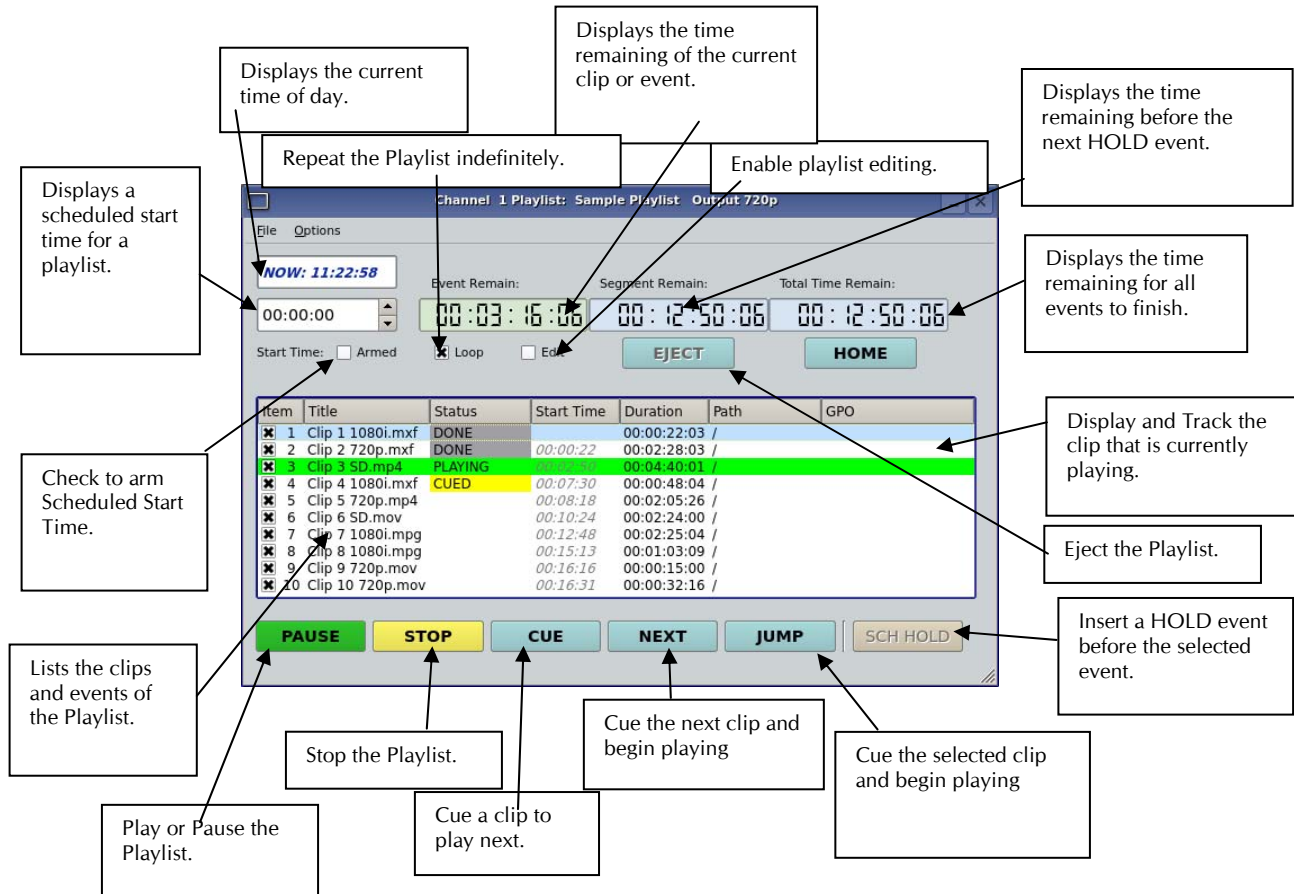


Figure 5 - Playlist Channel View

Playlist Menu Bar

There are two menus, **File** and **Options**.

File Menu

Open

Opens the Playlist Selector to allow choosing a Playlist to load into the Playlist Window.
Key Command – **Ctrl+D**.

Append

Opens the Playlist Selection dialog to allow choosing a Playlist to Append to the currently loaded list. This can be done while playing to allow continuous playback of new Playlists. See page **Error! Bookmark not defined.**

Save

Saves an edited Playlist using its existing file name.
Key Command – **Ctrl+S**.

Save As

Opens the Clip List to allow saving an edited version of the clip with a new name. This allows making alternate versions of a clip or making multiple segments of a master clip.
Key Command – **Ctrl+A**.

Rename

Opens the Playlist Selection dialog to allow renaming the currently loaded Playlist.

Transport

Switches from Playlist View to Transport View. Only available when idle.

Eject

Ejects the currently loaded Playlist in preparation for creating a new one. (It is not necessary to Eject a list to load another saved list. If the current list has been edited you will be asked to save the changes.)
Key Command – **Ctrl+N**.

Close

Closes the Playlist window. This has the same effect as the Close box in the upper right corner of the window. Note that this will not stop playback or eject a loaded list.

Options Menu

This menu contains two selections:

Take Control

Takes control of the video channel from another user (the Serial Control, a Remote Workstation, or if you are using a Remote Workstation possibly the local GUI.) This item is grayed out when the window has control.
Key Command – **Ctrl+T**.

Configure

Opens the Playlist's Configuration dialog. See page **Error! Bookmark not defined.**. Note that this is different than the dialog for the video channel setup, which must be accessed from the Transport View window.

Key Command – **Ctrl+C**.

Initial System Configuration

Selecting a Sync Reference

In many applications, this server and downstream equipment connected to it must be referenced to a common genlock source (SMPTE 170M or ITU-R-BT.470). A connector is provided on the rear panel to receive a genlock signal (black and burst at the field rate of 25 or 29.97 fields/second) or a tri-level sync signal. It has a 75-ohm termination.

The genlock input automatically detects what type of input is connected. The frequency of the reference must match the setting of the Frame Rate (see the next page).

An internal crystal reference is also provided so that the server can be used as a stand-alone player when there is no need to synchronize with other equipment. Systems that incorporate retiming circuitry in the router or video switcher inputs also may not require referencing.

Note that the input sync for recording is derived from the input itself. This allows the outputs to be timed while the input records an unreferenced signal.

Setting the Video Sync Source

To use with a referenced system, select **External Sync** using the GUI as follows:

- Connect a source of genlock (black burst) or tri-level sync to the Genlock (or Reference) input. Note that this may need to be connected while the unit powers up.
- From the main menu bar select **EDIT >CONFIGURE**. Select the **TIMING** option. The screen of **Figure 6** appears.
- Select **EXTERNAL** as the sync source.
- Check that the front panel **GENLOCK** LED is now illuminated and the word **GENLOCKED** now appears in the bottom right of the main GUI window.

Genlock Signal Quality

A genlock signal for the server must conform to one of the standards listed in the Technical Specifications. An unstable genlock source may result in unwanted artifacts in the video output.

To use in a non-genlocked system, follow the instructions above but select **INTERNAL** Sync.

The input to the server uses the input signal itself as a reference, this allows recording any signal that conforms to the currently selected frame rate. No configuration is required to use this feature.

Selecting the Video Frame Rate Family

360 Systems TSS servers can record and play video in four high definition video formats and two standard definition formats: These formats are divided into two “families” depending on the Frame (or Field) Rate that they are based on:

| | | |
|---------------------|----------------------------------|----------------------------|
| | 29.97/(59.94) Frames(Fields)/Sec | 25/(50) Frames(Fields)/Sec |
| High Definition | 1080i @ 59.94 Hz | 1080i @ 50 Hz |
| | 720p @ 59.94 Hz | 720p @ 50 Hz |
| Standard Definition | NTSC | PAL |

The rate is expressed in fps. 1080i and Standard Definition formats are interlaced and their fields are displayed at the higher frequency; the frame rate is half that. The 720p (progressive) format is more correctly referred to as a *frames per second* value.

To select a Video Frame Rate Family:

- Go to **Edit>Configure>Timing** dialog on the GUI.
- Select the button for the Frame Rate Family at which you will record or play.

A reminder will appear to stop video on all channels and prepare for automatic restart in the new format.

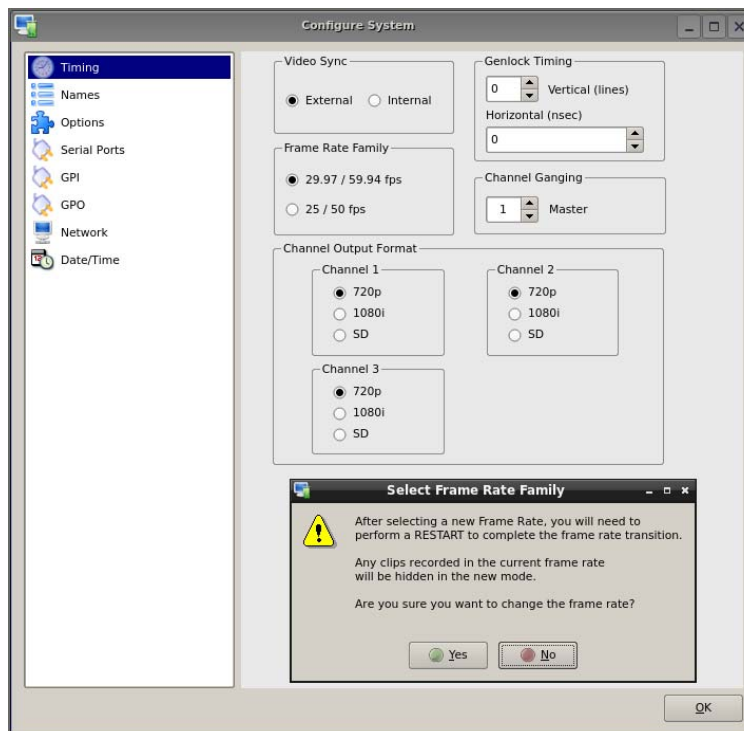


Figure 6 – Selecting a Frame Rate Family and Channel Output Format

The system must be set to operate at one Frame Rate Family at a time; it does not play clips of mixed Frame Rate Families. Only the files recorded in the currently selected Frame Rate Family will be visible in the Clip List. Files in the other format will become visible when the server is set to that frame rate. Note that this also applies to any files you will be transferring into the system; they must conform to the selected Frame Rate Family.

Audio is recorded and played at the industry standard of 48 KHz sample rate (referenced to the video frame rate), regardless of the video Frame Rate selected.

Selecting the Channel Output Format

Each of the system's Video Channels are independently configurable to output 720p, 1080i, or SD resolutions.

To select a Channel Output Format:

- Go to **Edit>Configure>Timing** dialog on the GUI.
- Select the button for the desired output format of each channel.

A reminder will appear to restart the system after a Channel Output Format has been changed.

Making a Recording from the GUI

Video recordings are made using the Transport View of **Channel 1 or Channel 2 (Model dependent)**. These channels can record *or* play clips, but not both at the same time. Channels 3 and 4 (if equipped) are playback only. The following steps are used to make a recording. Most configuration settings can be skipped once a workflow is established. Channel 1 is used below as an example; all instructions apply equally to channel 2 (Model dependent).

Record Configuration Options

If necessary, set Channel 1 and/or Channel 2 to the Transport View.
Click **FILE >TRANSPORT** in the Playlist View to switch to the Transport View.

Setting the Record Profile

Select **OPTIONS >CONFIGURE** from the Channel 1 Transport Window. The Dialog box in Figure 7 appears. Click the arrow to open the dropdown menu to select a Record Profile.

- AVC100 in .mxp (HD only)
 - AVC Intra 100 in mxp
 - Codec Type: H.264
 - Bit Rate: 100 Mb/s
 - Caption and VANC support pending
 - Audio Channels: 16
 - Audio Codec: PCM
- H.264 in .mp4
 - HD
 - MPEG 4 in .mp4
 - Codec Type: H.264
 - Bit Rates: HD 5-40 Mb/s
 - Does not support Closed Captions
 - Audio Channels: 2
 - Audio Codec: AAC
- MPEG2 PS 480 line in .mpg (SD only)
 - MPEG Program Stream in .mpg
 - Codec Type: MPEG2 Variable Bit Rate
 - Bit Rate: Maximum selectable 5-50 Mb/s
 - Does not support Closed Captions
 - Audio Channels: 2
 - Audio Codec: mp3 Layer 2
 - Audio Codec: AAC
- MPEG2 PS 512 line in .mpg (SD only)
 - MPEG Program Stream in .mpg
 - Codec Type: MPEG2 Variable Bit Rate
 - Bit Rate: Maximum selectable 5-50 Mb/s
 - Supports Closed Captions
 - Audio Channels: 2
 - Audio Codec: mp3 Layer 2
- IMX (D-10) in .mxp (SD only)

- IMX (D-10) in .mxf
- Codec Type: MPEG2 Constant Bit Rate
- Bit Rate: 30, 40, or 50 Mb/s
- Supports Closed Captions
- Audio Channels: 4
- Audio Codec PCM

Input Resolution Selection

Select **OPTIONS >CONFIGURE** from the Channel 1 Transport Window. The Dialog box in **Error! Reference source not found.** appears.

- Click the arrow to open the dropdown menu.
- Select the Resolution of the input feed. The available resolutions will vary, depending on the Record Profile Selected.
- Click **APPLY** or **OK**.

Note: A warning will appear in the Transport Window if the selected Input Resolution does not match the resolution of the input Feed.

Setting the Video Bit Rate

Select **OPTIONS >CONFIGURE** from the Channel 1 Transport Window. The Dialog box in **Error! Reference source not found.** appears.

- In the window, enter the desired Video Bit Rate (in Megabits/sec),. Alternatively, use the up/down arrows to set a number. The range of values available depends on the Record Profile selected.
- Click **APPLY** or **OK**.

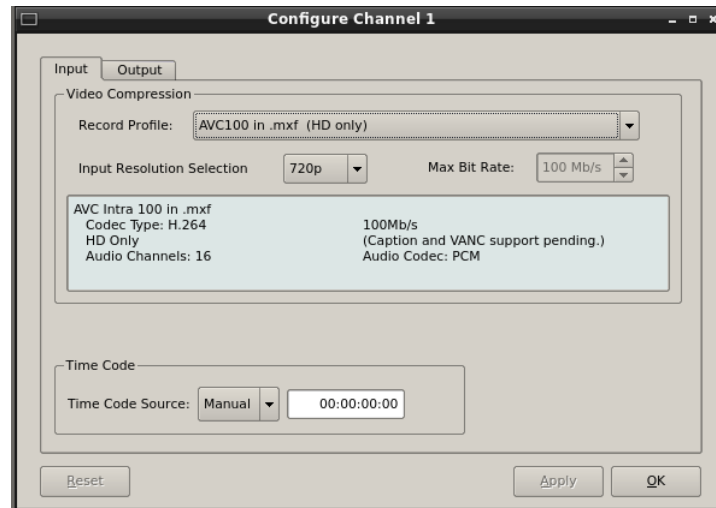


Figure 7 - Channel Configuration Dialog

Setting an Audio Delay Time

Audio tracks can be offset from video in 1 millisecond increments up to +/- one second. The setting is per channel and non-volatile. It applies to playback only, not recording.

You must stop and start the playback to hear the result of a change. This adjustment is made in Transport mode; once set it also applies to Playlist mode on that channel.

- Select **OPTIONS >CONFIGURE>OUTPUT** from the Channel Transport Window. The Dialog box in Figure 8 appears.
- Enter a time offset value in the window.
- Click **APPLY** or **OK**.

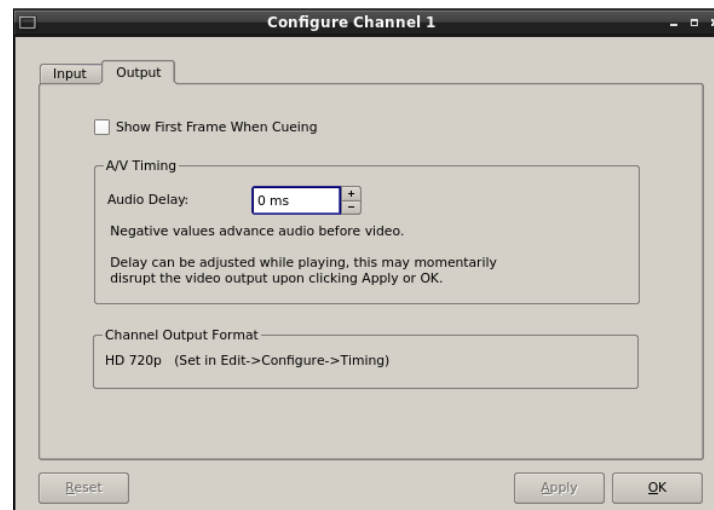


Figure 8 - Audio Delay Time Offset

Audio Output Sync Reference

The audio sample rate is derived from the selected video sync reference. Audio is recorded at a 48K sample rate. The 0.1% pull-down for 59.94 Hz video is taken into account when generating the sample rate.

Selecting a Time Code Source

When in High-Definition modes the server utilizes the time code standard specified in SMPTE 12M-1, and applies it as described in SMPTE 12M-2. It is suggested that the user refer to these documents, as HD time code differs significantly from standard definition methods.

- This function selects the source for time code for new recordings. The time code value obtained from the selected source will be applied from the beginning of a recording.
- Select **OPTIONS >CONFIGURE** from the Channel 1 Transport Window. The Dialog box in **Error! Reference source not found.** appears.
- The default Time Code Source is MANUAL. Alternatively, ATC (Ancillary Time Code) or TOD (Time Of Day as set by the system clock) may be selected.
- For MANUAL, enter a time value in the window for the first frame of the recording. Use the HH:MM:SS:FF format. It is not necessary to enter the colon (:) between digit pairs.

- Click **APPLY** or **OK**.

Beginning Recording

When the setup steps outlined above are complete, you are ready to record. Place Channel 1 in the Record Ready mode as follows.

There are two approaches to starting a recording: “named recording” and “crash recording”. You can name the clip first, then press Record; or just start recording, and let the system generate a clip name automatically. The clip may be renamed as desired when the recording is complete. The advantage of the first approach is that when the recording is complete, it is fully identified and ready for use; the second approach is valuable for live action such as sports, where there is no time to lose and action must be captured at once.

Clip names for crash recordings are of the form “new MMDD_N”, where MMDD represents the month and day of the recording, and N is the lowest non-zero number that does not cause the name to conflict with any previously made recording.

Making a Crash Recording

Press Record whenever Channel 1 reports that it is IDLE.

Making a Named Recording

- From the Channel 1 Transport Window, Select **FILE > NEW**. The dialog of **Figure 9** below appears.

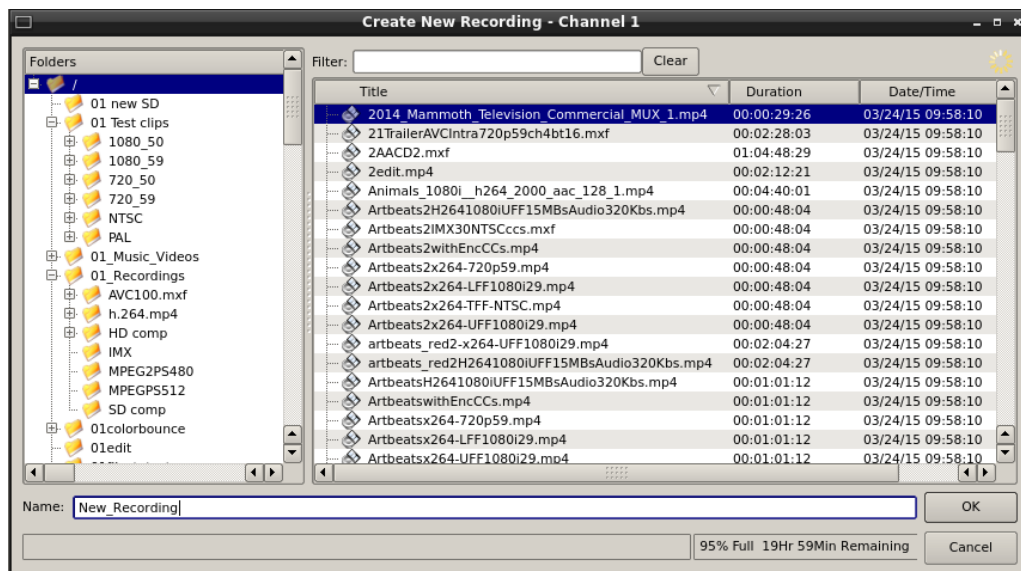


Figure 9 - Channel 1 Create New Recording dialog

- Enter a clip name using the keyboard. Up to 115 characters may be used. Spaces are allowed; however, some characters *other* than upper or lower case letters and numbers may not be used. These characters will not enter into the name field when typed. They

include * () + = ; : ' " < > , . / and ? A list of existing clips will appear in the large window, and can be used as a name reference when creating new clip names.

- The Channel 1 transport Window will display the words **IDLE CUEING** for two seconds or less. When ready to record, the Channel 1 Transport Window will display **IDLE READY**.

Note: File naming is case sensitive. Upper case letters sort before lower case. The name *FILE* sorts in the order shown, based on differing capitalization: *FILE*, *File*, *fiLe*, and *file*. When using the server with automation systems or other remote controls, it is not a good practice to distinguish files only by differences in case.



Figure 10 - Channel 1 Ready to Record

- Click the **RECORD** button at any time to begin recording. The yellow time display counter will update the clip duration continually.
- To stop recording, click **STOP**.

Monitoring a Recording Source with Input Feed (E-E) Mode

The **E-E** button appears in the Channel 1 and Channel 2 (model dependent) Record/Play window. It allows the input signal to be monitored from the server output. E-E Mode toggles automatically as described below, but can also be switched manually at any time.

When a new clip is created for recording, the input source is automatically switched ON to the output—an E-E connection. When a clip is opened for play on Channel 1 or 2, E-E monitoring is switched OFF. (The term E-E comes from “Electrical to Electrical”.)

When Channel 1 or 2 is switched to playlist mode, the E-E monitor is switched OFF. E-E mode cannot be toggled while the channel is in playlist mode.

When E-E is ON, the input video signal is routed to the outputs. Manually toggle the E-E mode button OFF to switch the output to the servers output, for conventional playback operation.

Under automation control, Auto E-E behavior is slightly different than under GUI control. The server will remain in E-E ON mode until a transport control command (Play, Stop, Jog, etc) is

received. After receiving such a command, the server will remain in E-E OFF mode until record mode is entered. In record mode, E-E mode is ON. As with GUI operation, automation controllers may send E-E ON and E-E OFF commands to override the automatic operation.

Note that when in E-E mode the video outputs are timed to the genlock signal. This allows use of the input as an on air source when connected to other referenced equipment, even when the input itself is not referenced. For example, you can simultaneously broadcast a live signal while recording the event for later rebroadcast.

All VANC lines are passed through E-E regardless of which lines are selected for recording. Similarly, all embedded audio is passed through even though (depending on the selected recording format) only the lowest-numbered channels are recorded.

Playing a Clip from the GUI

Video Playback can be done on all channels, individually or simultaneously. The record-capable channels (Model dependent) can record or play, but not both at once. Follow these steps to play a clip:

Beginning Playback

1. Select **FILE > OPEN** from the Transport Window of Channel 1, 2, 3 or 4 (Model dependent). The Select Clip window **Error! Reference source not found.** appears.
2. Navigate the folder structure if necessary by clicking on the folders.
3. Select the clip to be played by double-clicking it.
4. When the Transport Window indicates **Idle Ready**, the clip can be played by clicking **PLAY**.

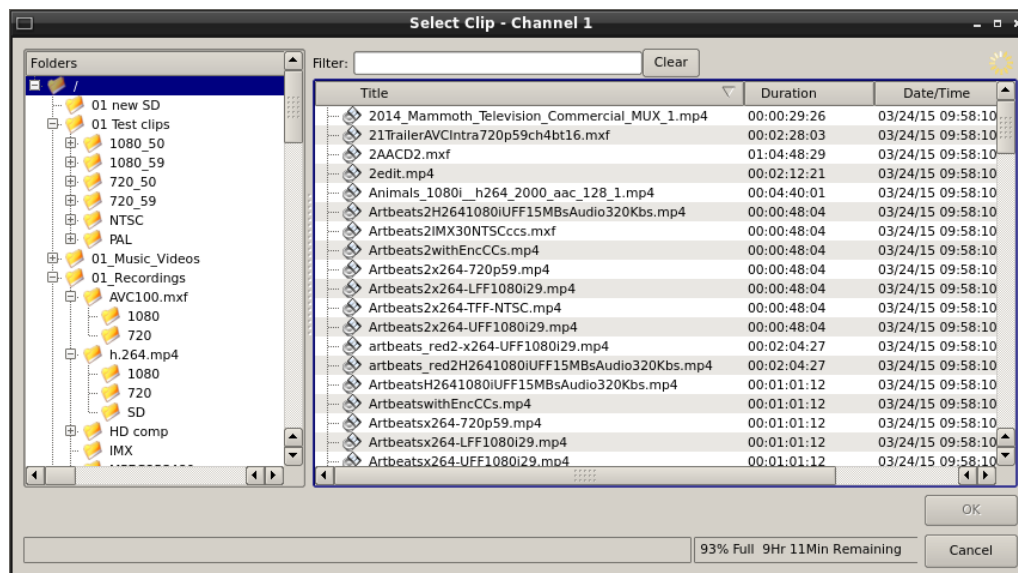


Figure 11 – Channel-1 Select Clip Window in “Open” Mode

Drag and Drop clip selection

1. Select **FILE > CLIP LIST** from the Main Window. The Clip List window in figure 11 appears.
2. Navigate the folder structure if necessary by clicking on the folders.
3. Select the clip to be played by clicking and holding the left mouse button. Wait briefly then while continuing to hold the button “drag” the clip to the transport window and let go.
4. When the Transport Window indicates **Idle Ready**, the clip can be played by clicking **PLAY**.

Looping a Clip

Clicking on the **LOOP** checkbox in the Transport View will cause a clip to loop until **LOOP** is unchecked, or until **STOP** is clicked. **LOOP** may be checked or unchecked before or during playback, but must be changed at least 2 seconds before the end of clip to take immediate effect.

Pausing a Clip

Click **PAUSE** at any time to pause a clip. Click again to resume. The **PAUSE** button is the same key as the **PLAY** button.

Ejecting a Clip

Ejecting a clip effectively removes it from the transport. The channel will output Black. Press **EJECT** to eject a clip.

Using Jog

The **JOG +** command will move to the next frame and go to Still.
The **JOG -** command will move to the previous frame and go to Still.

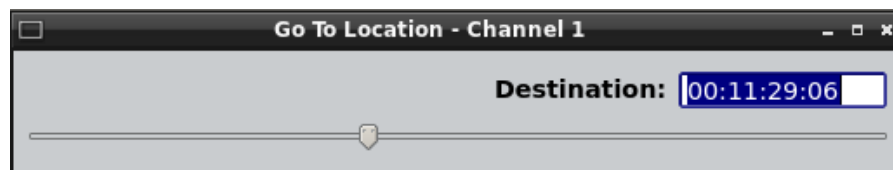
Using Go To Location

Click the arrows **|<** or **>|** to go to the next trim point (Mark In or Mark Out) in the selected direction. When in Edit mode, an additional click in the selected direction will go to the actual beginning or end of the entire clip.

To use the Go To Location slider, either select Go To from the Options Menu of the Transport you are using, or type **Ctrl+G** with the desired Transport selected (click anywhere in the Transport window to select it - its title bar will turn blue.)



Using the mouse, drag the slider to move rapidly through the video file. Or, type a specific frame location into the Destination field. You can type just as much of the location as necessary, by typing frames, seconds and frames, minutes and seconds and frames, or hours and minutes and seconds and frames. (You can type the colons but they are not required.) Press **Enter** when done. The video will jump to the specified frame (if it exists) and the Destination Field will become selected again to allow another location to be entered.



Using Fast Forward / Rewind

>> (Fast Forward) and << (Rewind) buttons transport program material at high speed in the chosen direction. Four speed choices are available in each direction. Click the button repeatedly for: 4x, 16x, 64x, and 128x. Audio does not play at any speed beyond +2X/-2X.

Slow Motion Playback

The TSS system will play smooth slow-motion video in forward or reverse, at any speed from zero to 2X forward or 2x reverse. Direction can be instantly changed, using either the GUI or a desk-top controller. Audio is also played at these lower speeds. At speeds beyond +2X/-2X, video frames will be selected as needed, yielding a chunky result; audio is muted at high speeds. Most slo-mo playback for sports and other uses lies well within the +2x/-2x zone.

To play in slow motion from the GUI, press PLAY and then move the shuttle slider to the desired speed. When you let go of the slider it goes back to pause. You can also have the speed control “stick” at a particular speed – see below. See the following section for details on the Shuttle control. For faster playback from the GUI, use the FAST FORWARD or REWIND buttons as described in the preceding section.

In sports, slow-motion control is usually accomplished with a desk-top slow-mo controller, such as those made by DNF Controls and others. These provide a hands-on experience far preferable to using the GUI.

Using Shuttle to Control Playback Speed

The **Shuttle Control** is a slider bar that controls playback speed. Playback speed control employs *varispeed* algorithms that may skip frames. It is not a perfect fast motion mechanism.

The **center position** represents zero speed, or Still.

The **right** and **left** extents of the slider represent +2X/-1X maximums.

The Shuttle control slider works in three basic ways: Snap-Back to still, Hold Speed, and Mouse Wheel.

- In **Snap-Back** operation, click and drag the slide control to change speed. Releasing the slider bar will let it snap back to zero speed, or still.
- For **Hold Speed** operation, position the cursor over the slider control scale (not the slider arrow) and click the left mouse button to increment the speed control. The transport will run in the selected direction at the selected speed without holding the mouse button down. The cursor may now be moved over the Stop button to wait for the desired point.
- When using a **wheel mouse**, position the cursor over the slider scale and rotate the wheel to increment speed. Rolling the wheel in opposite directions changes the direction the arrow slider moves. To stop video, click the Stop button or the arrow slider.

Editing a Clip

Edit controls are activated with the **Edit** check box. Several buttons are available to define the beginning and end of a region within a clip; associated time code displays are also present.

These non-destructive Mark In and Mark Out trim points can be set to define a portion of a clip to be played. These “edit pointers” do not create a new clip from the original material; they act like virtual trims, and material outside of the trim points is excluded, but can be retrieved by resetting the Mark pointers. After setting the Mark In and Mark Out points, clips will play between these points. These edit values are saved with the clip.

Edits may be saved to the current clip by de-selecting the **Edit** check box, or choosing **Save** from the clip window **File** menu. **Save As** works to save the edit points to a new clip name, even if the edits have not been saved in the current clip.

Marking the IN point

Sets the current time code value into the Mark In point time display. The **Mark In** button can capture a time code value from the clip when it is still, or on-the-fly.

Mark In Display

Displays the time code of the Mark In point. When no Mark In point has been set manually, this displays the Start of Message (SOM) time code (usually 00:00:00:00).

The values in this display window may be set by two methods:

- Enter Mark In point from the keyboard: Use the mouse or Tab key to move between In and Out fields. When a field is highlighted, enter a numeric value from the keyboard.
- Whether a clip is still or playing, press **Mark In** to capture a time code value from the clip’s current position.

Marking the Out Point

Sets the current time code value into the Mark Out point time display. The **Mark Out** button can capture a time code value from the clip when it is still, or on-the-fly.

Mark Out Display

Displays the Mark Out point time code. When no Mark Out point has been set manually, this displays the EOM time code (originally the end time of the recording).

The values in this display window may be set by two methods:

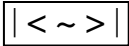
- Enter Mark Out point from the keyboard: Use the mouse or Tab key to move between In and Out fields. When a field is highlighted, enter a numeric value from the keyboard.
- Whether a clip is still or playing, press Mark Out to capture a time code value from the clip’s current position.

Duration Display

Displays the total running time (TRT) of the current clip. TRT is defined as the difference in the time codes between the first and last frames, plus one. For example, if the first frame of the clip is 00:00:00:00 and last frame displayed at the end is 00:00:01:15, the reported duration will be 00:00:01:16.

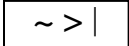
With 59.94 Hz drop-frame time code, the true play duration may not be the exact numerical value of $((\text{Mark Out} - \text{Mark In}) + 1)$ due to the discontinuities in the drop-frame time line. The true run time is shown in the Clip List.

Auditioning the Mark In Point (Review Edit Button)

The Review Edit button  cues the clip to the Mark In point (or SOM, if no Mark In point exists) and begins playback. Review Edit will stop at the Mark Out point. The Mark Out point will be displayed in Still mode.

The Review Clip button may be used to check the Mark In point without playing all the way through the clip. After Review Clip is pressed and play begins, all of the standard transport buttons are available for use.

Auditioning the Mark Out Point (Review Tail Button)

The Review Tail button  may be used to audition the Mark Out point without playing all the way through the clip. It will cue the clip to three seconds before the Mark Out point (or EOM, if no Mark Out Point exists) and then begin playback. Review Out will stop at the Mark Out Point.

Single-Frame Clips

It is possible to Click Mark In and Mark Out on the same frame to create a still frame for use in a playlist. These can function as either a hold point in the list that will display the frame until another action is taken, or they can be assigned a duration. See page **Error! Bookmark not defined.** for information on setting the duration of a still frame in a playlist.

System Configuration

The following configuration options apply to the server as a whole, except where it applies specifically to an individual channel.

Assigning Names to the Server and Transport Channels

The server can be assigned a name that will be displayed along the top of the Main GUI Window. Each individual server channel can also be given a name.

To assign a name to the server or transport channels, click **EDIT>CONFIGURE>NAMES** from the main menu pulldown.

The screen of **Error! Reference source not found.** is displayed. Use the keyboard to type in a name for any of the selections. Names can be up to 31 characters in length. Spaces, digits and other non-alphanumeric characters may be used. Click **APPLY** to accept the name. The names will appear in their appropriate windows immediately.

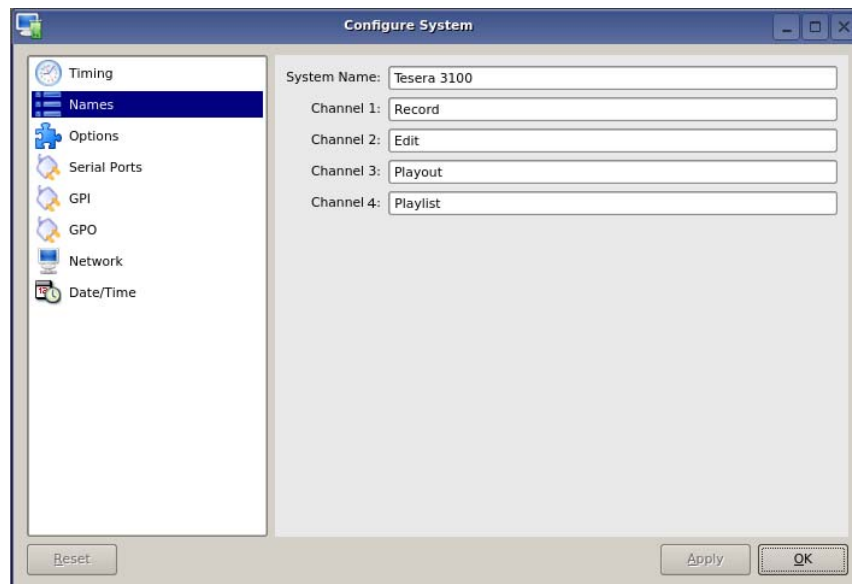


Figure 12 - Configure Names Screen

Programming GPIO Outputs

The system has twelve General Purpose Outputs, referred to as GPO 1 through 12. Each can be programmed to go active on the selected channel when one of the following events occurs:

| | |
|-----------------------|---|
| IDLE | Transport returns to idle |
| PAUSED | Transport is paused |
| STOPPED | Transport is stopped |
| PLAYING | Transport is playing |
| RECORDING | Transport is recording |
| PLAYLIST | Control GPO via playlist (or Playback Schedule) |
| RAID Fault | RAID Fault |
| NO GENLOCK | No genlock |
| NO VIDEO INPUT | No video at the selected input |
| Fan Fault | Fan Fault |
| System Fault | System Fault |
| Any Fault | RAID, Fan or System Fault |

To program a GPO output, select **EDIT >CONFIGURE >GPO**. The screen of **Error! Reference source not found.** is displayed. GPO 1 through 12 are triggerable outputs. The checkboxes to the right of each selection represent channel 1, 2, 3 and possibly 4 (Model Dependent).

- To activate one of the GPO, pulldown the event menu and select which event will activate the GPO.
- Select an associated channel where applicable by checking the channel checkbox.
- Click **APPLY** to activate.

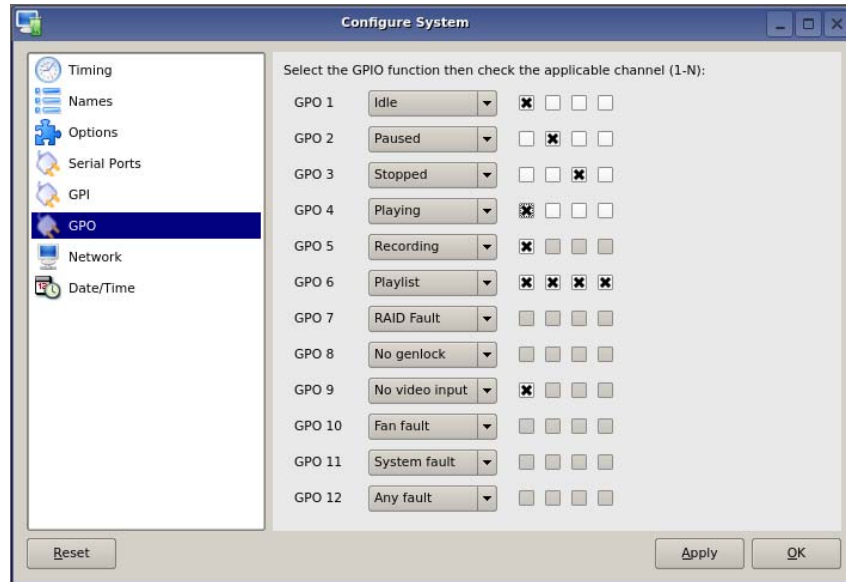


Figure 13 - GPO Configuration Screen

Programming GPI Inputs

The optional CXP-5 module has 12 General Purpose Inputs, referred to as GPI 1 through GPI 12. Each can be programmed to trigger one of the following events on a channel:

| | |
|----------------|--|
| CUE | Cue a clip (in a Playlist or Playback Schedule) |
| JUMP | Cue selected clip for immediate playback (Playlist Mode only) |
| NEXT | Immediately plays next cued clip in a playlist for playback (Playlist Mode only) |
| PAUSE | Pause a clip |
| PLAY | Play a clip |
| RECORD | Start a recording |
| SELPREV | In Playlist Mode – Navigate to clip above currently selected clip |
| SELNEXT | In Playlist Mode – Navigate to clip below currently selected clip |
| STOP | Stop a clip |

To program a GPI Input, select **EDIT >CONFIGURE >GPI**. The screen of Error! Reference source not found. will be displayed. GPI 1 through 12 are programmable inputs. The checkboxes to the right of each selection represent video channels 1, 2, 3 and possibly 4 (Model dependent).

1. To activate a GPI input, select the event from the pulldown the event menu
2. Mark a checkbox for the channel of interest. The event will be triggered when that GPI goes active.
3. Click **APPLY** to activate.

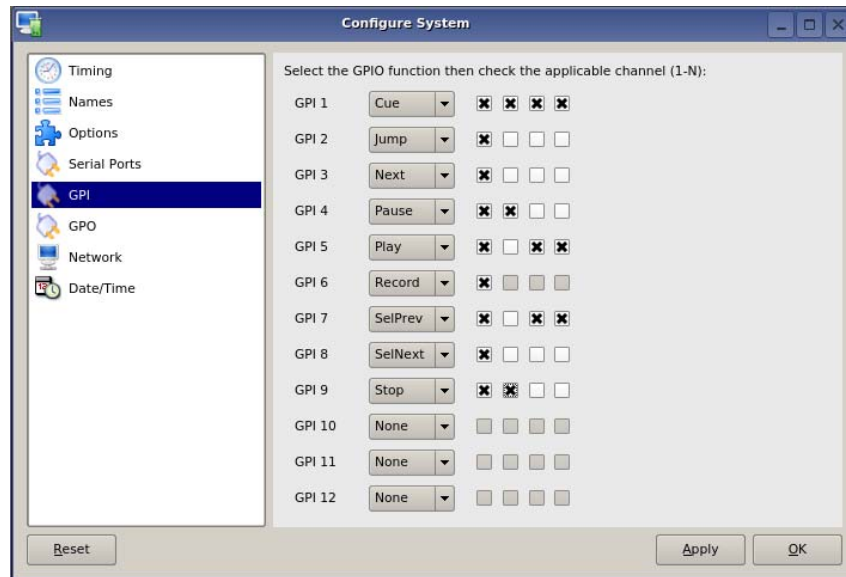


Figure 14 - GPI Configuration Screen

Configuring the Ethernet Network

The system provides a number of user settings that configure it for use in a practical network. These will be found on the Configure Network tab shown below.

The NET-1 Ethernet port on the server has a unique IP Address. In this way, each server can be identified on the network.

Network Settings Tab

Use the Main Menu selection bar at the top of the server GUI to configure network communication settings.

Click **EDIT >CONFIGURE >NETWORK**

The screen of Figure 15Error! Reference source not found. is displayed.

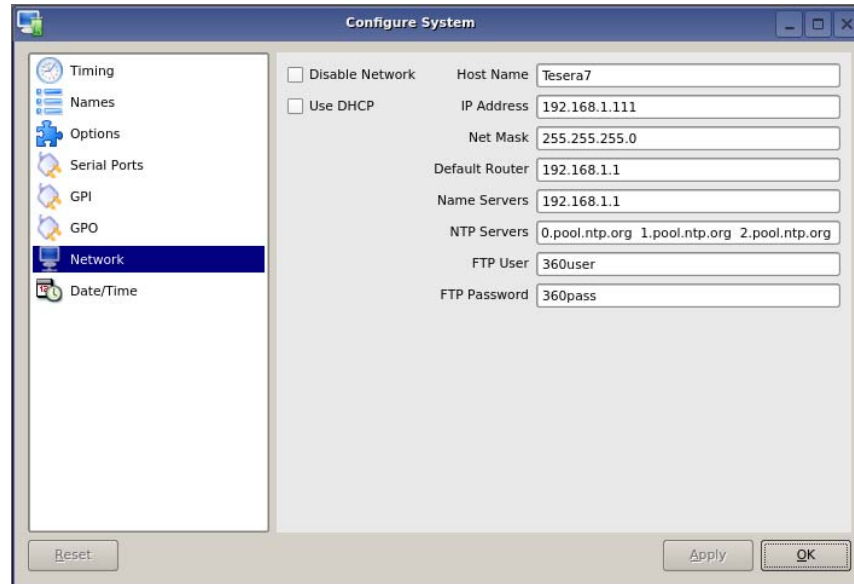


Figure 15 - Network Configuration Screen

The server is shipped with a default network Host Name and IP Address. Qualified network engineers may change these configurations to suit your specific network environment. Factory defaults for networking are:

- Network Disabled
- Use DHCP

Disable Network [X]

This selection turns the network OFF or ON. The default is Disabled (the box is checked). To Enable the network connection, click the box to un-check it. Disabling the network can be used to deny access to the server from the network for security purposes.

Enabling/Disabling DHCP [X]

Enabling DHCP will configure the network interface automatically.

If the DHCP box is not selected, the user may then manually enter assignments in the following windows:

- IP Address (Example: 192.168.1.20)
- Net Mask (Example: 255.255.255.0)
- Default Router (Example: 192.168.1.1)

The Host Name and NTP domain name may be a fully qualified domain name, such as edit1.mydomain.com. All other manually configured addresses must be properly formatted IP addresses.

FTP User / Password

In this space, you may set the User Name and Password to be used to access the system remotely via an FTP client.

Saving Network Configuration

Click on **OK**, **APPLY**, or **CANCEL** to accept or abandon new entries.

The IP address of the system is displayed in the center of the GUI at the end of the main window title.

IMPORTANT

The server is designed to be used in a private dedicated video network. An external firewall (preferably with Virtual Private Network (VPN) support) must be used in systems that require internal security or are connection to public networks.

Consult with a network security specialist for guidance on the best hardware, programming and practices for your facility's requirements.

Setting the Date and Time

Click **EDIT >CONFIGURE >DATE/TIME**. The dialog below appears.

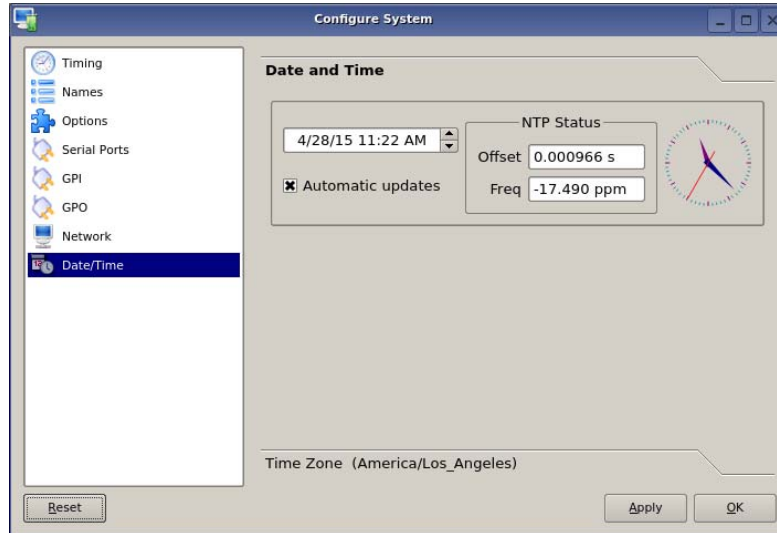


Figure 16 - Time/Date Configuration Screen

Set the **TIME** and **DATE** by clicking on the Time/Date field and navigating the clock and calendar.

Check **Automatic Updates** to enable automatic updates using the Network Time Protocol (NTP). Refer to Network Time Protocol on page 88.

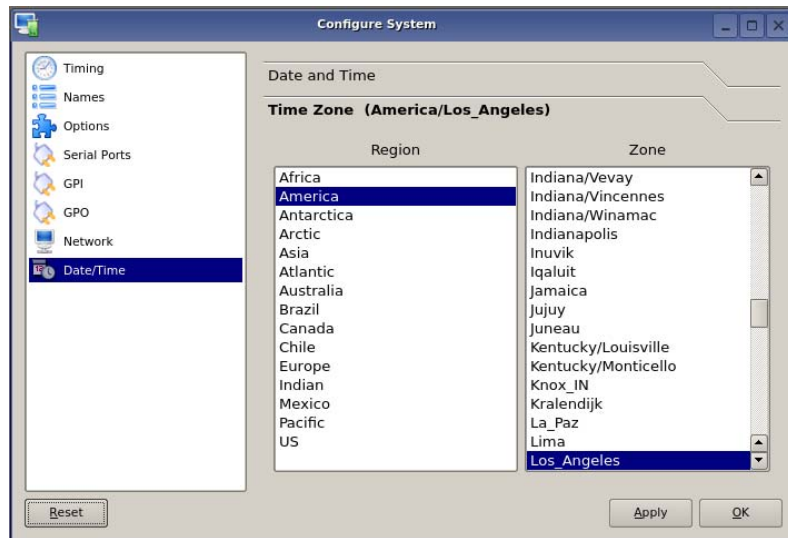


Figure 17 - Time/Date Configuration Screen

Select the **REGION** and **ZONE** according to your geographic location or time zone. Use the scroll-bar as necessary, and then click on the desired value.

Note: A System Restart is required for a Time Zone change to take effect

Clip List

The TSS server's Clip List is used to find, select, delete, name, and rename clips.

Clips can be dragged and dropped anywhere on a Transport for immediate playback.

Single or multiple clips can be dragged into a Playlist. See page **Error! Bookmark not defined.**

- Click **SHOW >CLIP LIST** from the main pulldown menu to display the Clip List.

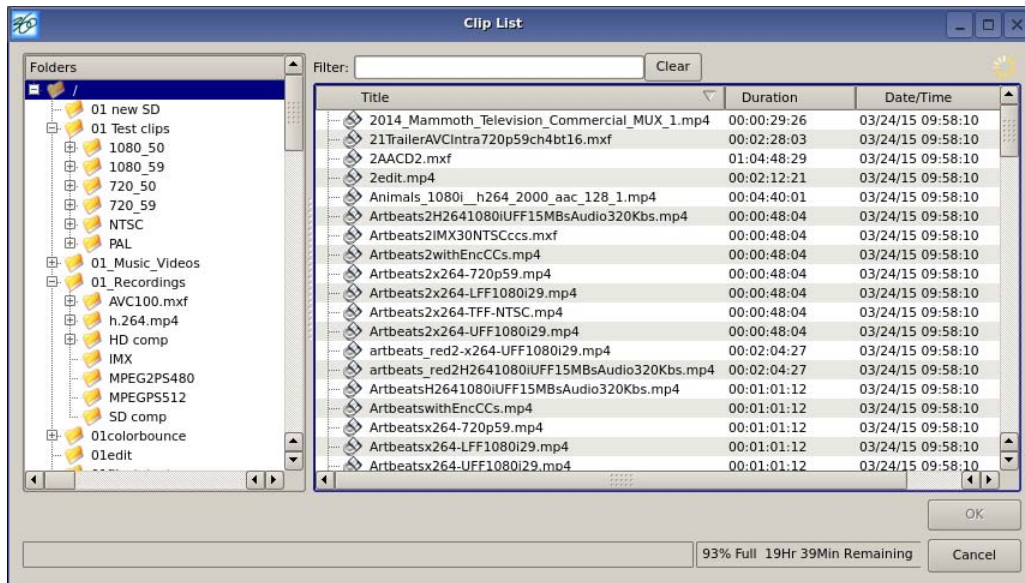


Figure 18 – Clip List

Renaming and Deleting Clips

Clips can be renamed by right clicking on them with the mouse, then selecting Rename from the pop-up menu.

Clips can be deleted by right clicking on them with the mouse, then selecting Delete from the pop-up menu.

Sorting Clips

Clips can be sorted in forward or reverse order by any of the columns by clicking once or twice on the column heading. The previous sort is maintained, so if the sort is by Name, then by Date, the clips of each Date will be sorted by Name.

Filtering the Clip Display

You can limit the number of clips displayed by typing a string in the **SEARCH FILTER** field. For example, typing "AT" in the filter field limits the display to all clips that contain "AT"

somewhere in the clip name. It is not case sensitive, AT will show At, aT and at as well. Pressing the **Clear** button restores the complete display.

Finding Clips

Clips can be easily found using the Clip Locator. To locate a clip:

1. Click **SHOW>FIND CLIPS**. The Clip Locator screen of **Error! Reference source not found.** appears.
2. Check **Case Sensitive** to make the search case-sensitive.
3. Check **Stop After First Match** to find only the first match.
4. Check **Use Regular Expressions** to search for the string of interest **ANYWHERE** in the clip name. With **Regular Expressions unchecked**, the search will match only clips that **BEGIN** with the string entered at **FIND**. See the next page for more on Regular Expressions.
5. Optionally, Enter a string in the **SEARCH FILTER** field to limit the number of clips displayed. For example, entering "AT" in the SEARCH FILTER field will limit the display to only clips containing "AT" in their clip name. Pressing the **Clear** button restores the complete display.
6. Enter a name or part of a name in the **FIND** field. Press **Enter** to initiate the search. The clip(s) will be displayed according to the rules set by the checkbox settings.

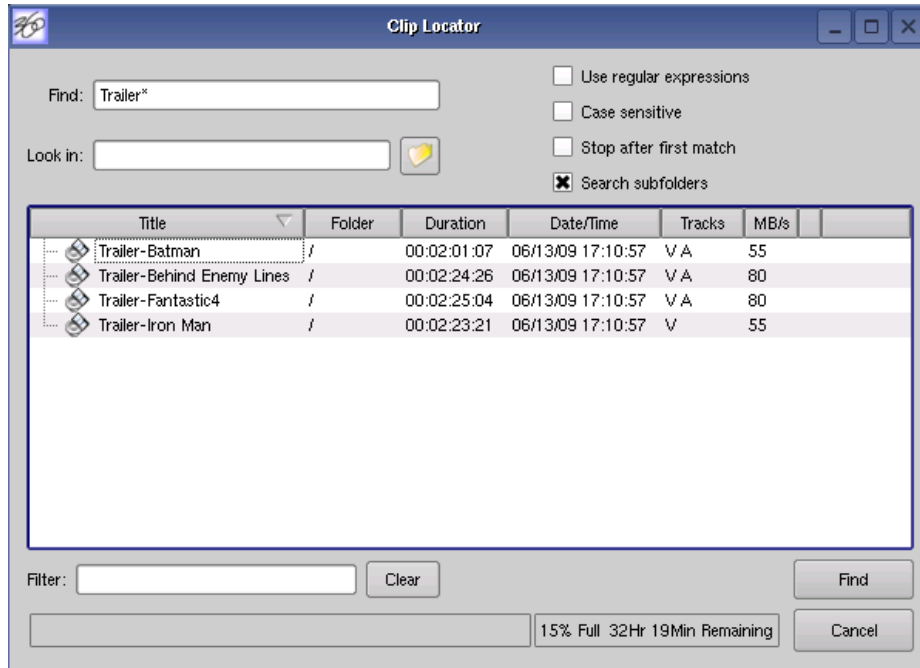


Figure 19 - Clip Locator

Finding Clips Using Wildcards

The following wildcard conventions may be used in a search when Use Regular Expressions is *unchecked*.

- * Match anything. For example, to find all clips starting with "xyz", use the pattern "**xyz***". To find all clips containing "2008" use "***2008***".
- ? Match any single character.

Finding Clips Using Regular Expressions

A regular expression ("RE") specifies a pattern to be matched in a clip name. Regular expressions can contain both special and ordinary characters. Ordinary characters just match themselves. Thus, the RE "night" would match the "night" in the clip name "Tonight Show", so this and any other clip name with "night" in it would be placed in the list of found clips.

The following special characters are supported:

- (dot) This matches any single character. "**a.c**" matches "abc", "aac", "a2c" and "a c" but not "acd".
- ^ (caret) This matches the start of a clip name. To find all clips starting with "xyz", for example, use the Regular Expression "**^xyz**".
- \$ Match the end of the clip name. To find all clips ending in "xyz" use the RE "**xyz\$**".
- < Match the beginning of a word. For example "**<Show**" will match all clip names containing a word that starts with "Show", such as "Now Showing", but not "LateShow".
- > Match the end of a word.
- * Match zero or more repetitions of the preceding character. "**.***" will match anything – "**G.*N.***" will match "Georgia Evening News" or "Good Night".
- + Match 1 or more repetitions of the preceding RE term. "**0+**" matches 00 or 0000, not 0.
- ? The preceding Regular Expression term is optional. "**ab?c**" will match "ac" or "abc" but not "adc".
- [] Used to indicate a set of characters. Characters can be listed individually, or a range of characters can be indicated by giving two characters and separating them by a "-". Special characters are not active inside sets. For example, [**a+\$**] will match any of the characters "a", "+", or "\$". [**a-z**] will match any lowercase letter. [**a-zA-Z0-9**] matches any letter or digit. If you want to include a "-" inside a set, precede it with a backslash ("\"-"), or place it as the first character. You can match all characters that are *not* within the set by making "^" as the first character of the set; "^" elsewhere will simply match the "^" character. For example, [**^7**] will match any character except "7".
- SPACE A space is treated as an ordinary character. " **Show** " (< space > **Show**) will match "Tonight Show" or "Now Showing" but not "NewShow". " " will match any clip with a space in the name.

The subject of Regular Expressions is much larger than can be completely covered here. They are used in several different operating systems and programming languages. Further information can be found on the internet and in books on Regular Expressions and Linux.

Using Playlists

The TSS Multi Format Video Server's Advanced Playlisting software provides extensive tools for building, editing and playing complex sequences of program content. Advanced Playlisting appears as on-screen windows, with an intuitive Graphic User Interface that makes it easy to operate without extra equipment. It's invaluable for building commercial breaks, news rundowns, still-store and clip lists. The server will create and store as many playlists as needed, each with its own unique name. For many users, Advanced Playlisting may be all that's needed to go to air.

The following features are included:

- Drag-and-drop playlist building and editing on a graphic interface
- Edit lists while they're running
- Start at any point in a list
- Displays run time for clips, plus segment length and total remaining time
- On-the-Fly commands for Pause, Skip, Hold, Next and Jump functions
- Append a playing list with a saved playlist
- Up to 12 programmable GPI Output events embedded in playlist clips
- Programmable time-of-day start for a playlist and for individual events
- Generates an As-Run Log
- Setting rules for deleting old playlist entries
- Simple text format allows playlists to be created, viewed and edited offline
- FTP access allows playlists to be transferred between servers, or to/from a PC

For information about the playlist and asrun file formats, external list editing and use with traffic systems, see Appendix D on page 138 and Appendix E on page 142.

The Playlist View

The playlist view for channel 1 is shown in **Error! Reference source not found.** Its functions are briefly described here. Table 1 provides an overview of Playlist control functions and their associated hot-keys.

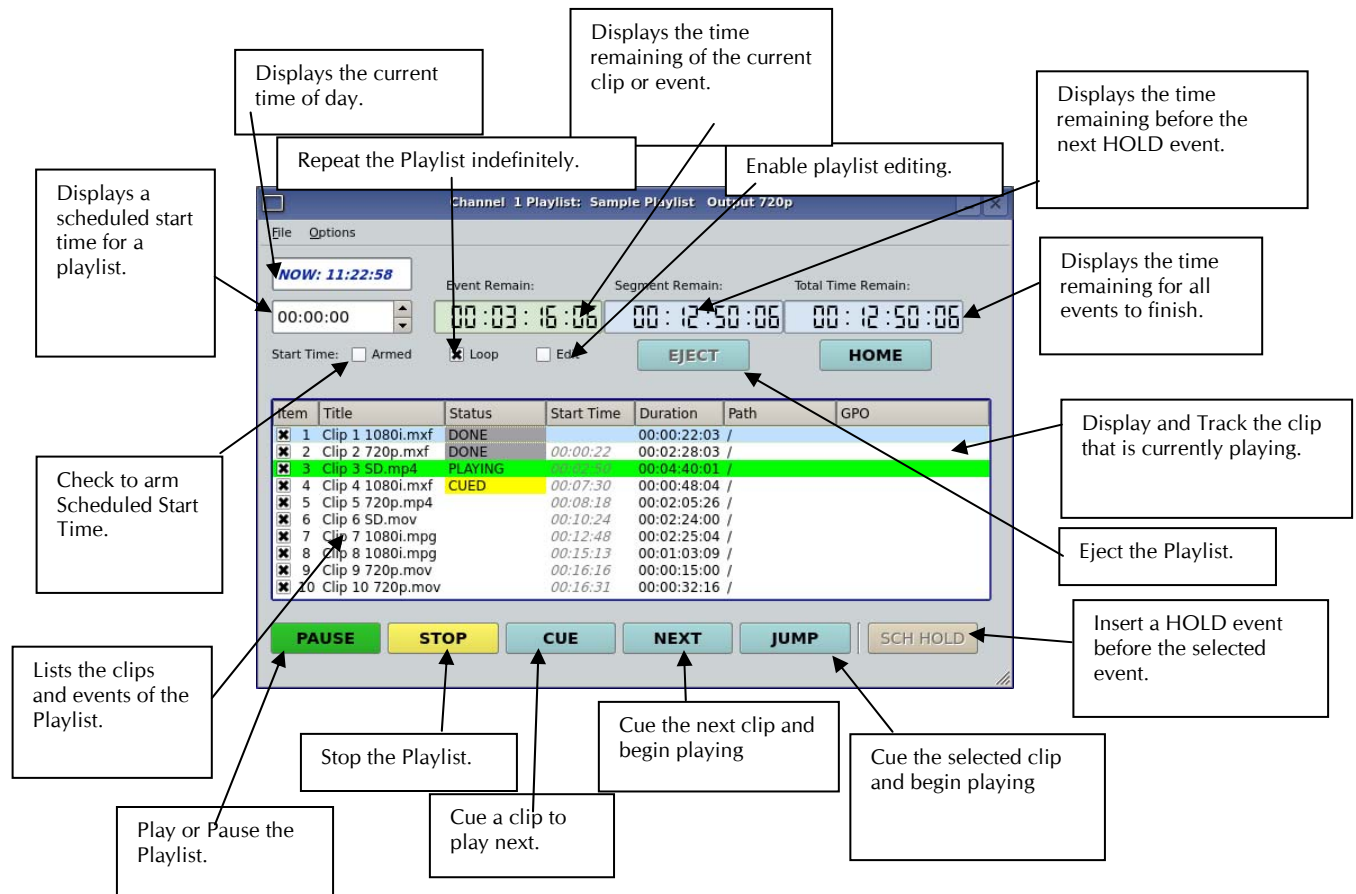


Figure 20 - Channel 1 Playlist View

| FUNCTION | DESCRIPTION / REFERENCE | INVOKE | HOT-KEY |
|-----------------------|---|--------------------------------|--------------------------|
| PLAY/ PAUSE | Play / Pause a clip (Page Error! Bookmark not defined.) | PLAY Button | P or SPACE |
| STOP/ SHOW | Stop / Show First Frame (Page Error! Bookmark not defined.) | STOP Button | S |
| CUE | Cue a clip (Page Error! Bookmark not defined.) | CUE Button | C |
| NEXT | Prepare next clip for playback (Page Error! Bookmark not defined.) | NEXT Button | N |
| INPUT ON AIR | Switch to Input (Selected input on multi input models) | | |
| JUMP | Jump to the selected clip (Page Error! Bookmark not defined.) | JUMP Button | J |
| LOOP | Check to loop a Playlist (Page Error! Bookmark not defined.) | LOOP Checkbox | L |
| EDIT | Check to enable editing (Page Error! Bookmark not defined.) | EDIT Checkbox | E |
| ARM START TIME | Enable Scheduled Start Time (Page Error! Bookmark not defined.) | ARM START TIME Checkbox | T |
| HOME | Scroll to currently playing Clip (Page Error! Bookmark not defined.) | HOME Button | H |

Table 1 - Playlist Control Functions

Creating and Running a Playlist

To Create a Playlist (Using Channel 1 in the example):

1. Change the transport for Channel 1 to the **Playlist View**. Click **FILE >PLAYLIST** in the Channel 1 transport pulldown menu. The window of **Error! Reference source not found.** appears.
2. Click the **EDIT** check box to put the channel into edit mode.
3. Click **SHOW >CLIP LIST** from the main menu to open the Clip List. Both windows are now visible.
4. Insert clips in the list using one of these methods:

Double click on a clip in the Clip List to add it to the Playlist. The clip will appear in the playlist. The first clip will indicate a status of **CUED**. Note that this mode of insertion can only work when one channel is in Edit mode.

Alternately, click on any clip and hold the mouse button as you move the cursor to the playlist. Let go of the button when the cursor is over the position that you want the clip to appear in the playlist (drag and drop).

You can drag and drop a single clip from one playlist to another by holding the Control key while you select and drag the clip. (Both lists must be in Edit mode.)

You can duplicate a playlist entry within the same playlist by dragging it while holding the Control key.

5. Repeat the procedures to add more clips.

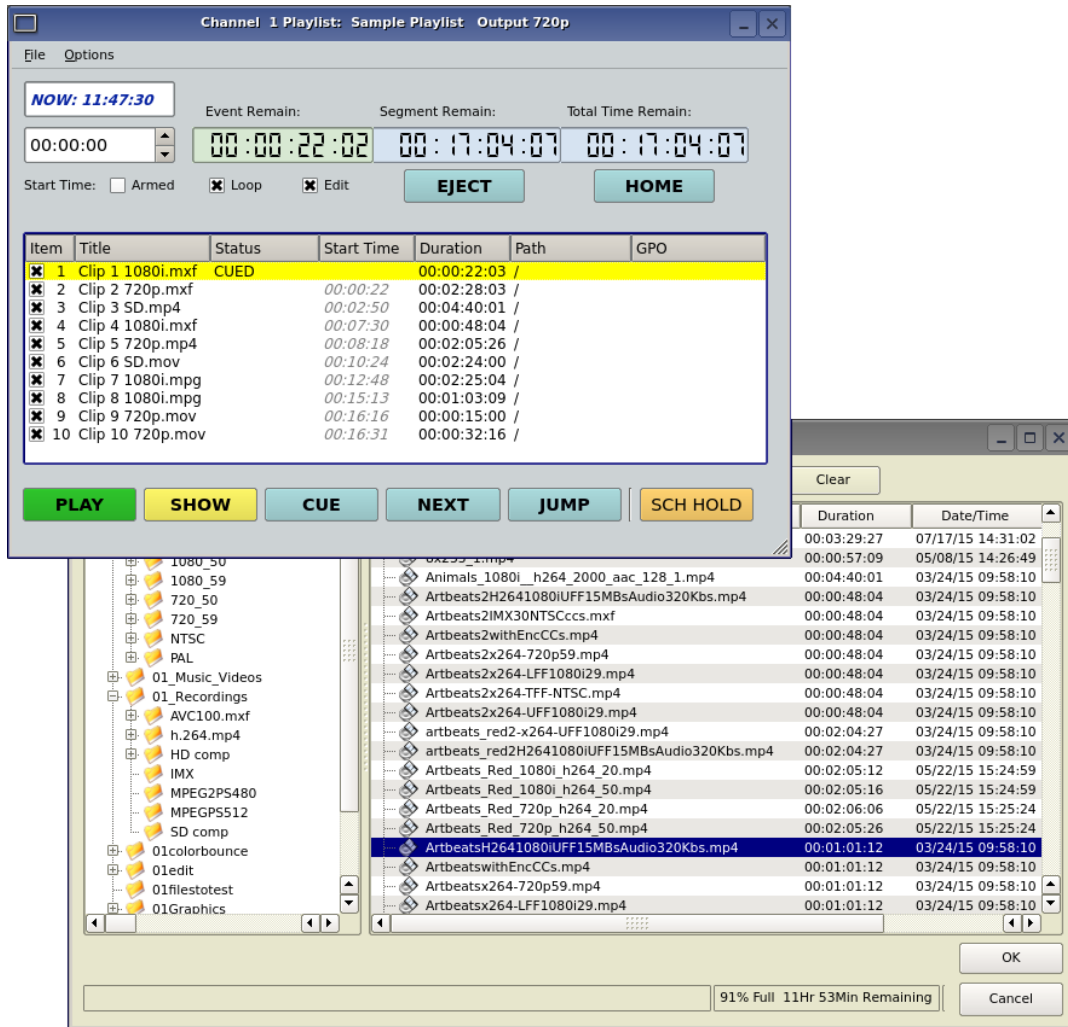


Figure 21 - Channel 1 Playlist with Clip List

6. Click **PLAY** to run the playlist. The clips will be played in the order they were entered in the playlist. The currently playing clip will indicate a status of **PLAYING**. The next clip on the list will indicate a status of **CUED**.
7. To **SAVE** the Playlist select **FILE >SAVE-AS**. Enter a file name. Click **SAVE**.
8. To **SAVE** an existing playlist without changing the name, use **FILE >SAVE**.

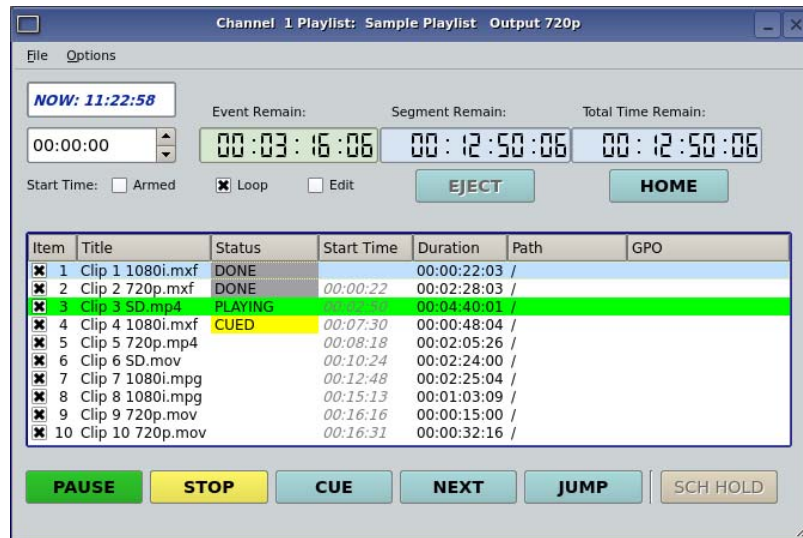


Figure 22 – Active Playlist

Loading a Playlist (FILE > OPEN)

Click **FILE >OPEN** from the Playlist View to bring up the list of available Playlists. Double-click on a playlist to load it.

Saving a New Playlist (FILE > SAVE AS)

Once a Playlist has been created, it can be saved by selecting **FILE >SAVE AS** from the Playlist View pulldown menu. Type in an appropriate name and click **SAVE**.

Saving an Existing Playlist (FILE > SAVE)

An existing Playlist can be saved by selecting **FILE >SAVE** from the Playlist View pulldown menu. Type in an appropriate name and click **SAVE**.

Stopping a Playlist (STOP)

Click **STOP** to halt a Playlist.

Pausing Playlist (PLAY/PAUSE)

When a Playlist is running, the **PLAY** key will change to indicate **PAUSE**. Pressing **PAUSE** stops the Playlist immediately, on the current frame of a clip. Pressing it again will resume playback.

Cueing a Clip (CUE)

When the Playlist is running, click **CUE** to immediately prepare a selected clip for playback. When the current clip is finished playing, the Playlist will play the Cued clip, followed by all subsequent clips. This allows the user to skip over clips that appear in the list between the currently playing clip and the selected clip.

The user may also re-cue a clip that has already been played. In this case, the Playlist will restart from the selected clip, and all subsequent events will be played (or re-played) in sequence. When the Playlist is stopped, CUE will prepare the selected clip to play when Play is pressed, or the list is started automatically by Arm Start Time.

Looping Playlist (LOOP [X])

To loop the entire playlist after the last clip completes, check the **LOOP** checkbox at any time. Upon un-checking, the list will play to completion and then stop.

Showing First Frame of CUED Clip (SHOW)

When a clip is cued, the **STOP** button legend changes to **SHOW**. Pressing it will display the first frame of the cued clip.

Preparing Next Clip for Playback (NEXT)

When a Playlist is stopped, click **NEXT** to prepare the next clip in the Playlist for playback. While the Playlist is running, NEXT will immediately begin playing the next cued clip in the Playlist. (The next clip may require several seconds to load and cue for a seamless transition.) If the next event in the Playlist is a **HOLD**, the **NEXT** command will move to the Hold event, and video will **Go to Black between Clips, Show First Frame of Next Clip** or **Hold on Last Frame of Clip**, depending on Hold Behavior selected.

Jumping to Selected Clip (JUMP)

Click **JUMP** to cue any selected clip for immediate playback; this permits jumping over intervening clips. JUMP also allows clips that have already been played to be immediately re-cued and played. In this case, the Playlist will restart from the selected clip, and subsequent events will be re-played in sequence.

Setting Playlist Start Time

Set a start time for a Playlist by entering a twenty four hour time of day in Hours, Minutes and Seconds in the **START TIME** field (see **Error! Reference source not found.**

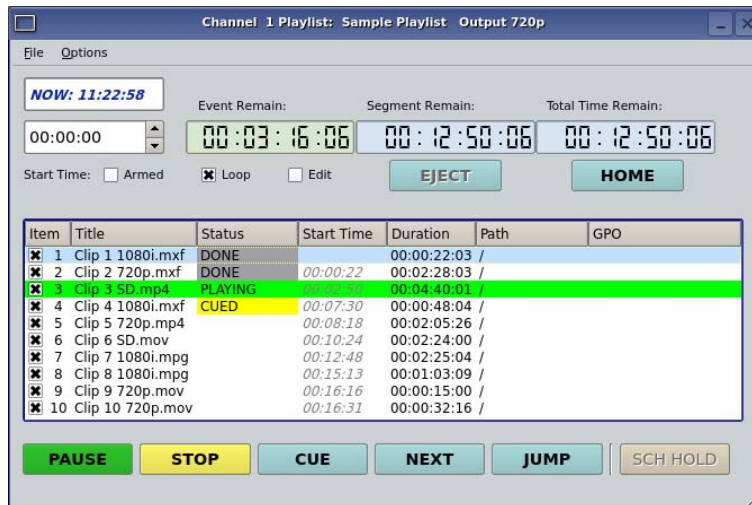


Figure 20 on page 65). Click on any field to edit the field. Check the **ARM START TIME** checkbox to arm the start time. The **ARM START TIME** checkbox will automatically uncheck itself once the playlist has started.

Triggering the **Start Time** is essentially the same as pressing the **Play** button, so it is possible to arm the start time while a list is playing, have the playback stop from a **Hold** or GPI Stop, and then restart when the **Start Time** triggers playback.

Automatic Scrolling to Currently Playing Clip (HOME)

Click **HOME** to make the currently playing clip visible in the Playlist View window. If no clip is playing, then the currently-cued clip is displayed. This is helpful if you have manually scrolled elsewhere in a large Playlist. Once this is done, the display will also maintain the currently-playing clip within the window, if EDIT is off

Set HOLD Behavior

This determines what happens during a HOLD:

Click **OPTIONS>CONFIGURE** from the Playlist View of the channel pulldown. Use the drop down menu to select between **Go to Black between Clips**, **Show First Frame of Next Clip** or **Hold on Last Frame of Clip**.

A hold can exist not only when there is a HOLD event in the list, but also because the next clip to play has a scheduled start time.

Note when using Hold on Last Frame or Show First Frame of Next Clip, you can still go to black at any particular point in the playlist by inserting a still or single frame clip of black.

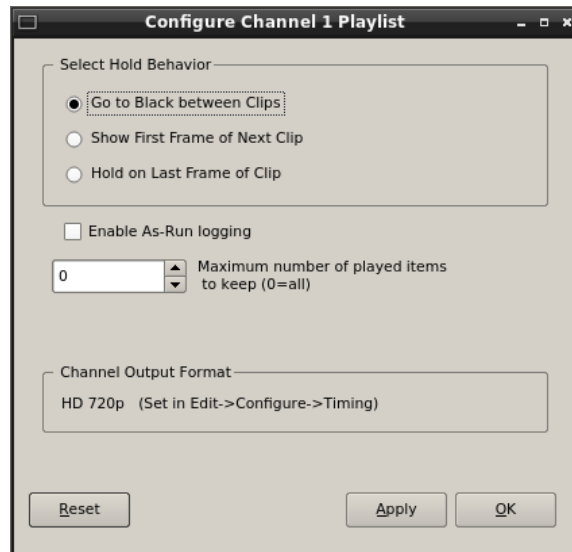


Figure 23 - Configure Channel 1 Playlist Window

Set Maximum Number of Items to Keep

To set the number of played items to be retained in a playlist:

Click **OPTIONS>CONFIGURE** from the Playlist View of the channel pulldown. Use the thumbwheel UP and DOWN scroll button to increase or decrease the number of clips to retain. The default value of zero will retain ALL Items. Note that this only applies to the playlist itself, the actual clips referenced are not deleted.

Enabling As-Run Logging

To enable As-Run logs, while in the Playlist View select **OPTIONS >CONFIGURE** from the menus within the Playlist window. Check the **Enable As-Run Logging** checkbox to enable As-Run logging. Uncheck the box to disable As-Run logging. When enabled, a check mark will appear next to the As-Run log label, and files played by a playlist will be written to an As-Run log. As-Run logs are available only through FTP downloads; they cannot be viewed or printed from the server. After logging into a server, select the ASRUN folder. All logs are stored in this location, and have the extension “.arl”. Refer to Appendix E – As-Run Logging for more details about As-Run logging functionality.

Viewing, Editing and Archiving Playlists

Playlists can be accessed via the server’s FTP feature, allowing several capabilities:

- Lists can be backed up on a PC, and sent to another server.
- Lists can be viewed and printed from the PC
- Lists can be edited or created on the PC and uploaded to the server.

Playlists are found in the server's FTP directory in the lists folder. They are simple text files with the extension .lst. Refer to Appendix D, Playlist Management for more information.

Editing Playlists

Removing a Clip from a Playlist

To Remove a clip or other event from a Playlist:

- Make sure the clip to be removed is not **PLAYING** or **CUED**.
- Position the cursor over the Clip and right-click. Select **REMOVE** from the pop-up menu.

Removing Clips Above or Below the Selected Clip

All clips above or below the selected clip can be removed unless a **CUED** or **PLAYING** clip is affected. These options will “grey out” if removal is not allowed for this reason.

To Remove All clips above a selected clip:

- Move the cursor over the clip to select it.
- Right click the mouse and select **Remove All Above** from the pulldown menu.

To Remove All clips below a selected clip:

- Move the cursor over the clip to select it.
- Right click the mouse and select **Remove All Below** from the pulldown menu.

Inserting a HOLD Into a Playlist

The **HOLD** command inserts a hold (wait) event in a Playlist immediately *before* the selected clip. The **PLAY** or **JUMP** command will restart a Playlist after it has stopped on a HOLD line. The **HOLD** command is also available in the Playlist Item Context Menu, accessed by right-clicking in the Playlist item window. If a programmed **Start Time** has been set and is armed, the Playlist will resume when the Programmed Start Time occurs. See Page **Error! Bookmark not defined.** for instructions on setting a programmed start time.

Appending a Playlist (FILE > APPEND)

Make sure the **EDIT** checkbox is checked in the Playlist View window. Click **FILE >APPEND** from the Playlist View to bring up the list of available Playlists. Double-click on a playlist to load it. It will appear at the end of the list after a label event that shows the name of the appended list. This operation can be performed during playback, allowing a new playlist to be loaded without interruption of programming.

Changing Event Start Time of Clips in Playlist

Make sure the **EDIT** checkbox is checked in the Playlist View window. Position the cursor over a clip and right-click. Select **EDIT EVENT** from the pulldown menu. Enter a start time in the Start Time box using 24 hour format for HH, MM SS. Click the Scheduled Start Time button to arm the start time for the event. Set the Duration of the recording. A duration of zero will create a maximal length recording, up to 20 hours or until the storage space is filled.

Changing Duration of Clips in Playlist

Make sure the **EDIT** checkbox is checked in the Playlist View window. Position the cursor over a clip and right-click. Select **EDIT DURATION** from the pulldown menu. Enter a duration in the Duration window. The minimum duration is 4 seconds. The entry may be in one of these formats:

- Hours, Minutes, Seconds and Frames entered as HHMMSSFF
04300102 = 4 Hours, 30 minutes, 1 second, 2 frames
- Hours, Minutes, Seconds and Frames entered as HH:MM:SS:FF
03:39:41:17 = 3 Hours, 39 minutes, 41 seconds, 17 frames
- As a whole number along with the special characters H for hours, S for seconds, M for minutes.
7H would set 7 hour duration. 31m would set 31 minutes. 15s would set 15 seconds.

NOTE: The Clip duration is affected only within the Playlist, for this event. The duration of the source clip is not changed. Other events containing the same clip are not changed.

Mapping GPO to Playlist Events

The optional CXP-5 Auxiliary Interface Module has twelve General Purpose Interface Outputs, referred to as GPO 1 through 12. Any of these can be programmed to go active at a pre-determined time, or *offset*, after the beginning of a Playlist clip. An active *duration* can also be set, after which the output again goes inactive. **In all cases, every output will go inactive when a clip ends.** By default, a new clip contains no programmed GPO output commands. Refer to Appendix A – Connector Specifications for details on electrically interfacing to the GPIO connector.

To Map a Playlist event to a GPO output, Follow these steps.

- A. Select **EDIT>CONFIGURE >GPO**. The screen of **Error! Reference source not found.** is displayed. GPO 1 through 12 correspond to the 12 GPIO outputs. The checkboxes to the right of each selection represent channel 1, 2, 3 (and 4 in four channel models). GPO 9 is shown with the trigger option pulldown expanded.
 - a. Set the GPO of interest to **PLAYLIST** mode from the pulldown menu.
 - b. Set the Channel to (video channel) 1, 2, 3 and/or 4 by checking the appropriate box to the right. Click **APPLY** to activate the settings.

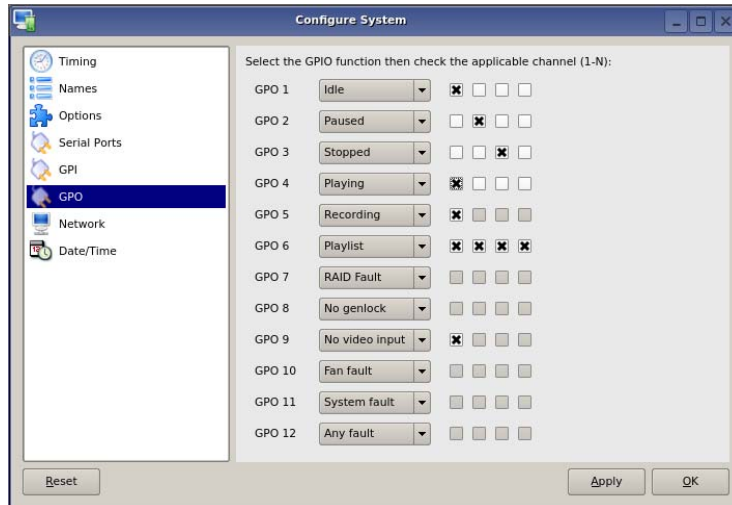


Figure 24 - GPO Configuration Screen

- B. Check the **EDIT** checkbox in the Playlist View of the transport.
- C. Place the cursor over a Clip in a Playlist. Right click on the clip. Select **EDIT GPO**. The Event Editor (**Error! Reference source not found.**) appears:
- D. Enable the GPO of interest by checking the corresponding **ENABLED** checkbox.
- E. Enter an offset into the Clip to activate the GPO line in the **Offset Field**. The form of the field is Hours, Minutes, Seconds and frames. (HH:MM:SS:FF)
- F. Enter the Duration for the GPO to remain active in the **Duration Field** using the same format. Click **APPLY** to activate the changes.

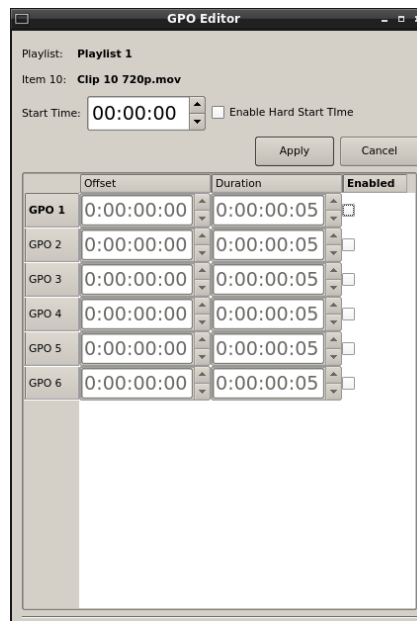


Figure 25 – GPO Editor

Mapping GPIO Inputs to Control a Playlist

Playlists can be controlled with the twelve GPI Inputs. See Programming GPI Inputs on page **Error! Bookmark not defined.**

Using Playback Scheduling (Event Scheduled Start Times)

The Playlist has the ability to set start times for individual clips and recordings. When an event has as Scheduled Start Time, playback will stop at that event (as though it was a hold). The event will cue and its programmed start time will be transferred up to the Playlist Start Time, and when the programmed time is reached the clip will play back.

The Playlist Start time can be overridden by:

- manually starting the playback, or
- editing the Event Start Time; the event will recue and Arm the list with the new start time, or
- clicking on the Arm Start Time checkbox to disarm it.
The List Start Time can be edited while disarmed, and then re-armed to effect a temporary change (this operation does not alter the Event Start Time programmed in the list).

Setting an Event Start Time

- A. Right-click on a clip or scheduled recording in a playlist that you want to set a Start Time for and select **Set Start Time**. The GPO Editor Window shown in Figure 25 will open.
- B. Enter the time of day in the **Start Time** box that you want the clip to begin payout, in the format HH:MM:SS.
- C. Check the **Enable Scheduled Start Time** box.
- D. Click **Apply**.

Note: The start time of a clip must occur **after** the end of the previous clip, otherwise the list will hold and the clip will begin payout *the next day* at the selected time.

Advanced Topics

System Timing

The TSS Multi Format Video Server is equipped for use with an external genlock signal as a timing reference. This causes all outputs to be synchronous with other video signals in a facility.

Adjustment of Genlock Timing will fine tune this synchronization to compensate for differences in equipment and wiring. This global setting for all outputs allows timing to be varied by one line of video. *The Vertical (lines) setting rarely needs to be adjusted.* If required, it would be adjusted so that the output of the first line of video happens concurrently with other contributing inputs. The visible effect is that the picture will rise or fall by one line when viewed at the output of a timed video switcher, or on a genlocked monitor. Note that this setting might cause SD VBI data such as closed captions (and less likely, HD VANC data²) to appear on different and possibly inappropriate lines.

² VANC data carries its line number within the digital data, as such it is less susceptible to issues that arise from changes in line timing. VBI relies on its actual position in the raster to be associated with a particular line.

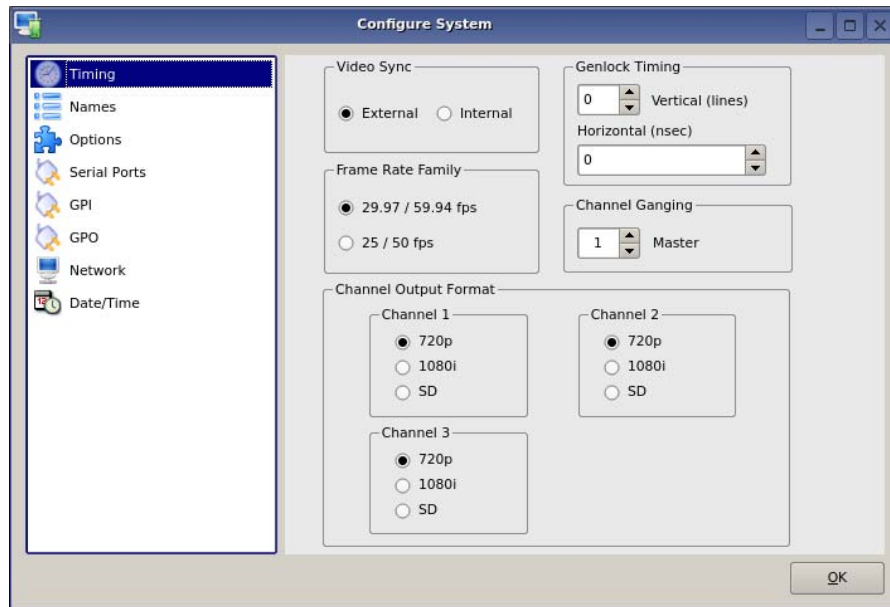


Figure 26 - Video Timing Adjustment

The Horizontal (nsec) adjustment is used to set the precise timing of the start of the frame relative to the reference signal, in order to match with other contributing signals. The effect is not normally visible; extreme settings may result in a slight visible shift of the picture from left to right.

Using Embedded Audio

The TSS Multi Format Video Server provides up to 16-channels of embedded audio. (Note that not all file formats support 16 channel audio.)

Features include:

- Video synchronous 24-bit audio at a 48K sample rate. (Other sampling rates are not supported.)
- The server records and plays Group 1, 2, 3 and 4 audio, (channels 1-16).
- In E-E or Input Monitor mode, all embedded audio channels will pass through the server unaltered, regardless of whether they are being recorded in the selected file format.
- User bits in the HD-SDI embedded audio stream are not supported.
- Dolby®-E is supported with 360 Systems' Bit-for-Bit® technology. Note that this requires using a recording format such as AVC-100 that uses PCM audio recording.

Ganging Channels for Synchronized Playback

Two or more video channels can be ganged together for frame-accurate playback. This may be used for key and fill material (either stills or clips), or multi-channel playout of presentations, such as synchronized matte backdrops on News Broadcasts, or multi-screen projection.

The channels can be ganged in the following combinations (Model dependent):

- Channel 1 can control Channel 2 and/or Channel 3 (and/or Channel 4).
- Channel 2 can control Channel 3 (and/or 4).
- (Channel 3 can control Channel 4).

Only one channel can be set as the master channel. You can use channel 1 as the Master channel and gang channels 3 and 4 to it to allow independent use of the recording features of channel 2 (If equipped).

To configure Channel Ganging Click **EDIT >CONFIGURE >TIMING** from the Main Menu. The video timing adjustment screen of Figure 26 displayed. Two examples of this are:

- To gang Channel 1 to channel 3, set **CHANNEL GANGING MASTER** to 1 and click the **GANG** checkbox on channel 3.
- To gang Channel 3 to channel 4, set **CHANNEL GANGING MASTER** to 3 and click the **GANG** checkbox on channel 4.

FTP File Transfers

The TSS Server connects over Gigabit Ethernet using its own internal RFC-1359 compliant FTP server. File transfers to and from the server are managed from an FTP client file transfer program running on an external system on the network (such as a Windows® or Macintosh® computer). This provides a rapid way to execute file transfers, allows managing many servers at once, and does not tie up the server GUI which may already be in use. **Error! Reference source not found.**

| FTP Client | Platform |
|-------------------|-------------------------|
| Flash FXP | WINDOWS |
| DOS FTP | WINDOWS |
| WS FTP | WINDOWS XP |
| Internet Explorer | WINDOWS XP |
| Filezilla | WINDOWS MACINTOSH LINUX |
| Fetch | MACINTOSH |
| CyberDuck | MACINTOSH |

Table 2 - Supported FTP Clients

FTP programs may also be used to move recorded or edited material between a server and Network Attached Storage (NAS).

From a networking or system-integration viewpoint, the server appears as a normal FTP server in any size network, with the exception that it may only receive video, graphic and scheduling related files that are compatible with the server.

The server is designed to be used in a private dedicated video network. A firewall with VPN capability must be used in systems that require internal security or connection to public networks.

Consult with a network security specialist for guidance on the best hardware, programming and practices for your facility's requirements.

Gigabit Ethernet Cable Quality

The high data rates generated by Gigabit Ethernet require high-quality cable designed for this application. Low-quality network cables can result in high error rates and lower transmission speed. For Gigabit operation, standard CAT-5 cable should be used only for very short cable runs.

New Category 5e (enhanced) cables ensure maximum transfer rates, and should be used as the minimum standard. Category 6 cable is a good choice for applications where longer cable runs are required.

Configuring the FTP Interface

Before logging in to the server's FTP server, the network must be configured according to the local network topology. This is primarily a matter of setting a static IP address or configuring the server to use DHCP to obtain an IP address from a DHCP server. Refer to page **Error! Bookmark not defined.** for details on configuring the network settings.

When connecting directly to a PC or Laptop, configure the server as IP address 192.168.1.3, netmask 255.255.255.0 and disable DHCP. In the PC, double click on the Local Area Connection Icon in the system tray or in the Network and Dial-Up Connections in the Control Panel. In the Local Area Connection Status dialog, click on Properties. Click on the item "Internet Protocol (TCP/IP)" and click on Properties again. In Local Area Connection Properties, turn off "Obtain an IP Address Automatically" by selecting "Use the Following IP Address" and set the address to 192.168.1.2, netmask to 255.255.255.0.

No hardware settings are available or needed. The NET-1 port automatically negotiates port speed and configures transmit and receive connections, and does not need a "crossover" cable when connecting directly to a PC.

The actual transfer rate depends on the format of the files being transferred, and the number of video streams being played or recorded.

Setting the server FTP User and FTP Password

- Click on Edit > Configure > Network from the Main GUI Window
- Enter the desired FTP User name in the FTP User field
- Enter the desired FTP Password in the FTP Password field
- Click Apply

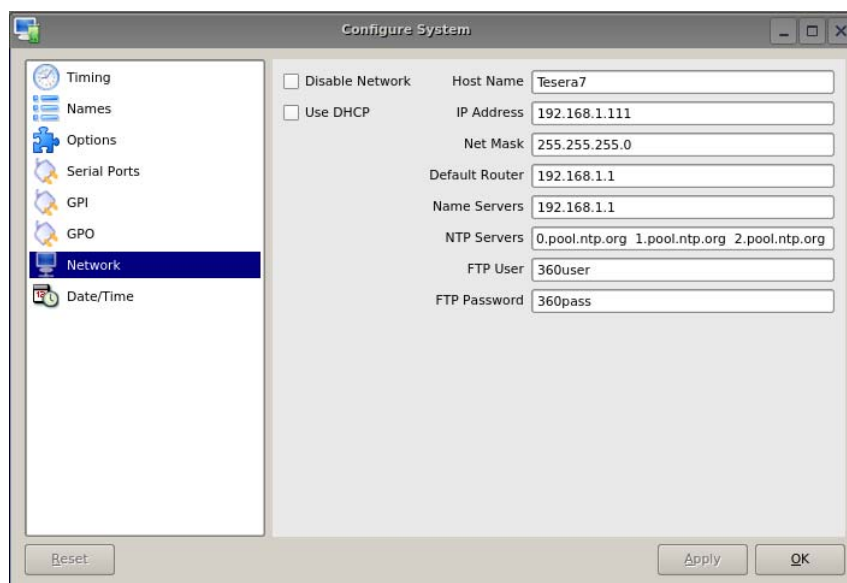


Figure 27 – FTP User and Password Configuration

Logging in to the server FTP Service

Using one of the FTP clients shown in **Error! Reference source not found.:**

- Enter the username and password

When the FTP client is connected, it will display the Clips in the main directory and all of the sub-folders. Clips can be uploaded, downloaded, deleted and renamed using standard FTP client commands. Clips in the subfolders can be displayed by entering those folders. Consult the documentation for your FTP client for information on changing folders.

FTP Transfer Rates

Transfer rate (transfer time relative to clip length) depends greatly on the current operational demands on the server. This includes the number of channels that are being used, whether there is recording taking place, the bitrate of the video, and the number of VANC data lines in use.

Secondarily, the network itself and the source of FTP data can be limiting factors in some cases. The following rates assume a dedicated network with limited additional traffic, a high bandwidth FTP source, and a video bit rate of 75 Mb/s with 1 VANC line.

| Transfer Time for 1 minute of video | | |
|-------------------------------------|--------------------------------------|--------------------------------------|
| Workload | Upload to TSS | Download from TSS |
| IDLE | 14 seconds (45.0 MB/s or 360 Mb/s) | 28 seconds (22.5 MB/s or 180 Mb/s) |
| 1 Channel Playing | 14 seconds (45.0 MB/s or 360 Mb/s) | 28 seconds (22.5 MB/s or 180 Mb/s) |
| 3 Channels Playing | 15 seconds (39.4 MB/s or 315.2 Mb/s) | 45 seconds (14.0 MB/s or 112 Mb/s) |
| 1 Record, 2 Play | 17 seconds (37.0 MB/s or 296 Mb/s) | 44 seconds (14.3 MB/s or 114.4 Mb/s) |

Multiple Simultaneous FTP Operations

FTP client programs that allow multiple simultaneous data transfers should be set to allow only one data connection at a time.

While it is possible to log in from multiple clients, it is only acceptable to perform multiple file transfers when the system is idle or playing or recording on a single channel.

Overwriting Files

It is the responsibility of the client application (Windows Explorer, FlashFXP, etc) to ask the user if they want to overwrite a file.

Interrupted and Resumed Transfers

If a transfer is interrupted (for example, by a dropped connection) the transfer must be restarted. Resumption of a partial transfer is not possible.

Transfer of Edited Segments

Edited segments made on the TSS Server are not available for transfer via FTP.

Supported File Types

The system recognizes media file types by their file extension. It is important that the file extension properly identifies the file content. Attempts to send a file in one format but masquerading as another due to a wrong file extension may result in undefined behavior.

It is also true that file extensions such as .mxf and .mov can contain many different formats of video and audio. The TSS Server will only accept files that contain compatible formats as defined below.

Always test file import before depending on it for broadcast. Some formats allow wide variation in the structure of files, and the parameters used in the video compression. The system will not accept all possible variations, and it is even possible that a file that is accepted may not operate perfectly in all respects. Always test files from new sources before going on air.

The TSS Server supports many different codec, container format, resolution and frame/field rate combinations. While it is not possible to list all possible combinations, the formats below supported and are known to work.

- 1920 X 1080i @ 29.97 or 25 fps
- 1920 X 1080p @ 59.94 or 50 fps
- 1280 X 720p @ 59.94 or 50 fps

- 720 X 512 NTSC @ 29.97 fps
- 720 X 486 NTSC @ 29.97 fps
- 720 X 480 NTSC @ 29.97 fps
- 640 X 480 NTSC @ 29.97 fps
- 720 X 576 PAL @ 25 fps
- 720 X 608 PAL @ 25 fps

The following codecs and file formats are supported:

H.264/MPEG-4 AVC in .mp4

H.264 or MPEG-4 Part 10, Advanced Video Coding (MPEG-4 AVC) in the .mp4 container is supported.

H.264/MPEG-4 AVC in .mov

H.264 or MPEG-4 Part 10, Advanced Video Coding (MPEG-4 AVC) in the .mov container is supported.

AVC Intra 100 in .mxf

AVC Intra-100 using the H.264/MPEG-4 AVC standard in the .mxf container is supported.

MPEG2 PS in .mpg

MPEG-2 (H.222/H.262) Program Stream with a .mpg file extension is supported.

IMX (SMPTE D10) in .mxf

MPEG IMX using H.262/MPEG-2 Part 2 encoding in a .mxf container is supported.

Playlists (.lst, .txt)

A server playlist is a text-based file residing in the 'lists' directory. Playlists can be created off-line and transferred to the server using FTP. See page 138 for further information on playlist file editing and management.

As-Run Logs (.arl)

As-Run logs are available as a document of content actually played. They may be extracted through FTP transfer. See page **Error! Bookmark not defined.** for further information on using As-Run logs.

Network Time Protocol

Automatic Date/Time Updates

When using server play-lists in broadcast applications, an accurate record is often needed of what was played and when. The server's As-Run logging feature creates such a record, time stamping each played clip using the machine's internal date/time clock. Very accurate time stamping can be achieved by synchronizing the server's clock to an external time base that is referenced to Coordinated Universal Time (UTC).

This is accomplished using the Network Time Protocol (NTP) to interrogate time servers through a network connection. A time server could be an in-house computer or dedicated time server that is equipped with a GPS receiver, or a radio receiver locked to signals from the NIST radio station WWV. Alternatively, public time servers may be used which are accessible through an Internet connection.

Connecting to the Internet

To obtain automatic date/time updates from the public time servers on the Internet, you will need to provide the server with Internet access. Generally, servers would be connected on a secure high-speed local area network, with any Internet connection going through a router with an integrated firewall. The Network Time Protocol uses TCP/IP port number 123, so be sure the firewall is configured to allow access to this port per Figure 28.

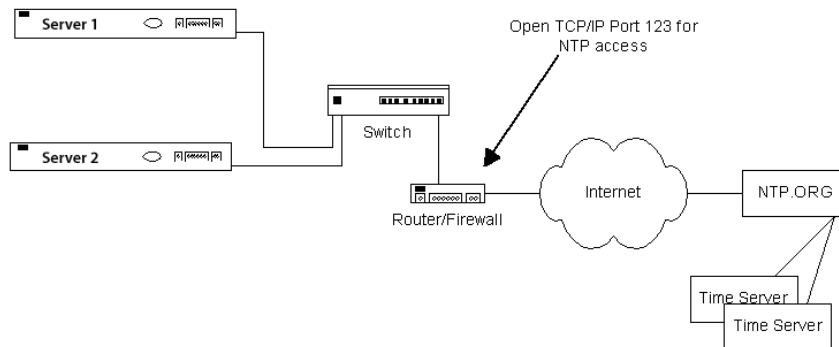


Figure 28 - NTP Network Block Diagram

Configuring NTP

The server GUI is used to set the time zone and to enter the networking parameters. The local GUI must be used, as these configuration screens are not available on the Remote Workstation Interface.

Selecting the Time Zone

Starting at the main menu bar, Click **Edit >Configure >Date-Time** screen. When “Automatic Updates” is not checked, the Region and Zone lists are enabled. Select your region and then the zone within that region. There may be more than one way to your zone; America/New York, for example, is the same as US/Eastern. Click the **APPLY** button to activate the settings,

After changing the time zone a Quick Restart must be performed before changes become effective.

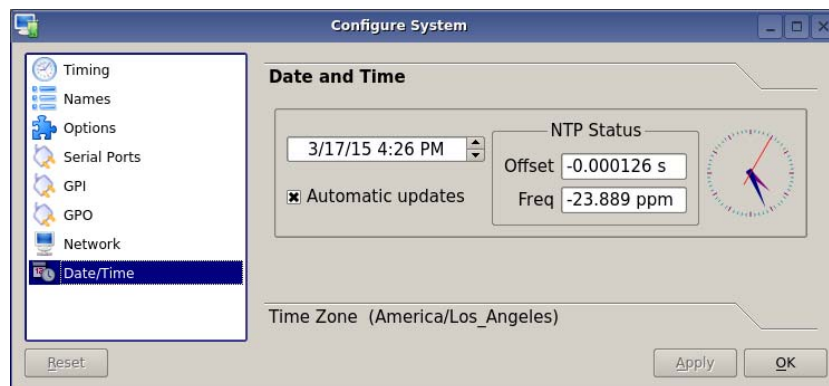


Figure 29 - Date/Time Configuration Screen

When **Automatic updates** is checked, all functions on this page are locked out as they are automatically adjusted by the NTP service. The NTP Status will be updated when the NTP service checks the time, displaying the current Offset and Frequency adjustments to the clock.

Entering Network Parameters

From the GUI's main menu bar, click **EDIT>CONFIGURE>NETWORK**. The following screen appears. Make sure the basic network parameters have been entered.

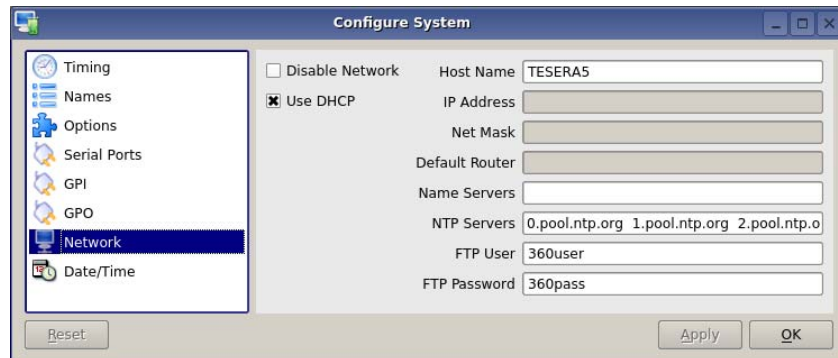


Figure 30 - Network Configuration Screen

Disable Network: uncheck

Host Name: (Any name will suffice, but since this name appears on each line of the server's diagnostic logs, it is a good idea to keep this short.) The name should also be unique from other devices on the network.

If "**Use DHCP**" if not checked, then enter a fixed IP address compatible with your local subnet. For example,

IP Address: 192.168.1.20
Net Mask: 255.255.255.0
Default Router: 192.168.1.1

The **Name Servers** and **NTP Servers** fields provide the information needed to reach the public time servers. The **NTP Servers** field contains a list of time servers, either by numeric IP address, or by site name (URL). Entries are separated by spaces.

The nonprofit Internet Systems Consortium, Inc. (ISC) maintains sites that automatically return lists of public time servers to an NTP client such as the server. Hence, the *NTP Servers* field is initially filled in with the URL's for these sites (0.pool.ntp.org, for example). Of course you can overwrite this list with the addresses of specific time servers you may want to use. However, if you try to clear the **NTP Servers** field it will be reset to the default list.

Note: When URLs (non-numeric site addresses such as pool.ntp.org) are used in the **NTP Servers** field, the IP address of at least one DNS (Domain Name server) must be provided in the **Name Servers** field. Typically, this address is supplied by your Internet Service Provider.

These name servers translate URL names into numeric IP addresses needed to access the sites in question.

When using a GPS-based time server which is connected directly to a local area network, enter its numeric IP address (such as 192.168.1.60) into the *NTP Servers* field, leaving the *Name Servers* field blank.

Also, if you know the numeric IP addresses of the public or corporate time servers on the Internet, you can enter these addresses, separated by spaces, in the *NTP Servers* field, leaving the *Name Servers* field blank, since there would be no URLs to be resolved.

Note: Not all Network Time servers allow unlimited public access. Refer to www.ntp.org for more information.

Click the **APPLY** button to save your changes.

Automation Control

The optional CXP-5 Auxiliary Interface Module's serial control inputs connect with many broadcast automation systems, instant replay panels, video switchers, and remote control devices.

For compatibility with simple controllers and push buttons, the server also provides 12 GPI (contact closure) inputs, and 12 programmable command outputs.

Remote Serial Control

The server's four 9-pin RS-422 serial control inputs permit control of their associated video channels. The following serial protocols are accepted:

- VDCP
- BVW
- ODETICS Extensions to the BVW protocol

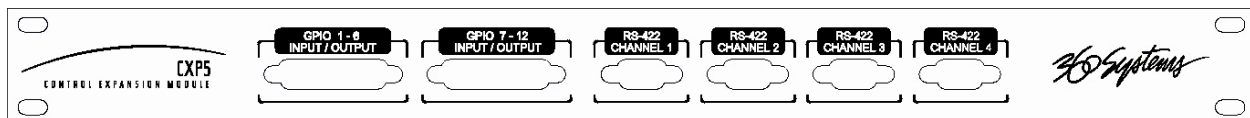


Figure 31 - CXP-5 Detail of Serial Port Connectors

- CH1** - Channel 1, also referred to as COM1
- CH2** - Channel 2, also referred to as COM2
- CH3** - Channel 3, also referred to as COM3
- CH4** - Channel 4, also referred to as COM4 (Not used on 3 channel models)

With VDCP, each port can also respond to channel ID numbers that are equal to, or multiples of, its base number. For example, channel 1 will also respond to 5, 9, 13, etc. This can be helpful when an automation system needs to control a number of servers at once

The server's multiple serial ports allow simultaneous connection of an automation controller and a desktop editing controller. For example, one could attach an edit controller to Channel 1 for record, playout, and editing; while an automation controller on Channel 3 manages play-to-air operations. Alternatively, a single controller could control the operation of all server channels. A single VDCP controller will commonly control multiple server channels.

It is possible for a single VDCP controller to control multiple server channels through one physical serial port. This is up to the design of the controller; it cannot be configured in the server if the controller does not support it. When using a single port to control more than one channel, be sure the **Assigned Serial Ports** option is unchecked. Do not attempt to use a different serial port to control one of the video channels that is under multichannel control.

Controller Priority

Only one serial controller can control a given video channel at a time. In general, the first controller to gain control of a video channel will have exclusive command. This prevents

conflicting instructions that would cause unexpected behavior. The only exception is that the graphic user interface can immediately take control of a channel by deselecting **Serial Control** in that channel's dialog window.

External controllers are prohibited from taking control away from the GUI. The **Serial Control** box must be checked in the channel dialog window before a remote control device can communicate with that channel.

Configuring the Automation Interface

Setting the automation protocol for a video channel

Each video channel can be configured independently for VDCP or BVW protocol.

To map a protocol to a channel, Click **EDIT >CONFIGURE >SERIAL PORTS** from the main pull-down menu. The screen of in **Figure 32** is displayed. Use the **PORT** pulldown to select COM1, 2, or 3; these map to Video channels 1, 2, or 3.

- Select VDCP to map the port to VDCP protocol
- Select BVW to map the port to BVW and ODETICS protocols

Note that the ODETICS protocol is layered with the BVW protocol, and that it supports clip names of up to **eight characters only**. Clips with longer names will not be displayed by an Odetics controller and will not be accessible. This includes the demo clips shipped with the server; see the section on page **Error! Bookmark not defined.** to rename the clips to allow their use for testing.

VDCP operation can allow control of a channel by ID number from a different numbered serial port, while BVW and Odetics protocol control only the channel number corresponding to the number of the serial port in use. When using both protocols, take care to not allow a VDCP controller to address a channel that is controlled by BVW/Odetics on another serial port.

If necessary turn on "**Assigned Serial Ports**" in VDCP Options – this will force VDCP to control the channel corresponding to the serial port it is connected to *regardless* of the channel ID in the control messages. This allows flexible assignment in control systems that limit choices of channel IDs, and also (with some systems) can reduce the possibility that, if the server is disconnected for any reason, the controller might have to be reset to resume communication.

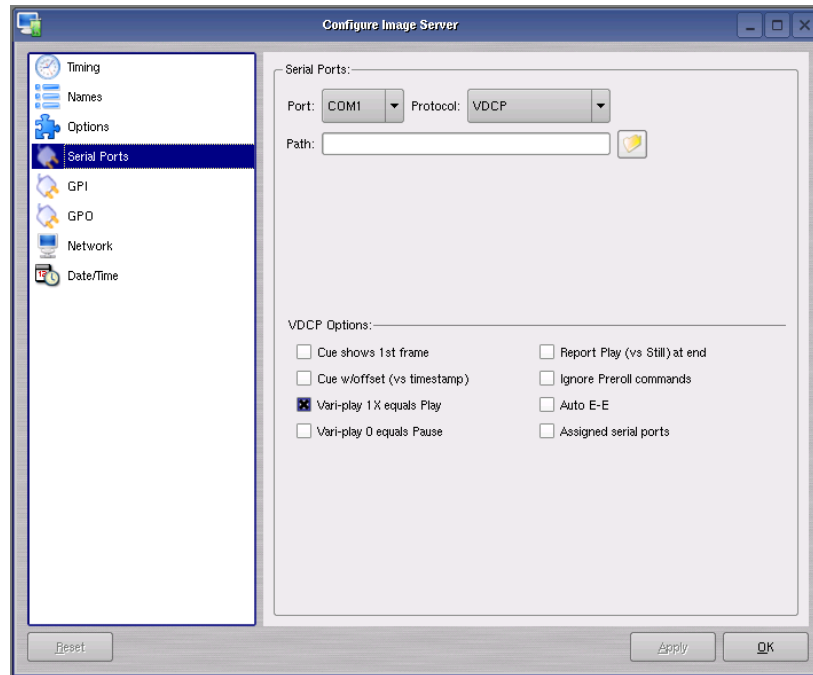


Figure 32 - Serial Port Configuration Screen

Setting the Automation Source Directory

By default, automation equipment will access the Home or Root directory as a source of clips. The directory accessed by automation equipment can be set for each port as follows.

Select the port to be used (COM1, COM2, COM3 or COM4).

Click on the **FOLDER** icon in the **PATH** field of the Serial Port Configuration Screen. Navigate to the folder to be accessed by automation equipment.

It is recommended that for most applications only the root directory be used, and the automation system be relied on for file management rather than the server. Automation can only see the clips that are in the assigned Automation Source Directory. There are two classes of applications for folders in conjunction with serial control:

Limiting the number of clips accessible to automation or remote controllers.

- Some controllers have limited capacity for clip display and selection. Using a folder to present only the currently needed clips can streamline operation.
- Content can be prevented from being aired but still be readily accessible. Content can be ingested at any time and made available to air by moving it into the Automation Source Directory.
- “Archived” material can be held in organized folders, then copied into the Automation Source Directory as needed to air. The copies can then be deleted after airing without affecting the archived copy.
- Content for different purposes can be grouped in folders, and selected by changing the Automation Source Directory.

Segregating material for different broadcast channels

- Content can be placed in a folder for each channel, and played out by separate automation systems or controllers. Each channel can run completely independently – there can be duplicate file names with different content, and the opportunity for airing content on the wrong channel is greatly reduced.
- Content that is common to both channels can be copied into both directories. When this is done in the GUI (as opposed to FTP transfer) the copies reference the same data so they are available immediately and take no additional disk space.

Other Automation Options

As illustrated in **Figure 32**, a number of check boxes are provided that control how the server will respond to certain VDCP commands. Once set, these options remain selected when the server is turned off, and until changed by the user.

NOTE: The following options will apply to all four video channels. They cannot be individually configured for each video channel. Except where noted, they apply only to VDCP operation.

Cue Shows 1st Frame

Upon receiving a Cue With Data or a Play Cue command, the server will cue the clip then jog to and display the first frame of video. (This also applies to Odetics protocol.)

Cue with Offset (vs. Timestamp)

When checked, the time code for the clip becomes “zero-based” with reference to the head point. To move to the head point of the clip, the automation controller would send a time code value of 00:00:00:00, regardless of the clip’s original time stamp. When unchecked, the server will calculate time code position based upon the time stamp from the first frame of the unedited clip. Note that this only affects the operation of the serial port, it does not change the way the server displays time code in the GUI.

Variplay 1X Equals Play

The server will interpret a Variplay 1x command as a Play command. (This also applies to Odetics protocol.)

Variplay 0 Equals Pause

The server will interpret a Variplay 0x command as a Pause command. (This also applies to Odetics protocol.)

Report Play (vs Still) At End

When the end of a clip is reached, the server will report Play to the automation controller, instead of Still.

Ignore Preroll Commands

A minimum 4-frame pre-roll is required to allow the server time to respond to serial commands. See the documentation for your controller or automation to find out how to set the preroll value. Due to various ways preroll commands are implemented in different systems, it may be sufficient to check only this box. A setting of 4 frames in the automation controller will then work correctly.

This option is very seldom used; it allows preroll commands to be ignored and assumes that the operational preroll is 4 frames. Do not check this unless you experience problems with frame accuracy on recordings and playback transitions. Start with a setting of 4 frames on the automation system and adjust until you achieve proper timing.

Auto E-E

Toggles Auto E-E mode (input monitor) on/off.

Assigned Serial Ports

VDCP protocol provides for altering the mapping of Serial Port to Video Channel via control commands. Checking this option will **lock** the Serial Port to Video Channel ordering.

- When checked, any command received on a particular serial port will be used to control the like numbered video channel. This means that automation systems that use fixed or limited VDCP ID numbers can use any output to control any channel of the server.
- With this option checked, there is no requirement for a Port Open command to allow the automation to control the channel. With some systems, this can negate the requirement to restart the automation system when bringing the server online.
- Do not check this option when using controllers that communicate with multiple channels over a single serial port.
- Do not use this option with **DNF Controls** products.

Communication Port Parameters

The serial data transfer parameters for the server are fixed and cannot be changed. These characteristics are common to all automation controllers:

| | |
|------------|-------------|
| Baud Rate | 38.4 K Baud |
| Start Bits | 1 |
| Data Bits | 8 |
| Parity | Odd |
| Stop Bits | 1 |

Tested Automation Controllers

The server has been tested by 360 Systems and the manufacturers of equipment listed below, and found to operate correctly. This list is not comprehensive, and the inclusion or absence of a product does not indicate a preference for any make or model. Operational variations do exist between makes and models.

| Manufacturer | Controller | Protocol | Notes |
|---------------------|-------------|----------|-----------------------------|
| HARRIS AUTOMATION | ADC-100 | VDCP | ALL HARRIS CONTROLLERS SAME |
| SUNDANCE | FAST BREAK | VDCP | |
| NVERZION | EMC-NT | VDCP | |
| CRISPIN CORP. | SYSTEM 2000 | VDCP | |
| FLORICAL | AIR BOSS | VDCP | |
| VCI SOLUTIONS (DTG) | AIRO | VDCP | |

| | | | |
|----------------------|-----------|---------|--|
| HARDATA | HDX VIDEO | ODETICS | |
| IBIS | ITA | VDCP | |
| PEBBLE BEACH SYSTEMS | ANEMONE | VDCP | |
| PROBEL | MORPHEUS | VDCP | |
| PHAROS | PLAYTIME | VDCP | |
| AVECO | ASTRA | VDCP | |

Tested Remote Control Panels and Switchers

360 Systems servers have been tested by 360 Systems as well as manufacturers of remote control devices and video switchers listed below, and found to operate correctly.

| Manufacturer | Controller | Protocol | Notes |
|---------------------|--------------------|-----------------|-------------------------------|
| ROSS VIDEO | SYNERGY® SWITCHERS | VDCP | |
| ECHOLAB | OPERA SWITCHERS | VDCP | |
| DNF CONTROLS* | 4000-CL | VDCP | ALSO USED WITH DNF SHOT BOX |
| DNF CONTROLS | 300-SSM | P2 | BVW-75, ALSO ODETICS PROTOCOL |
| DNF CONTROLS | D-MAT | VDCP | ALSO ODETICS WITH D-MAT-O |
| ASH VALE | SM-2 | P2 | SLOW MOTION CONTROLLER |
| BUF | VTC-4000 | P2 | BVW-75, ALSO ODETICS PROTOCOL |
| BUF | SPOT | VDCP | ALSO ODETICS PROTOCOL |
| LANCE DESIGNS | TDC-100 | ODETICS | USE INT MODE |
| HI-TECH SYSTEMS | ACTIV CART BOX | VDCP | ALL VDCP PRODUCTS SAME |

* Uncheck “Assigned Serial Ports” in Serial Port Options when using any DNF Controls product.

Remote Workstation Interface

The Remote Workstation Interface is a software application that provides control of the server from PC workstations located within a facility. A remote workstation can access one or more video channels of the server to perform ingest, playback, trimming, playlisting, traffic operations or monitoring of server activities.

Applications include—

- Control of a server located in a machine room
- Ingest station for loading commercials and other content from tape
- Edit station for trimming content
- Building, editing and running playlists
- Remote control of a server located at a transmitter site (“evergreen” backup)
- Access to file content and operations by engineering or management
- Control of more than one server from a single workstation
- On a wireless network, a server can be controlled by a secure Wi-Fi enabled laptop computer
- Remote control in a conference room, or during auditorium presentations
- Servers may be securely controlled from a remote location, even across public Internet connections, with inexpensive VPN (Virtual Private Network) technology.

A single server may be controlled from more than one different location on the network. See **Figure 33**.

Similarly, a single computer can run multiple Remote Workstations to control multiple servers.

Remote Workstation software provides the same functionality as the local GUI with the following exceptions: It cannot access the server’s network configuration screen, shutdown the server, access the RAID status display, or display the server’s time-of-day clock.

As of this writing, the current version of Remote Workstation is 3.05.22; this is required to work with server software version 1.08.561.

System Requirements

- PC with Windows XP, Vista or Windows 7 installed. Other operating systems have not been tested and may not be supported.
- 10 MB free space on the computer hard disk, plus 128 MB RAM.

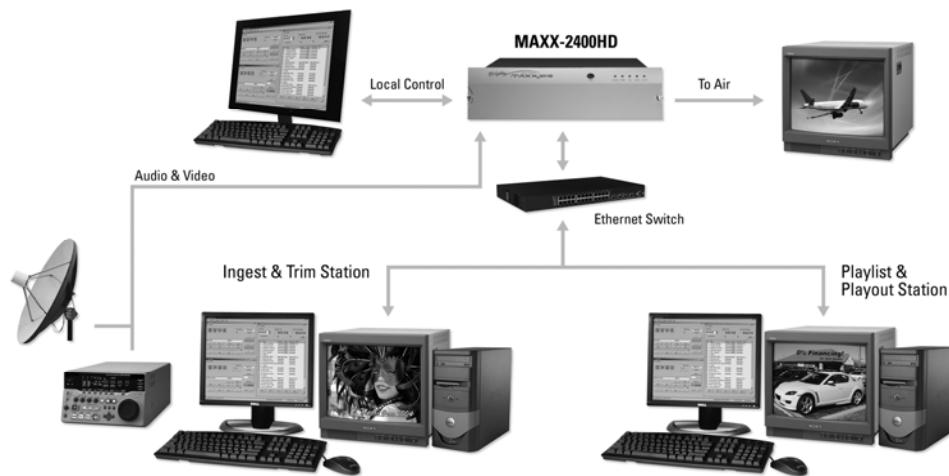


Figure 33 - Remote Workstation Deployments

About the Remote Workstation Interface

The Remote Workstation Interface consists of a CD-ROM or USB flash drive carrying the Remote Workstation application for Windows XP, Vista or Windows 7 computers. It self-installs using the normal Windows prompts. It is possible to install the Remote Workstation software on a number of PCs; any of them can then control one or more channels of one or more servers. Simultaneous active RWI connections to a particular server should be limited to three.

Operations

Up to four Remote Workstations can simultaneously view the channel activity of a single server. Only one Remote Workstation at a time can take control of a particular video channel. Control of the server video channel is not automatically granted to a Remote Workstation just by attempting to use the GUI; control must be actively taken, using the TAKE CONTROL option described below. This allows remote monitoring of server channel activity while greatly reducing the likelihood that a remote user will interfere with operations initiated by another. All Workstations, including the server's local GUI, have equal priority and any can take control of a video channel at any time. Control is granted for server channels individually, and not automatically for all four; therefore, four Remote Workstations can each control a separate video channel. Each Remote Workstation can display or close transport windows without affecting other Workstations or the Local GUI.

The IP address of a Remote Workstation currently controlling a channel appears in the status bar on the bottom-left of the Playlist or Channel window.

A menu labeled Options appears at the upper-left of each server channel window. Clicking this menu presents a drop-down menu with a TAKE CONTROL option. Select this then click Yes in the confirmation dialog to give control of the video channel to your workstation.

Installation

To install Remote Workstation software from CD-ROM or USB drive, insert the media into the PC.

- The auto-run capability of Windows will start the Remote Workstation setup program. If it does not, select the Run... option of the taskbar Start Menu and type: D:\setup.exe. If necessary, replace D:\ with the drive letter of the flash drive.
- You will be prompted to enter the IP address of the server you wish to control. If you know the address, enter it here. This information can also be entered after installation.
- Read the terms under which this software is licensed to you. If you agree, installation will continue. If you do not agree, installation will stop. Follow the prompts to finish installation.
- By default, the Remote Workstation software installs all required files into the "C:\Program Files\ Image Server RWI" folder. However, during the installation process an alternate directory may be specified. If a previous version of Remote Workstation is already installed on the Host computer, use this feature to install the new version in a uniquely named folder, for example C:\Program Files\MAXX2420-SHD.

After Installation

A 360 Systems Remote Workstation icon will appear on your desktop. Double click the icon to open a remote session on the server.

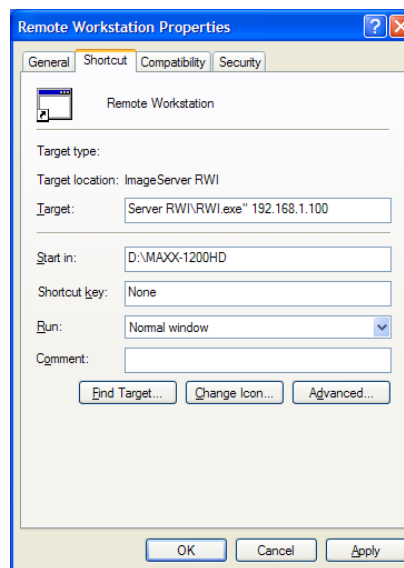


Figure 34 – Remote Workstation Properties Page

Because multiple simultaneous sessions of Remote Workstation may be run on a single PC, it is possible to make copies of the Remote Workstation icon and change the IP address of each, to permit access to any number of servers. Simply right click on the Remote Workstation icon and select Copy from the pop-up menu. Next, right click anywhere on the desktop and select Paste. Finally, follow the instructions above to edit the IP address to match the second server.

Hard Disk Management

The TSS Multi Format Video Server employs an advanced SAS controller that manages the high-capacity hard disk array operating in a RAID-5 configuration. This design increases system performance, and by storing parity data, can survive the complete loss of a drive in the array without data loss.

The system brings a high level of reliability to SAS RAID through a switched architecture that exceeds the reliability of standalone drive systems. The non-blocking switched architecture isolates the drives from one another. Any drive failure makes that drive unavailable and the rest of the storage system remains undisturbed. In addition, Advanced Data Protection checks all drive commands to ensure that no command corruption has taken place over the entire data path.

Some of the RAID-5 implementation features and benefits include:

- Non-blocking switch technology with RAID-5 parity
- On-board processor minimizes host CPU overhead
- Easy-to-configure arrays
- Dynamic sector repair for robust data protection
- Accelerated RAID-5 writes
- Easy drive replacement from front panel

About RAID 5

A RAID 5 configuration features the data striping of RAID 0, combined with the parity benefits of RAID 4. Using a parity (exclusive OR) function, RAID 5 can tolerate the loss of one drive. Parity information is distributed across all drives rather than being concentrated on a single disk. This avoids throughput loss due to contention for the parity drive. Spare drives can be used to rebuild an array after a drive is replaced.

RAID-5 capacity equals the size of drive times (number of drives -1). In addition, the array's storage efficiency increases with the number of disks; from 66.7 % for 3 drives to 75 % for four drives: storage efficiency = (number of drives -1) X (number of drives).

RAID Level 5:
“Independent Access Array with Rotating Parity”
High Data Reliability & Transfer Capacity

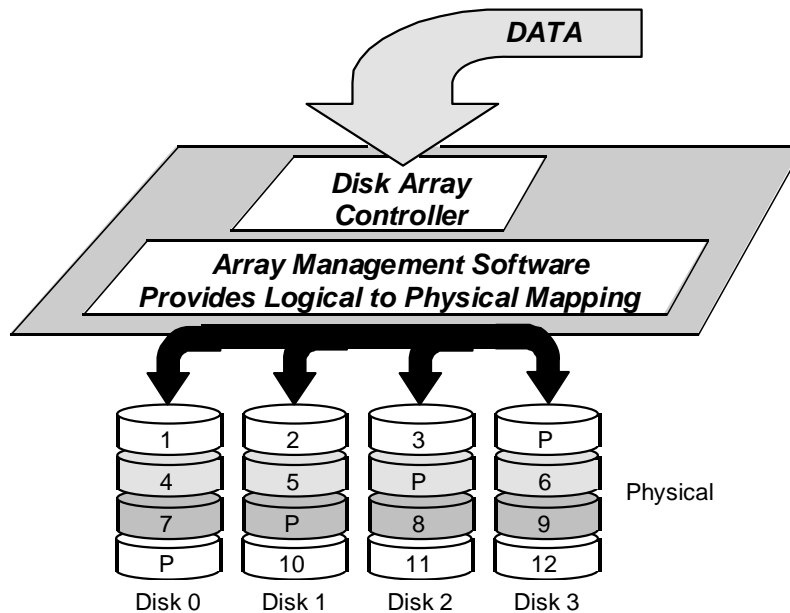


Figure 35: RAID 5 Array Schematic

Improved Write Performance

The server uses new designs to improve RAID-5 write performance for both large sequential and small random transactions. This advanced block caching firmware delivers extremely high performance for RAID-5 write operations.

Managing Disk Arrays

The TSS System contains a RAID configuration utility providing tools for monitoring and managing the disk array. Monitoring and troubleshooting programs automatically check the array, report problems and provide access to RAID status information and service options.

If up to a drive fault should occur, it should not cause data loss; but remember that the drive array is degraded and no longer has fault tolerance. Hence, another disk failure will cause a complete loss of data and system failure. After a drive failure it is strongly recommended that at the earliest time diagnostics be performed and the error condition be resolved.

Error Notification and Repair

The server will notify users in the event of a fault by an indicator in the Image Server GUI status bar, on the bottom of the screen and highlighted in yellow (Figure 36). A GPIO Output can be programmed to activate upon a RAID or system fault. This can be used to activate a warning lamp or alarm. Refer to Page **Error! Bookmark not defined.** for more information on programming GPIO events. A drive fault can be triggered by a variety of conditions such as a faulty drive or improper shutdown.



Figure 36 - GUI Drive Fault Indication

The first step in response to an error warning is to open the RAID configuration utility and review the error messages contained within Dashboard window. Click **Start > RAID Status** to launch the RAID configuration utility.

IMPORTANT

The term “DEGRADED” refers to the state of the Array data, not necessarily the hardware or disk drives themselves. It indicates that the parity information that protects the data is not up to date. While it can be caused by hardware problems, it can also be the result of something as simple as power loss without a proper Shutdown operation.

“Verifying” is the process by which the array controller corrects data parity errors that may have occurred because of power loss, incorrect shutdown or some other data error. Upon detection of a parity error, the controller will automatically start the rebuilding process as a background task. This task should not interfere with the server’s ability to record or play clips.

The term “degraded” refers to the state of the Array data, not necessarily the hardware or disk drives themselves. It indicates that the parity information that protects the data is not up to date.

Parity errors may occur if the server loses power, or is improperly shut off. No data will be lost, but the parity re-initialization process may take several hours. NEVER disconnect AC power to shutdown the server. Shutdown the system only by momentarily pressing the front panel **RESET** button or selecting **Start > Shutdown** from the graphical user interface.

Note that in some cases the power may not automatically shut off after a Shutdown is executed. When the front panel LED indicators start flashing in response to the Shutdown command, the file system has been successfully closed and it is safe to force the power off by holding the **RESET** button in for four seconds.

A Degraded array with a drive listed as “Not In Use”, “Not Present” or “Inaccessible” is usually indicative of a permanent drive error; redundant data will still allow normal operations to continue. You may first try to rebuild the array with the existing drive still installed. If the array continues to indicate a failed drive, replace the drive and then rebuild the array. The replacement must be a drive from the same model series and the same or greater capacity as other drives in the array. Because specific drive models become unavailable as time goes on, 360 Systems recommends that maintenance spares be purchased at the same time as the server.

Log-In to the RAID Utilities

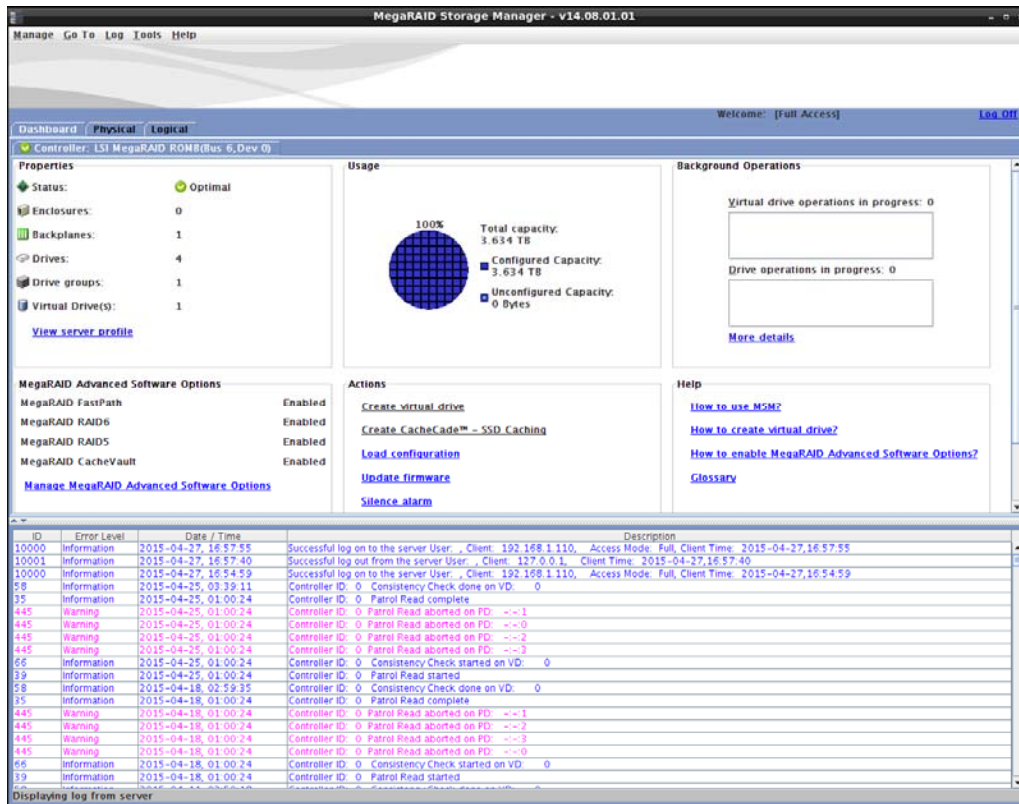


Figure 37 - RAID Utilities Main Screen

To log in to the RAID utilities, perform the following steps.

- Open the RAID utilities by selecting **Start > Raid Status**

The application will launch and present the main screen or “Dashboard”.

Determining the Condition of the RAID Array

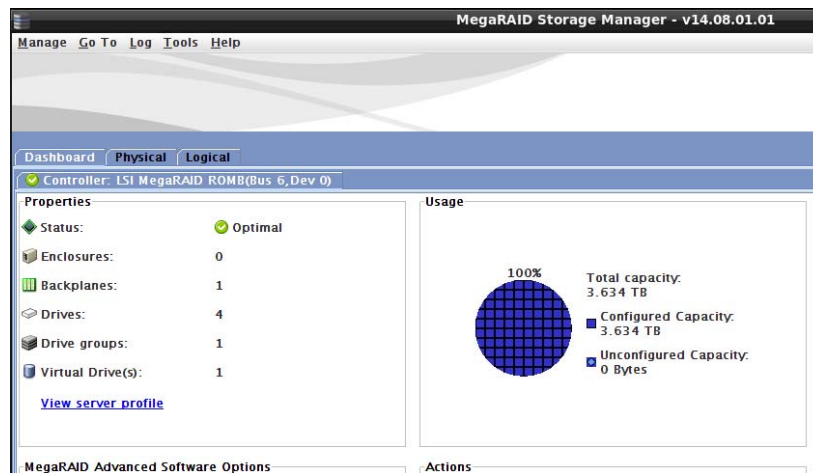


Figure 38 - RAID Array Condition Screen

The **RAID Dashboard** window displays the current status of the RAID controller and all disks connected to the RAID system. On inspection, you may find the array in one of the following states:

Optimal, indicating the RAID array is operating normally and no action is necessary.

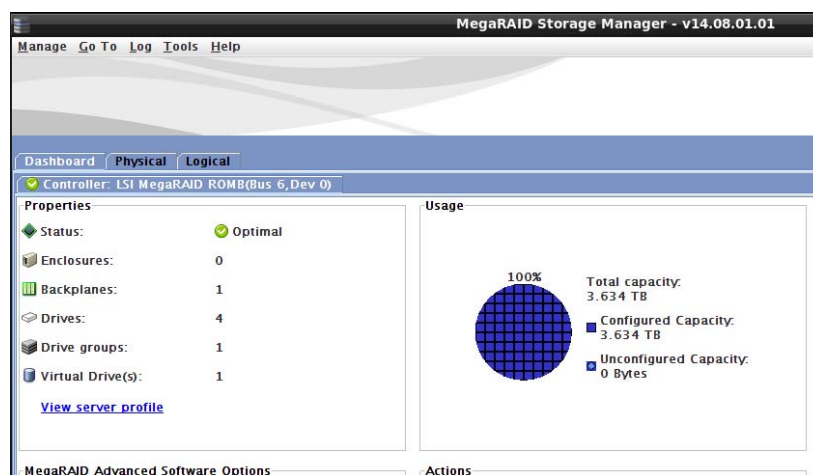


Figure 39 - RAID Array Optimal

Needs attention, indicating an issue exists with the RAID and action should be taken.

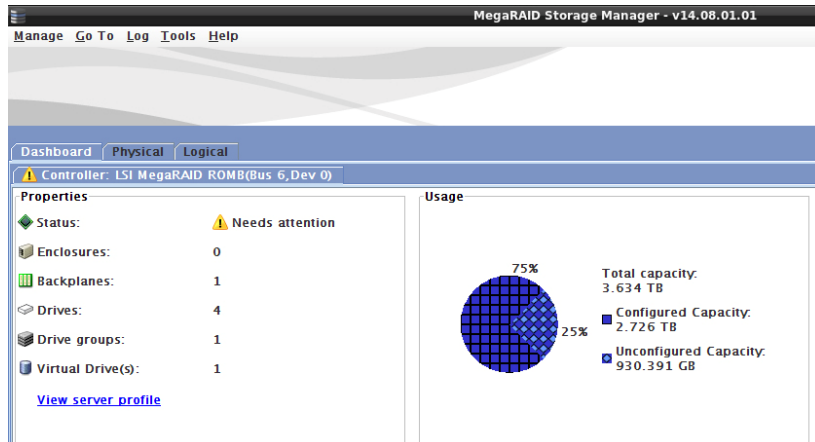


Figure 40 - RAID Array Needs Attention

Other indicators may be:

Degraded, indicating the drive array needs rebuilt or repaired.

Verifying, indicating the state of the array is being checked for consistency.

Rebuilding, indicating the drive array is rebuilding.

Displaying the Log for the Raid Array

| ID | Error Level | Date / Time | Description |
|-------|-------------|------------------------|--|
| 10000 | Information | 2015-04-27 15:41:50 | Successful log on to the server User: Client: 192.168.1.126, Access Mode: Full, Client Time: 2015-04-27 15:41:50 |
| 10001 | Information | 2015-04-27 15:39:54 | Successful log out from the server User: Client: 127.0.0.1, Client Time: 2015-04-27 15:39:54 |
| 351 | Critical | 2015-04-27 15:39:16 | Controller ID: 0 VD is now DEGRADED VD: 0 |
| 61 | Information | 2015-04-27 15:39:16 | Controller ID: 0 State change on VD: 0 Previous = Optimal Current = Degraded |
| 114 | Information | 2015-04-27 15:39:16 | Controller ID: 0 State change PD = --:0 Previous = Online Current = Offline |
| 10000 | Information | 2015-04-27 15:38:44 | Successful log on to the server User: Client: 192.168.1.126, Access Mode: Full, Client Time: 2015-04-27 15:38:44 |
| 44 | Information | 2015-04-27 14:12:13 | Controller ID: 0 Time established since power on: Time: 2015-04-27 14:12:13 137 Seconds |
| 389 | Information | 2015-04-27 21:11:24 | Controller ID: 0 Host driver is loaded and operational |
| 44 | Information | 2015-04-27 21:10:49 | Controller ID: 0 Time established since power on: Time: 2015-04-27 21:10:49 52 Seconds |
| 247 | Information | 39 seconds from reboot | Controller ID: 0 Device inserted Device Type: Disk Device Id: 3 |
| 91 | Information | 39 seconds from reboot | Controller ID: 0 PD inserted --:2 |
| 247 | Information | 39 seconds from reboot | Controller ID: 0 Device inserted Device Type: Disk Device Id: 2 |
| 91 | Information | 39 seconds from reboot | Controller ID: 0 PD inserted --:3 |
| 247 | Information | 39 seconds from reboot | Controller ID: 0 Device inserted Device Type: Disk Device Id: 1 |
| 91 | Information | 39 seconds from reboot | Controller ID: 0 PD inserted --:0 |
| 247 | Information | 39 seconds from reboot | Controller ID: 0 Device inserted Device Type: Disk Device Id: 0 |
| 91 | Information | 39 seconds from reboot | Controller ID: 0 PD inserted --:1 |
| 255 | Information | 21 seconds from reboot | Controller ID: 0 Board Revision: |
| 351 | Information | 11 seconds from reboot | Controller ID: 0 Package version 23.18.0-0013 |

Displaying log from server

Figure 41 - RAID Log Screen

By selecting either the Physical or Logical tabs in the main window, the bottom portion of the screen will display the log messages related to the RAID. The RAID controller keeps track of any condition that would adversely affect its reliability. In the event that an error should occur, the log will be helpful in diagnosing the problem.

Errors within the logs will show in red

- Critical and Fatal errors will show as **RED** in the logs
- Warnings will show in **PINK**
- Information notes will show in **BLUE**

Checking Status of the Drives

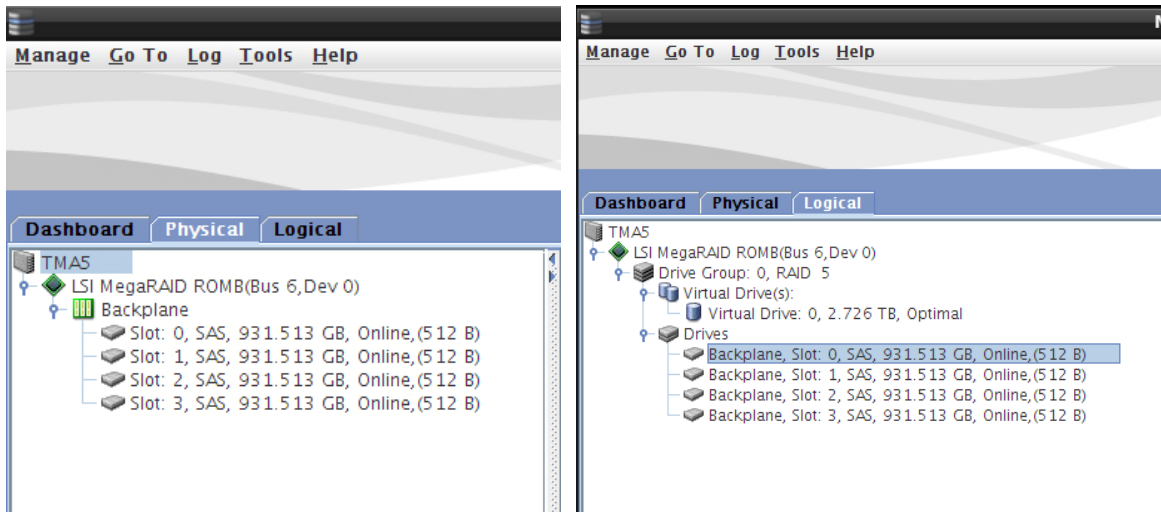


Figure 42 - RAID Physical and Logical drives

To check the status of the RAID drive array, click on either the Physical or Logical tabs. This will display the current status

Any drives or arrays that are in a state other than optimal, will show with a red or yellow marker. This will clearly identify the source and condition of the failure.

Removing the Degraded Drive from the RAID Unit

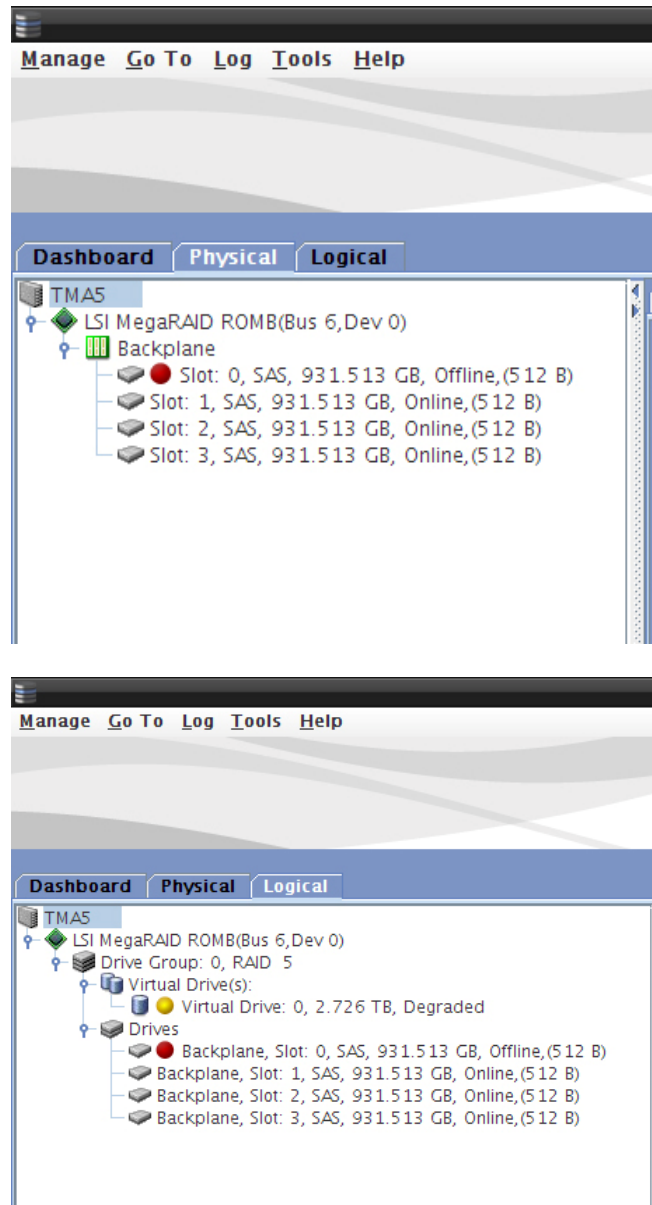


Figure 43 - Removing Failed Drive from Array

To prepare a drive for removal, the drive must first be offline. In either the Physical or Logical tabs, check to see if the drive with the error shows a status of “offline”. To force the drive offline:

- Right click on the drive you wish to remove and select, **Make Drive Offline**.
- A dialog will appear stating **“Warning: This will make the Physical Drive Offline Are you sure?”** Check the **Confirm** box and click the **Yes** button.

- A second dialog will appear stating **“It is advisable to backup data before this operation. Are you ready?”** Check the **Confirm** box and click the **Yes** button.

CAUTION: Forcing more than one drive at a time offline will result in a lost of all data. Be sure to select only the drive with the error to make offline.

Once the drive is “offline”, the drive may safely be removed from the chassis and replaced.

Rebuilding the RAID Array

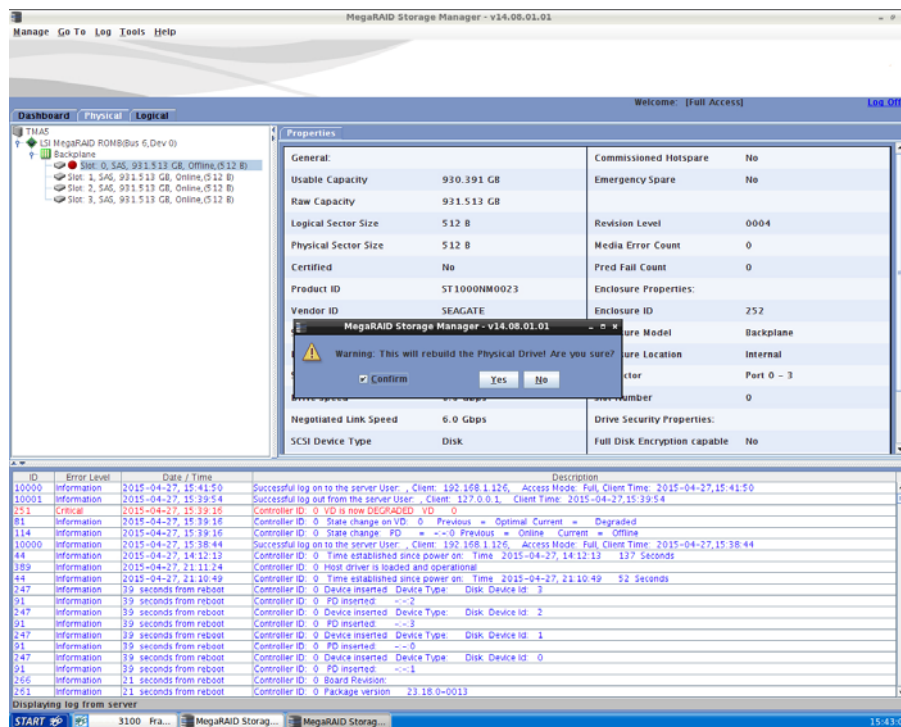


Figure 44 - Selecting a drive to rebuild

- Right click on the drive with the error and select **Start Rebuild**. The dialog above will appear stating **“Warning: This will rebuild the Physical Drive! Are you sure?”**.
- Check **Confirm** and click the **Yes** button.
- Status of the rebuilding will show on the Dashboard or by going to **Manage > Show Progress** in the file menu.

Replacing Hard Drives

The server hard disk drives have been factory tested and configured in a RAID 5 array. Each drive is numbered (0-3) and must be replaced in the same slot as removed from.

Please read Opening the Front Panel on page 114 for instructions on accessing the hard drive bays. Detailed information about how to replace hard drives is on page 118.

RAID Controller Settings

The server RAID controller is configured at the factory. The following is provided only to verify these settings and to recreate them if necessary in the event the system is rebuilt.

These settings are critical to proper operation of the system and should not be altered unless advised by 360 Systems technical support.

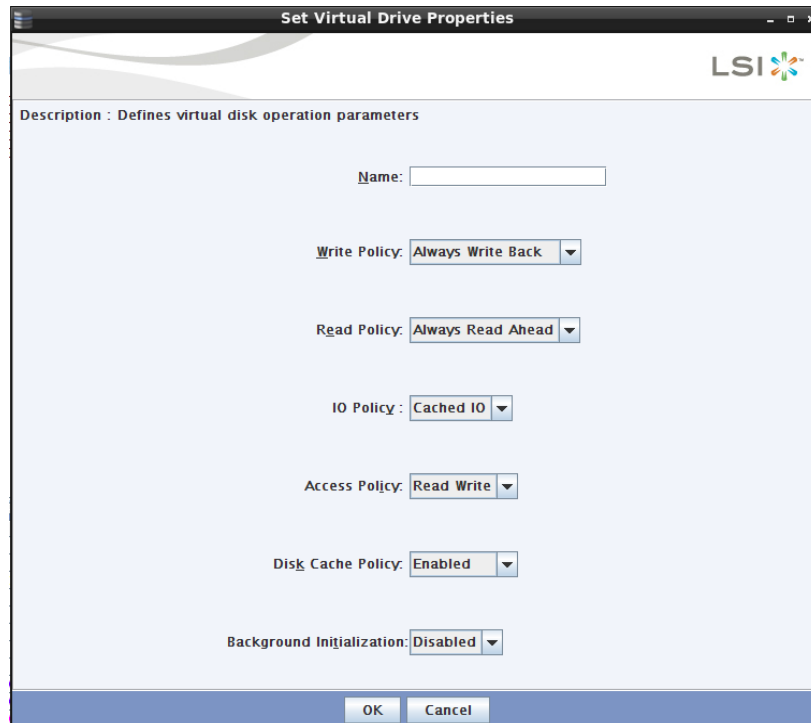


Figure 45 – RAID Controller Settings

Maintenance

Fault Diagnostics

Front Panel Indicators

The four LED indicators on the front panel are used to diagnose server fault conditions. The meaning of each indicator is noted in the following table.

| | | |
|--------------|---|---|
| POWER | FLASHING indicates that there is a fault in the system power supply. | Shut down the server and contact 360 Systems Customer Support for further hardware diagnosis. |
| NETWORK | Lit indicates that a connection to the Ethernet port exists. | Unlit indicates a Network cable is not attached to the port. |
| SYSTEM / UID | Solid or flashing blue indicates the UID is active. Press the UID button to disable. Solid red indicates a failure state of the temperature of the unit. Flashing red indicates a failure of the fans | Shut down the server and contact 360 Systems Customer Support for further hardware diagnosis. |

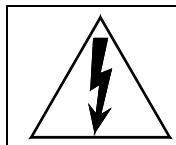
| | |
|---|--|
|  | <p>Repairs should be performed only by qualified electronics technicians.</p> |
|---|--|

Gigabit Ethernet Indicators

The Gigabit Network Port card has the following indicator lights:

| Label | Indication | Meaning |
|---|----------------|---|
| ACT/LNK (Left) | Green on | The port is connected to a valid link partner |
| | Green flashing | Data activity |
| | Off | No link |
| 10=OFF 100=GREEN 1000=YELLOW (Right) | Off | 10 Mb/sec |
| | Green | 100 Mb/sec |
| | Yellow | 1000 Mb/sec |

Access To Components



Be certain to shut down the server and disconnect the power cord before opening the unit for service.

The following sections provide instruction on disassembly and re-assembly for maintenance.

Opening the Front Panel

The front panel is easily opened for access to the disk drives bays and front power button. Firmly gripping the left and right sides of the panel, pull one side straight out releasing the panel from the server.

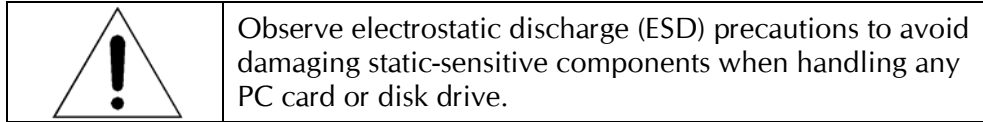
To re-install the front panel, verify that all drive bays are completely closed and locked, then place the left or right side of the front panel into position pushing firmly on the opposite side. The panel should click into position.

Removing the Top Cover

Use a No. 2 Philips head screwdriver to remove the one (1) screw toward the rear of the top cover. Then press the two round latches in the top center at the same time and pull or push the top cover toward the rear of the server to disengage the latches. Lift the top cover up and away from the server.

General Handling Precautions

ESD Precautions



- When the case of your server is open and its internal parts are exposed, do not touch any internal part without first grounding yourself to the chassis.
- Always wear a ground strap or work on an ESD-protective mat.
- DO NOT remove components from protective packaging until you are properly grounded.
- Handle printed circuit boards by their edges or by the metal bracket.
- Don't touch any pin, contact, lead or component on the printed circuit boards.
- Keep disk drives in their anti-static package until installed in the server.

Mechanical Concerns

- Be careful when installing I/O cards into your system. Excessive force can damage the PC boards, cables or the motherboard.
- Be sure each board is aligned with its slot in the mating connector before installing. Use care to not flex any PC boards.
- Interface cable connectors must be mated carefully. Use care to not bend any of the pins. The connectors provided are keyed to prevent upside-down insertion.
- Interface cables are fragile and must not be pinched. Ensure that their dress does not restrict airflow from fans or heat sinks within the enclosure.
- Prior to installation, keep disk drives stored in a foam-lined protective carton to protect them from physical damage.

Installing/Removing I/O Cards

Request separate repair and replacement part documentation from 360 Systems' Technical Service Department. Tel: +1 (818) 991-0360. Any repair, adjustment or service operation must be performed by a qualified technician.

Software Updates from a USB Key

Software updates for the system may be issued from time to time providing product enhancements. The server's operating system and application programs can be updated by the user from a USB Flash Drive distributed by 360 Systems. The current software version is determined by looking in the GUI **Help>About** dialog box.

To install a program update, follow these instructions. Please read them completely before beginning.

CAUTION: This procedure requires the server to be offline for the duration of the update.

1. Discontinue all record, play, network transfer or system-level operations.
2. With power applied, insert a 360 Systems USB Flash Drive into a USB a socket.
3. Shutdown the server from the GUI by going to Start > Shutdown or by pressing the front panel power switch briefly to shutdown the server.
4. Wait 5 seconds, then press the front panel power switch to boot from the USB Flash Drive.
5. The Installer menu provides a choice to Update the server operating system, begin a new complete install, or cancel the install.
 - Choose UPDATE if you want to keep the video and audio clip files that exist on the server. Use this selection for all normal software updates.

 - Choose NEW Installation only if you want to partition and reformat the drive array, and install the new operating system.

IMPORTANT!

Using the NEW option **will destroy all video and audio files on the server**. For normal software upgrades, use the UPDATE option instead of NEW.

6. The message, "Please wait while server is being installed" will appear with an activity indicator. When installation is complete, the server will automatically reboot from its hard disk array, and will display a copyright notice while starting up.

7. **IMPORTANT!** Remove the USB Flash Drive. Never leave it plugged into the server. Do not use the Defragment option unless instructed to do so by 360 Systems.

Updating Firmware

From time to time it may be necessary to update firmware code on one of the many pieces of hardware included in the serve. Firmware is low-level code used by the hardware; it is not server operating system software. If a software update is to be performed as well, install it first unless instructions that came with the software update specifically require loading a particular version of firmware. Firmware updates should only be performed if requested by 360 Systems' technical support personnel. Updating firmware without special instruction may render the system inoperable.

Replacing a Hard Drive

Do not remove a hard drive from the server unless the diagnostic software identifies a permanent fault. In that event, the front panel LED on the drive will blink RED. Use the hard disk management tools to verify that a drive is at fault. The application monitors many things about the array and individual drives, and will clearly indicate whether a drive has failed.

CAUTION:

Do not install drives that are not approved by 360 Systems. All drives in the RAID array must be of a similar model family and the same or greater capacity.

Each hard drive slot is numbered 0 through 3, as are the drives. If for any reason one or more drives have been removed, they must be reinstalled in the same location, the drive number matching the numbered location. Installation in the wrong location may destroy data stored on all the drives.

If you have ANY doubt that you are replacing the correct drive, try to restart the server with the drive disconnected. It should boot up normally. Immediately perform the Shutdown (**Start>Shutdown>Shutdown**) procedure and continue. If the server does not start normally, reconnect the drive and verify which drive is faulty.

1. Drives in the RAID array may be swapped out with the system running. CAUTION: Removing the incorrect drive may cause the server to go offline and may potential damage the RAID. It is highly recommended to take the server offline and power down the system before conducting a drive replacement.
2. Remove the front panel from the server to expose the drive bays.
3. Open the latch on the drive carrier for the drive to be replaced.
4. Remove the four screws holding the old drive to the drive carrier and install it on the new drive.
5. Slide the drive and drive carrier into the correct position in the drive bay. Close the drive carrier latching arm.
6. Reinstall the front panel.
7. If the server was powered down, turn the system ON using the front panel **POWER** button, and check the RAID array status.
8. Verify correct operation of the server.

Factory Repair Policy

A video server being returned under warranty shall be sent to 360 Systems, freight prepaid, in the original or equivalent packaging. Call 360 Systems for a return authorization number *before* returning a product. Have your serial number and software version number available for reference.

Use the following address for shipping and correspondence. 360 Systems' offices are open Monday through Friday, from 8:30 AM to 5:00 PM, Pacific Time.

360 Systems
Customer Service Dept.
3281 Grande Vista Drive
Newbury Park, CA 91320

| | |
|-----------|--|
| Telephone | (818) 991-0360 |
| Fax | (818) 991-1360 |
| E-mail | techsupport@360systems.com |
| Website | www.360systems.com |

Regulatory Certifications

Safety

The server complies with the following safety standards:

UL60065, Issue:2003/06/30 Ed:7 Rev2007/12/11, Standard for Safety for Audio, Video and Similar Electronic Apparatus – Safety Requirements

CSA C22.2#60065, Issued:2003/04/01 Ed:1, Audio, Video and Similar Electronic Apparatus – Safety Requirements – IEC 60065:2001; Supersedes E60065-00-CAN/CSA; Amendment 1: April 2006 – (R2007)

Radio Interference Compliance

Radio Interference (USA)

WARNING: This equipment has been tested and found to comply with the limits for Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction's manual, may cause interference to radio communications. Operation of this equipment in a residential area is likely to cause interference in which case the user will be required to correct the interference at his own expense.

The user is cautioned that changes and modifications made to the equipment without approval of the manufacturer could void the user's authority to operate this equipment.

It is suggested that the user use only shielded and grounded cables to ensure compliance with FCC Rules.

FCC Emission Limits

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesirable operation.

Radio Interference (Canada)

English: This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Français: Cet appareil numérique de la classe A respecte toute les exigences du Règlement sur le matériel brouilleur du Canada

RoHS Compliance

This product is in compliance with the Hazardous Substances in Electrical and Electronic Equipment directive (RoHS) - 2002/95/EC. The materials and substances listed in the RoHS directive, specifically lead, mercury, cadmium, hexavalent chromium, PBB and PBDE's, are not intentionally added to, or believed to be contained in this product.

CE Mark

Testing to be completed before shipment to the EU.

Product Warranty

Limited Warranty

This product is warranted to the original purchaser against defects in material and workmanship for a period of one year from the date of original purchase. This warranty covers parts and labor and is effective when the product is used without alteration for the purpose intended by 360 Systems. This warranty excludes products with modified or unauthorized software, that have been subject to misuse or neglect, that have been modified, repaired improperly or by unauthorized personnel, damaged by rough handling, abuse, improper operation, excessive temperature, lightning strike, static electricity, electrical surges or other electrical system malfunctions, improper or inadequate maintenance or care and that have been subject to use of unauthorized or non-conforming accessories or attachments. This warranty also excludes normal wear and deterioration occasioned by the use of the product.

If part of the product is defective, the entire product must be returned along with the original purchase receipt or other evidence of purchase and a description of the defect to 360 Systems, 3281 Grande Vista Drive, Newbury Park, CA 91320. Upon receipt, its condition will be verified, and if the product qualifies for warranty coverage, 360 Systems will, at its option, repair or replace the product without charge. In the case of replacement, if the replacement for a defective product is no longer available, 360 Systems will replace it with a similar product or, if not available, a product of equal value.

DISCLAIMER AND LIMITATION OF LIABILITY

The liability of 360 Systems under the foregoing warranty is limited solely to the repair or replacement of defective material or workmanship and does not include any expense related to the shipment of the product to or from 360 Systems or compensation for any inconvenience or loss of use of the product while it is being repaired or replaced.

EXCEPT AS EXPRESSLY STATED HEREIN, 360 SYSTEMS EXPRESSLY DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, OF ANY KIND WITH RESPECT TO THE PRODUCT, INCLUDING WITHOUT LIMITATION WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

BY PURCHASE OR USE OF THIS PRODUCT, THE OWNER/OPERATOR ASSUMES SOLE RESPONSIBILITY FOR OBTAINING LICENSES and/or PATENTS ASSOCIATED WITH ITS OWNERSHIP, BROADCASTING, RENTAL, OR ANY OTHER USE OF SAID PRODUCT. THE OWNER/OPERATOR IS SOLELY LIABLE FOR ANY BREACH OF THAT RESPONSIBILITY AND SHALL INDEMNIFY AND HOLD 360 SYSTEMS HARMLESS FROM ANY AND ALL CLAIMS THAT MAY ARISE IN REGARD TO ANY SUCH LICENSES and/or PATENTS, INCLUDING THIRD PARTY PATENT CLAIMS. THIS PROVISION SHALL TAKE PRECEDENCE OVER ANY PROVISIONS TO THE CONTRARY IN OWNER/OPERATOR'S PURCHASE ORDERS OR OTHER DOCUMENTS.

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Some states or regions do not allow the exclusion or limitation of incidental or consequential damages under certain circumstances, so the above limitations and exclusions may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state or region to region.

End User License Agreement

For Server Software

IMPORTANT

THIS IS A LEGAL AGREEMENT BETWEEN YOU (“YOU”) AND 360 SYSTEMS® (“COMPANY”). COMPANY IS WILLING TO LICENSE THE SERVER SOFTWARE TO YOU ONLY UPON THE CONDITION THAT YOU ACCEPT ALL OF THE TERMS CONTAINED IN THIS SOFTWARE LICENSE AGREEMENT (“AGREEMENT”). PLEASE READ THE TERMS CAREFULLY BEFORE OPENING THIS PACKAGE, OR IF DOWNLOADED, BEFORE INSTALLING THE SOFTWARE, AS OPENING THE PACKAGE, OR IN THE CASE OF DOWNLOADED SOFTWARE, INSTALLING IT, WILL INDICATE YOUR ASSENT TO THEM. IF YOU DO NOT AGREE TO THE LICENSE TERMS, THEN COMPANY IS UNWILLING TO LICENSE THE SOFTWARE TO YOU, IN WHICH EVENT YOU MAY RETURN THE UNOPENED SOFTWARE PACKAGE TO THE PLACE FROM WHICH IT WAS ACQUIRED WITHIN 14 DAYS OF THE DATE OF PURCHASE AND YOUR MONEY WILL BE REFUNDED. IF YOU ARE VIEWING THIS AGREEMENT ELECTRONICALLY, SELECT THE “ACCEPT” BUTTON AT THE BOTTOM OF THIS PAGE TO INDICATE YOUR ACCEPTANCE OF THE TERMS OF THIS AGREEMENT. IF YOU ARE NOT WILLING TO BE BOUND BY ITS TERMS, SELECT THE “DECLINE” BUTTON AT THE BOTTOM OF THIS PAGE AND THE REGISTRATION OR INSTALLATION PROCESS WILL NOT CONTINUE.

1. Company grants to You a non-exclusive license to use the server software program (the “Software”) and any accompanying documentation (“Documentation”) solely for your internal business needs pursuant the terms and conditions of this Agreement. The license to use the Software is conditioned upon Your compliance with the terms of this Agreement. You shall be solely responsible for installation of the Software.
2. Your use of the Software is limited to the licensing option set forth on your invoice. Each licensing option is defined as follows:
Single User License. Software provided to You under this option may only be installed on any server owned or controlled by You, but in no event may it be used on more than one server at the same time.
Multiple User License. Software provided under this option may be installed on more than one server owned or controlled by You, the maximum number of which is indicated on the purchase invoice for this Software.
3. You may not transfer the Software to another entity or person. Any such transfer terminates your license under this Agreement. You shall not modify, translate, reverse assemble or reverse compile in whole or in part the Software that is provided in object code. You may not rent, sell, time-share, lease, sublicense, transfer, publish, disclose, display, or otherwise make available the object code or copies thereof to others. You may not make copies of the object code except as provided herein. You shall not tamper with, bypass or alter any security features of the Software or attempt to do so.
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5. Company warrants that the Software will perform substantially in accordance with its Documentation. Your exclusive remedy for breach of this limited warranty and Company's entire liability shall be, in Company's discretion, either return of the price paid to Company by You for the Software, or repair or replacement of the Software after Software and Documentation are returned to Company with an applicable receipt. Company's warranty is void if failure of the Software has resulted from accident, abuse, modification or misapplication. COMPANY MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED, WITH RESPECT TO THE SOFTWARE AND DOCUMENTATION, AND SPECIFICALLY DISCLAIMS THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. COMPANY DOES NOT WARRANT THAT THE OPERATION OF THE SOFTWARE WILL BE UNINTERRUPTED OR ERROR FREE.
6. TO THE MAXIMUM EXTENT PERMITTED BY LAW, IN NO EVENT SHALL COMPANY BE LIABLE FOR ANY SPECIAL, INCIDENTAL, CONSEQUENTIAL OR PUNITIVE DAMAGES WHATSOEVER, INCLUDING ANY CLAIMS FOR LOST PROFITS, BUSINESS INTERRUPTION, LOST INFORMATION OR OTHER DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE SOFTWARE. IN ALL EVENTS, COMPANY'S SOLE OBLIGATION OR LIABILITY UNDER THIS LICENSE IS THE REPLACEMENT OR REPAIR OF THE SOFTWARE OR A REFUND OF THE PURCHASE PRICE.
7. You may terminate the license granted in Section 1 of this Agreement at any time by destroying or erasing your copy of the Software. Company may terminate this Agreement immediately and without notice if you fail to comply with any term or condition of this Agreement. In the event of termination of this Agreement, all the sections of this Agreement will survive except for Section 1.
8. This Agreement shall be governed by and construed in accordance with the laws of the State of California, U.S.A., without reference to conflicts of laws provisions or the 1980 U. N. Convention on Contracts for the International Sale of Goods and, as to matters affecting copyrights, trademarks and patents, by U.S. federal law. Any dispute with respect to this Agreement shall be brought and heard either in the California state courts located in Los Angeles County, California, or the federal district court for the Central District, Western Division, located in Los Angeles, California. In such event, the parties to this Agreement each consent to the *in personam* jurisdiction and venue of such courts. The parties agree that service of process upon them in any such action may be made if delivered in person, by courier service, by telegram, by facsimile or by first class mail, and shall be deemed effectively given upon receipt.
9. This Agreement sets forth the entire agreement between You and Company pertaining to the licensing of the Software, and supersedes in its entirety any and all written or oral agreements previously existing between the parties with respect to such subject matter. If any provision of this Agreement is held invalid or unenforceable, such provision shall be revised to the extent necessary to cure the invalidity or unenforceability, and the remainder of this Agreement shall continue in full force and effect. In the event of any conflict between any provision of this Agreement and applicable law, the provisions of this Agreement affected shall be modified to remove such conflict and permit compliance with such law, and as so modified this Agreement shall continue in full force and effect. This Agreement may not be assigned without the consent of Company.

Appendix A

Connector Specifications

Serial Control Connector Pinout (Optional CXP-5 module)

| Pin | DB9-F Connector |
|-------|------------------|
| 1 | GND |
| 2 | Transmit A (TX-) |
| 3 | Receive B (RX+) |
| 4 | GND |
| 5 | N/C |
| 6 | GND |
| 7 | Transmit B (TX+) |
| 8 | Receive A (RX-) |
| 9 | GND |
| Shell | Frame ground |

BNC Connectors

The following note applies to all video and Genlock connectors:

An HD-BNC connector used as an output has a 75-ohm source impedance.

An HD-BNC connector used as an input has a 75-ohm termination.

GPIO Connectors (Optional CXP-5 module)

General purpose control inputs (GPI) may be applied to the GPIO connectors, which are DB-25 pin connectors. These inputs are optically isolated from the server circuitry; individual floating returns are provided. +5 volts may be sourced from pins 18 or 26, or provided from an external source. Current limiting devices are provided within the server.

General purpose status outputs also appear on the GPIO connectors. Open-collector outputs are provided as status outputs, and may be used to drive an external LED or control input.

Refer to the connector pin-out table and partial schematic, following. Inputs and outputs 1-6 are on connector 1, 7-12 are on connector 2, shown in parentheses. The schematic applies to both connectors as well.

GPIO Connector Pinout

Numbers in parentheses indicate numbering of signals on GPIO Connector 2

| Pin | Signal | Pin | Signal |
|----------|------------|--------|------------------------|
| 1 | GPI 1 (7) | 14 | GPI 1 (7) RTN |
| 2 | GPI 2 (8) | 15 | GPI 2 (8) RTN |
| 3 | GPI 3 (9) | 16 | GPI 3 (9) RTN |
| 4 | GPI 4 (10) | 17 | GPI 4 (10) RTN |
| 5 | GPI 5 (11) | 18 | GPI 5 (11) RTN |
| 6 | GPI 6 (12) | 19 | GPI 6 (12) RTN |
| 7 | N/C | 20 | N/C |
| 8, 9, 10 | GND | 21, 22 | +5V SOURCE (200MA MAX) |
| 11 | GPO 2 (8) | 23 | GPO 1 (7) |
| 12 | GPO 4 (10) | 24 | GPO 3 (9) |
| 13 | GPO 6 (12) | 25 | GPO 5 (11) |

Warning: Incorrect wiring of GPIO connector may damage its interface circuitry.

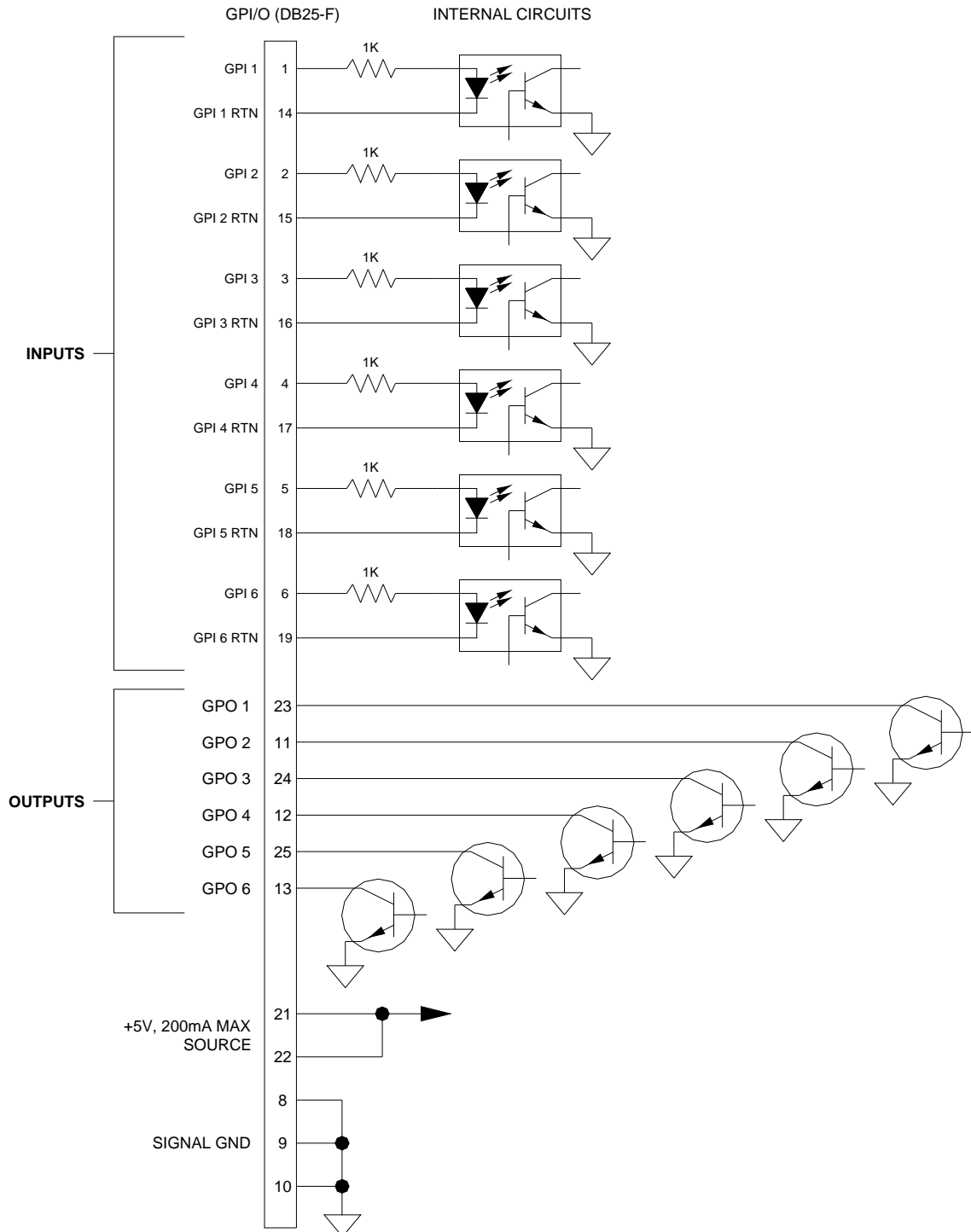


Figure 46: GPIO Connection Schematic

System Board Ports

Standard computer I/O ports on the server include video monitor, keyboard, mouse, and Gigabit and 10GB Ethernet.

Keyboard and Mouse

Keyboard and mouse PS-2 ports are provided on the rear panel as well as USB connectivity.

DVI Port

A DVI or VGA compliant computer monitor may be connected to the DVI video port on the server. If a VGA monitor is to be used, the DVI to VGA adapter (included) must be used to make the connection. 360 Systems does not provide a monitor with the server.

USB Ports

USB ports may be used to connect keyboard, mouse, CXP-5 module and for use when conducting software upgrades. USB ports should not be used for connecting devices beyond this as other devices may cause harm or instability to the system.

Unused Ports

An RS-232 serial port and VGA port are present on the server. These are not active and no connection should be made to them.

Appendix B

Serial Command Protocols

VDCP Command Table

The server responds to the following VDCP commands. Shaded areas indicate commands slated for future implementation.

COMMAND FROM CONTROLLER RETURN FROM CONTROLLED DISK

| CMD-1 | CMD-2 | NAME | CMD-1 | CMD-2 | NAME |
|---------|-------|---------------------|-------|-------|------|
| 0X / 8X | 15 | Delete Protect ID | | 04 | ACK |
| 0X / 8X | 16 | Undelete Protect ID | | 04 | ACK |

| CMD-1 | CMD-2 | NAME | CMD-1 | CMD-2 | NAME |
|-------|-------|----------------|-------|-------|------|
| 1X | 00 | Stop | | 04 | ACK |
| 1X | 01 | Play | | 04 | ACK |
| 1X | 02 | Record | | 04 | ACK |
| 1X | 04 | Still | | 04 | ACK |
| 1X | 05 | Step | | 04 | ACK |
| 1X | 06 | Continue | | 04 | ACK |
| 1X | 07 | Jog | | 04 | ACK |
| 1X | 08 | Varispeed Play | | 04 | ACK |
| 1X | 0A | EE Mode | | 04 | ACK |

| CMD-1 | CMD-2 | NAME | CMD-1 | CMD-2 | NAME |
|---------|-------|-----------------------|-------|-------|------|
| 2X / AX | 1D | Rename ID | | 04 | ACK |
| 2X | 1E | Preset Std. Time | | 04 | ACK |
| 2X / AX | 1F | New Copy | | 04 | ACK |
| 2X | 20 | Sort Mode | | 04 | ACK |
| 2X | 21 | Close Port | | 04 | ACK |
| 2X | 22 | Select Port | | 04 | ACK |
| 2X / AX | 23 | Record Initialize | | 04 | ACK |
| 2X / AX | 24 | Play Cue | | 04 | ACK |
| 2X / AX | 25 | Cue with Data | | 04 | ACK |
| 2X / AX | 26 | Delete ID | | 04 | ACK |
| 2X / AX | 2C | Record Init with Data | | 04 | ACK |
| 2X | 30 | Preset | | 04 | ACK |

| CMD-1 | CMD-2 | NAME | CMD-1 | CMD-2 | NAME |
|--------------|--------------|------------------------------|--------------|--------------|----------------------|
| 3X | 01 | Open Port | 3X | 81 | Grant/Denied |
| 3X / BX | 02 | Next | 3X | 82 | List of ID's |
| 3X | 05 | Port Status Request | 3X | 85 | State Status |
| 3X | 06 | Position Request | 3X | 86 | Position |
| 3X / BX | 07 | Active ID Request | 3X | 87 | Active ID |
| 3X | 08 | Device Type Req. | 3X | 88 | Device Type |
| 3X | 10 | Syst. Status Request | 3X | 90 | System Status |
| 3X / BX | 11 | ID List | 3X | 91 | List of ID's |
| 3X / BX | 14 | ID Size Request | 3X | 94 | ID Size |
| 3X / BX | 16 | ID Request | 3X | 96 | ID Presence |
| 3X | 17 | Compression Settings Request | 3X | 97 | Compression Settings |
| 3X / BX | 18 | ID's Added List | 3X | 98 | List ID's Added |
| 3X / BX | 19 | ID's Deleted List | 3X | 99 | List ID's Deleted |

AX and BX versions are long-filename variants.
 Macro commands (5X/DX in CMD-1) are not implemented.

P2 (BVW) Serial Command Table

The server command set includes most BVW-type commands. Commands not implemented include those for DMC operations, audio split and in/out points, and those specifically related to tape as a medium.

| COMMAND | DESCRIPTION | RETURN | COMMENT |
|---------|------------------------|--------|---------|
| 00.11 | DEVICE TYPE REQUEST | ACK | |
| 00.1D | LOCAL ENABLE | ACK | |
| 00.0c | LOCAL DISABLE | ACK | |
| 20.00 | STOP | ACK | |
| 20.01 | PLAY | ACK | |
| 20.02 | RECORD | ACK | |
| 20.10 | FAST FORWARD | ACK | |
| 2x.11 | JOG FORWARD | ACK | |
| 2x.12 | VAR FORWARD | ACK | |
| 2x.13 | SHUTTLE FORWARD | ACK | |
| 20.20 | REWIND | ACK | |
| 2x.21 | JOG REVERSE | ACK | |
| 2x.22 | VAR REVERSE | ACK | |
| 2x.23 | SHUTTLE REVERSE | ACK | |
| 20.30 | PRE-ROLL | ACK | |
| 20.0F | EJECT | ACK | |
| 20.05 | STANDBY ON | ACK | |
| 20.60 | FULL E-E OFF | ACK | |
| 20.61 | FULL E-E ON | ACK | |
| 24.31 | CUE UP WITH DATA | ACK | |
| 40.08 | TIMER 1 RESET | ACK | |
| 40.10 | IN ENTRY | ACK | |
| 40.11 | OUT ENTRY | ACK | |
| 40.18 | IN SHIFT + | ACK | |
| 40.19 | IN SHIFT - | ACK | |
| 40.1A | OUT SHIFT + | ACK | |
| 40.1B | OUT SHIFT - | ACK | |
| 40.2D | LOST LOCK RESET | ACK | |
| 41.36 | TIMER MODE SELECT | ACK | |
| 41.37 | INPUT CHECK | ACK | |
| 44.00 | TIMER 1 PRESET | ACK | |
| 44.04 | TIME CODE PRESET | ACK | |
| 44.31 | PRE-ROLL TIME PRESET | ACK | |
| 41.33 | SERVO REFERENCE SELECT | ACK | |
| N/A | TIMER MODE STATUS | ACK | |
| 7x.20 | STATUS DATA | 7x.20 | |
| N/A | COMMAND SPEED SENSE | 71.2E | |
| 40.48 | REF VIDEO SELECT ON | ACK | |
| 40.49 | REF VIDEO SELECT OFF | ACK | |
| 6x.0E | CURRENT TIME SENSE | ACK | |

ACK = 10.01 NAK = 11.12.xx

Odetics® Protocol

Odetics serial protocol is an extension of P2 machine control protocol. Among its most significant features is the selection of a file by name rather than by time-code location, as with P2. Odetics protocol is used by many table-top controllers and some automation systems.

Note that the Odetics protocol only supports clip names up to 8 characters. Longer clip names are automatically filtered out from responses by the server.

ACK = 0X1001

| COMMAND | DESCRIPTION | RETURN | COMMENT |
|---------|-------------------------|--------|-----------------------|
| 0X1001 | ACK | | |
| 0X000C | LOCAL DISABLE | ACK | |
| 0X0011 | DEVICE TYPE | 0X1211 | BVW-75 |
| 0X001D | LOCAL ENABLE | ACK | |
| 0X2000 | STOP | ACK | |
| 0X2001 | PLAY | ACK | |
| 0X2002 | RECORD | ACK | |
| 0X2004 | STAND BY OFF | ACK | |
| 0X2005 | STAND BY ON | ACK | |
| 0X200D | DMC START | ACK | COMMAND HAS NO EFFECT |
| 0X200F | EJECT | ACK | |
| 0X2010 | FAST FORWARD | ACK | |
| 0X2X11 | JOG FORWARD | ACK | |
| 0X2X12 | VAR FORWARD | ACK | |
| 0X2X13 | SHUTTLE FORWARD | ACK | |
| 0X2020 | REWIND | ACK | |
| 0X2X21 | JOG REVERSE | ACK | |
| 0X2X22 | VAR REVERSE | ACK | |
| 0X2X23 | SHUTTLE REVERSE | ACK | |
| 0X2030 | PREROLL | ACK | |
| 0X2X31 | CUE UP | ACK | |
| 0X2X38 | PROG SPEED PLAY PLUS | ACK | |
| 0X2X39 | PROG SPEED PLAY MINUS | ACK | |
| 0X2052 | TENSION RELEASE | ACK | COMMAND HAS NO EFFECT |
| 0X2054 | ANTI CLOG TIMER DISABLE | ACK | COMMAND HAS NO EFFECT |
| 0X2055 | ANTI CLOG TIMER ENABLE | ACK | COMMAND HAS NO EFFECT |
| 0X2X5C | DMC SET FORWARD | ACK | COMMAND HAS NO EFFECT |
| 0X2X5D | DMC SET REVERSE | ACK | COMMAND HAS NO EFFECT |
| 0X2060 | FULL EE OFF | ACK | |
| 0X2061 | FULL EE ON | ACK | |

| COMMAND | DESCRIPTION | RETURN | COMMENT |
|---------|-----------------------------|--------|-----------------------|
| 0x4X00 | TIMER1 PRESET | ACK | |
| 0x4X04 | TIME CODE PRESET | ACK | |
| 0x4008 | TIMER1 RESET | ACK | |
| 0x4010 | IN ENTRY | ACK | |
| 0x4011 | OUT ENTRY | ACK | |
| 0x4X14 | IN PRESET | ACK | |
| 0x4X15 | OUT PRESET | ACK | |
| 0x4018 | IN SHIFT PLUS | ACK | |
| 0x4019 | IN SHIFT MINUS | ACK | |
| 0x401A | OUT SHIFT PLUS | ACK | |
| 0x401B | OUT SHIFT MINUS | ACK | |
| 0x4020 | IN RESET | ACK | |
| 0x4021 | OUT RESET | ACK | |
| 0x402D | LOST LOCK RESET | ACK | |
| 0x4X30 | EDIT PRESET | ACK | COMMAND HAS NO EFFECT |
| 0x4X31 | PRE-ROLL TIME PRESET | ACK | |
| 0x4X32 | TAPE AUTO SELECT | ACK | |
| 0x4X33 | SERVO REFERENCE SELECT | ACK | |
| 0x4X34 | HEAD SELECT | ACK | COMMAND HAS NO EFFECT |
| 0x4X35 | COLOR FRAME SELECT | ACK | COMMAND HAS NO EFFECT |
| 0x4X36 | TIMER MODE SELECT | ACK | |
| 0x4X37 | INPUT CHECK | ACK | |
| 0x4040 | AUTO MODE OFF | ACK | |
| 0x4041 | AUTO MODE ON | ACK | |
| 0x4046 | VARIABLE MEMORY OFF | ACK | |
| 0x4047 | VARIABLE MEMORY ON | ACK | |
| 0x4048 | VIDEO REFERENCE DISABLE OFF | ACK | COMMAND HAS NO EFFECT |
| 0x4049 | VIDEO REFERENCE DISABLE ON | ACK | COMMAND HAS NO EFFECT |
| 0x4X70 | VIDEO INPUT SELECT | ACK | |
| 0x4X91 | OUTPUT VIDEO LEVEL | ACK | COMMAND HAS NO EFFECT |
| 0x4X92 | OUTPUT SETUP BLACK LEVEL | ACK | COMMAND HAS NO EFFECT |
| 0x4X93 | OUTPUT CHROMA LEVEL | ACK | COMMAND HAS NO EFFECT |
| 0x4X98 | OUTPUT H PHASE | ACK | COMMAND HAS NO EFFECT |
| 0x4X99 | OUTPUT SC PHASE | ACK | COMMAND HAS NO EFFECT |
| 0x4X9A | OUTPUT VIDEO HUE | ACK | COMMAND HAS NO EFFECT |
| 0x6X0A | TC GEN DATA SENSE | | |
| | GEN TIME DATA | 0X7408 | |

| COMMAND | DESCRIPTION | RETURN | COMMENT |
|---------|--------------------------|--------|-----------------|
| | GEN UB DATA | 0X7409 | |
| | GEN U BAND TC DATA | 0X7809 | |
| 0x600C | CURRENT TIME SENSE | | |
| | CORRECTED LTC TIME DATA | 0X7414 | |
| | VITC TIME DATA | 0X7406 | |
| | TIMER1 DATA | 0X7400 | |
| | HOLD USER BITS LTC DATA | 0X7415 | |
| | HOLD USER BITS VITC DATA | 0X7416 | |
| 0x6010 | IN DATA | 0X7410 | |
| 0x6011 | OUT DATA | 0X7411 | |
| 0x6012 | A IN DATA | NAK | |
| 0x6013 | A OUT DATA | NAK | |
| 0x6020 | STATUS DATA | 0X7420 | |
| 0x6X23 | SIGNAL CONTROL DATA | 0X7423 | |
| 0x602E | COMMAND SPEED DATA | 0X712E | |
| 0x602F | VAR MEM SPEED DATA | 0X712F | |
| 0x6X30 | EDIT PRESET DATA | NAK | |
| 0x6031 | PREROLL TIME DATA | 0X7431 | |
| 0x6036 | TIMER MODE STATUS | 0X7136 | |
| 0xA001 | AUTO SKIP | ACK | ODETICS COMMAND |
| 0XAX02 | CUE UP TO RECORD | ACK | ODETICS COMMAND |
| 0XAX04 | PREVIEW IN PRESET | ACK | ODETICS COMMAND |
| 0XAX05 | PREVIEW OUT PRESET | ACK | ODETICS COMMAND |
| 0XA006 | PREVIEW IN RESET | ACK | ODETICS COMMAND |
| 0XA007 | PREVIEW OUT RESET | ACK | ODETICS COMMAND |
| 0XAX10 | ERASE ID | ACK | ODETICS COMMAND |
| 0XA014 | LIST FIRST ID | 0X8814 | ODETICS COMMAND |
| 0XA015 | LIST NEXT ID | 0X8814 | ODETICS COMMAND |
| 0XAX18 | ID STATUS REQUEST | 0X8818 | ODETICS COMMAND |
| 0XA01C | MAXIMUM STORAGE LENGTH | 0X891C | ODETICS COMMAND |
| 0XAX20 | SET DEVICE ID | ACK | ODETICS COMMAND |
| 0XA021 | DEVICE ID REQUEST | 0X8821 | ODETICS COMMAND |
| 0XCX01 | JUMP FORWARD X FRAMES | ACK | ODETICS COMMAND |
| 0XCX02 | JUMP BACK X FRAMES | ACK | ODETICS COMMAND |
| 0XCX03 | GET LOADED ID | ACK | ODETICS COMMAND |

Appendix C

Technical Specifications

| | |
|---|--|
| Video | |
| Video Inputs | 75Ω HD-BNC connector Each input automatically configures for HD or SD |
| Video Outputs | 75Ω HD-BNC connector Each output is independently configurable for HD or SD Automatic Up/Down/Cross conversion of clips to match selected output format. |
| HD Input/Output | HD-SDI, Compliant with SMPTE 292M 3G-SDI, Compliant with SMPTE 424M |
| SD Input/Output | SD-SDI, Compliant with SMPTE 259M |
| Video Formats | Selectable (by frame rate family): 720p at 59.94 Fps, 1080i and 480i at 29.97 fps or 720p at 50 Fps, 1080i and 512i at 25 fps |
| Video Encoding/Decoding | Selectable software based codecs. Standard complement includes MPEG-2 and H.264. Other optional codecs available. Fully agile playback of clips in any installed format. |
| Jog/Shuttle | Zero to 255X, forward/reverse |
| Vari-speed/Slow Motion Play with audio | Zero to 2X, forward/reverse |
| Channel Ganging | 2, 3 or 4 -channel synchronized playback for key & fill or multi-screen display |
| Audio | |
| Embedded Audio | 16 channels – SMPTE 299M (per video channel) |
| Program Storage | |
| Disk Storage System | 1.5 to 8 Terabyte SAS array, 4 drives, RAID-5 |
| Storage time | HD 60 hours approx. @ 40 Mb/sec using H.264 SD 200 hours approx. @ 30 Mb/sec using H.264 |
| Drive Replacement | Front panel access. Hot swappable. |
| Software upgrades | USB drive |
| Network Connectivity | |
| File import/export | FTP over Gigabit or 10GB Ethernet |
| Remote GUI | PC w/ Remote Workstation software |
| Playlist and As-Run Log file interchange. | FTP over Gigabit or 10GB Ethernet |
| Diagnostics | Download of events logs. |
| Miscellaneous | |
| Serial Control | VDCP, BVW, Odetics; 4 9-pin D connectors. |
| GPIO | 12 inputs, 12 outputs, 2 x 25-pin D |
| VBI & Ancillary Data | User selectable VANC. Any 6 lines within lines 8-22 (cc, AFD, etc) |
| Genlock Input | NTSC 286 mV as per SMPTE 170M PAL 300 mV as per ITU-R BT.624-4 HD Tri-level sync 600 mV _{p-p} as per SMPTE 274M/296M HD-BNC connector |
| Fault Monitoring LEDs | Front Panel LEDs: power, genlock, fans, system, RAID status |
| Fault Monitoring Output | Fault outputs on GPO, SNMP, Email notifications. |
| Operating System | Linux® |

| Power & Mechanical | |
|-------------------------------|--|
| Power Supply | 100-240 V, 50/60 Hz, 200 W modular power supply 100-240 V, 50/60 Hz, 460 W. Dual, modular, redundant (optional) |
| Mechanical | Rack mounting: 1.75" x 19" x 27.75" (44 x 483 x 705 mm) HWD. |
| Cooling | Multiple fans Hot swappable |
| Weight | Approx 50 lbs (23 Kg) net |
| Agency Approvals | ETL Intertek, FCC Class A, RoHS |
| Country of Origin | Made in U.S.A. |

Keyboard Shortcuts

| Transport Control | |
|--------------------|-------------------------------|
| L | Forward at 4x, 16x, 64x, 128x |
| K | Pause (Stop) |
| J | Reverse at 4x, 16x, 64x, 128x |
| Space Bar | Play/Pause (toggle) |
| R | Record |
| Home | GoTo Head point |
| End | GoTo Tail point |
| Shift + E | E/E Toggle |
| Shift + L | Loop Toggle |
| Shift + C | Local Toggle |
| Shift + J | Eject Clip |
| Right Arrow | Jog forward 1 frame |
| Left Arrow | Jog reverse 1 frame |

| File Operations | |
|-----------------|---------|
| Ctrl + N | New |
| Ctrl + O | Open |
| Ctrl + S | Save |
| Ctrl + A | Save As |
| Ctrl + D | Delete |
| Ctrl + R | Rename |

| Menu Operations | |
|-----------------|------------------------|
| Alt + F | Expands File Menu |
| Alt + T | Expands Transport Menu |
| Alt + C | Expands Configure Menu |
| Alt + P | Expands Playlist Menu |
| Alt + W | Expands Window Menu |
| Alt + H | Expands Help menu |

| Edit Operations | |
|------------------|----------------------|
| E | Enter/Exit Edit Mode |
| I | Capture Mark In |
| O | Capture Mark Out |
| Shift + R | Review Edit |
| Shift + T | Review Tail |

| Playlist | |
|--------------|------------|
| Home | Recue |
| Space | Play/Pause |
| K | Stop |

| Playlist Edit | |
|--------------------|------------------|
| Shift + C | Clear |
| Left Arrow | << (Remove clip) |
| Right Arrow | >> (Add clip) |

| Navigating Between Channels | |
|--------------------------------|--|
| Ctrl + < number > | Switches to Transport Channel <number> |
| Alt + < number > | Switches to Playlist Channel <number> |

| Mark In/Mark Out Times (Edit Mode) | |
|------------------------------------|--|
| < number > | Inserts right justified number |
| DEL | Removes last digit |
| ESC | Aborts time code entry |
| . ; : (any) | Shifts time code left |
| TAB | Toggles between Mark In and Mark Out times |
| | |
| | |

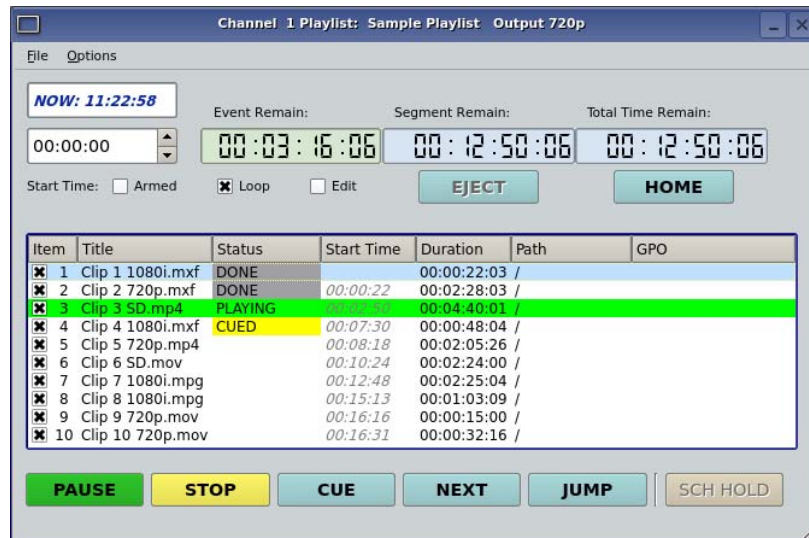
Appendix D

Playlist Management Detail

Playlists can be accessed via the server's FTP feature, allowing several capabilities:

- Lists can be backed up on a PC, and sent to another server.
- Lists can be viewed and printed from the PC
- Lists can be edited or created on the PC and uploaded to the server.

Playlists are found on the server FTP directory in the lists folder. They are simple text files with the extension .lst. Below is an example of a playlist as it appears in the GUI and its corresponding .lst file:



Playlist Example

```
#360PLAYLIST 2.0
#StartTime 13000100
#Loop 0

"/Public Service Announcement"
"/Adverts/Commercial"
"<HOLD>", HOLD
"/Sitcom", #1@0;10
"/Movie of the Week", #2@15;1000, #6@1245000;400
"/Documentary", SKIP
"/Still Frame"
"/Still Frame 2", frames=150
```

Each line of the example appears with its explanation below:

`#360PLAYLIST 2.0`

Header line, this must always be present exactly as shown.

`#StartTime 13000100`

This is the Start Time in military format, hours, minutes, seconds and frames, without leading zeros. This value shows 13:00:01 or 1 minute past 1 pm. The default is 0 which is 12 midnight. While frames are present in this value, the last two digits should always be "00" when entering any value except 0.

`#Loop 0`

This is the default, a looping list would show "`#Loop 1`".

"/Public Service Announcement"

This is the first clip in the list, named Public Service Announcement. It is enclosed in quotes, and preceded by a forward slash (/) which denotes that the clip is found in the root directory (i.e. it is not in a subfolder).

"/Adverts/Commercial"

This is the second clip, named Commercial. It is in the Adverts subfolder. Further levels of subfolder nesting would be shown as "/Folder/Subfolder/ClipName".

"<HOLD>", HOLD

This is a Hold event. The list will stop until it is restarted by command.

"/Sitcom", #1@0;10

This clip has a GPI Output event associated with it, in this case Output #1, at an offset of 1 frame, for a duration of 10 frames. Similar to Start Time values, GPI Output Offsets and Durations are represented as hours, minutes, seconds and frames without leading zeros. The format is:

| |
|---------------------------------------|
| ,#GPIOutputNumber@Offset;D uration |
|---------------------------------------|

"/Movie of the Week", #2@15;1000, #6@1245015;400

This clip has two GPI Output events, Output #2 @ 15 frames offset ; 10 seconds duration, and #6@1 hour 24 minutes 50 seconds 15 frames offset; 4 seconds duration.

"/Documentary", SKIP

This clip is skipped, this is programmed in the GUI by unchecking the check box for the event.

"/Still Frame"

Still frames appear the same as standard motion clips; the name of this clip is Still Frame.

"/Still Frame 2", frames=150

This still frame has a duration programmed. Unlike other time values, durations are frame counts. At 59.94 Hz, this is a 5 second duration. While it is possible to add a duration to a motion clip, this is not recommended. It is only allowed to specify fewer frames than the edited length of the clip (Mark In to Mark Out). You cannot make the clip "loop" by specifying a longer duration.

When opening Playlist files in a text editor, you may have to change the file type to "All Files" to be able to see files with the .lst extension.

Some text editors, such as Notepad, do not display each line separately. Word and Wordpad perform correctly because they accept files that have only Line Feeds (LF) at the ends of lines. The server will accept modified or externally created files with only LF or with both LF and Carriage Return (CR) at line endings. Do not use only CR without LF.

A list can be edited by:

- Changing the name of a clip: Clip names are case sensitive. Any clip name that does not match an existing clip will be reported as MISSING when the list is loaded on the server. This also applies to the name of a subfolder.
- Adding or deleting an event manually: Any of the available event types can be created.

- Modifying or adding to existing events: “, SKIP” “, frames = xx” or GPI Outputs can be added.
- Cutting and pasting the contents of one list into another, or duplicating sections of a list.

Save the file as a raw text file, and replace the .txt extension with .lst. File names should be limited to 31 characters.

When transferring .lst files via FTP, always specify Binary mode. Do not use ASCII or Auto.

Appendix E

As-Run Logging Detail

To enable As-Run logs, open a Playlist window, select Options, and then click on As-Run Logs. When enabled, a check mark will appear next to the As-Run log label, and files played by a playlist will be written to an As-Run log. Clips played in a transport window do not get written to an as-run log.

As-Run logs are available only through FTP downloads; they cannot be viewed or printed from the server itself. After logging into the server, select the ASRUN folder. All logs are stored in this location, and have the extension “.arl”.

As-Run Naming Convention

The Naming convention for as-Run logs is as follows: **mmdd.c_xxxx.n.arl**

| | |
|-------------|-------------------------|
| mm | month (01 through 12) |
| dd | Day (01 through 31) |
| c | Channel (1 through 3) |
| xxxx | Name of Playlist |
| n | Instance Count |
| arl | file extension |

Sample As-Run Log

IS-76152 as-run (Ch2:KQRS) Engr Wed Feb 02, 2009 [Wednesday PM] Pg 1

| | | | | |
|---|----------|-------------|------------------------------|-----------|
| 1 | 10:54:40 | 00:00:05:00 | KRBE ID - Legal | PLAYED OK |
| 2 | 10:54:45 | 00:00:30:00 | Cellular One – Talk Time | PLAYED OK |
| 3 | 10:55:15 | 00:00:30:00 | Burger Stop – 2 for 1 | PLAYED OK |
| 4 | 10:55:45 | 00:00:15:00 | Promo – Friends - Today | PLAYED OK |
| 5 | 10:56:00 | 00:00:30:00 | Bank of America – Gold Years | PLAYED OK |
| 6 | 10:56:30 | 00:07:18:05 | RICKI WEDNESDAY – SEG 1 | PLAYED OK |

Periodically, old logs should be deleted using the Delete command on your FTP client software.

As-Run Log Page Header

This section describes the format of the first line (page header):

IS-76152 as-run (Ch2:KQRS) Engr Wed Feb 02, 2009 [Wednesday PM] Pg 1

IS-76152: IS-XXXXX, where XXXXX is the unique machine ID as shown in Help > About > Unit ID.

as-run (Ch2:KQRS): ChX is the channel number and KQRS is the name of the specific channel, as defined in the Configuration System window.

Engr: The name of the server, as defined in the Configuration System window.

Wed Mar 30, 2009: The base date to which clip times are referenced.

[Wednesday PM]: The name of the playlist

Pg 1: The page number of the printout.

As-Run Log Body

This section describes the format of the body of an As-Run log:

2 10:54:45 00:00:30:00 Cellular One – Talk Time PLAYED OK

2: The line number (order) of the clip as it appears in the playlist. The same clip could have multiple numbers as files are added or deleted.

10:54:45 The time at which the clip was played in HH:MM:SS, on a 24-hour clock.

00:00:30:00 The length of the clip in HH:MM:SS.FF, on a 24-hour clock.

Cellular One – Talk Time: The name of the clip.

PLAYED OK: The status of the played clip.

Other possible status conditions are:

CLIPPED - Less than the full length played.

SKIPPED – The clip was skipped over because it was deselected (unchecked) or playback was order was modified by CUE or JUMP

STOPPED – The clip was stopped during payout.

Appendix F

Mechanical Drawing

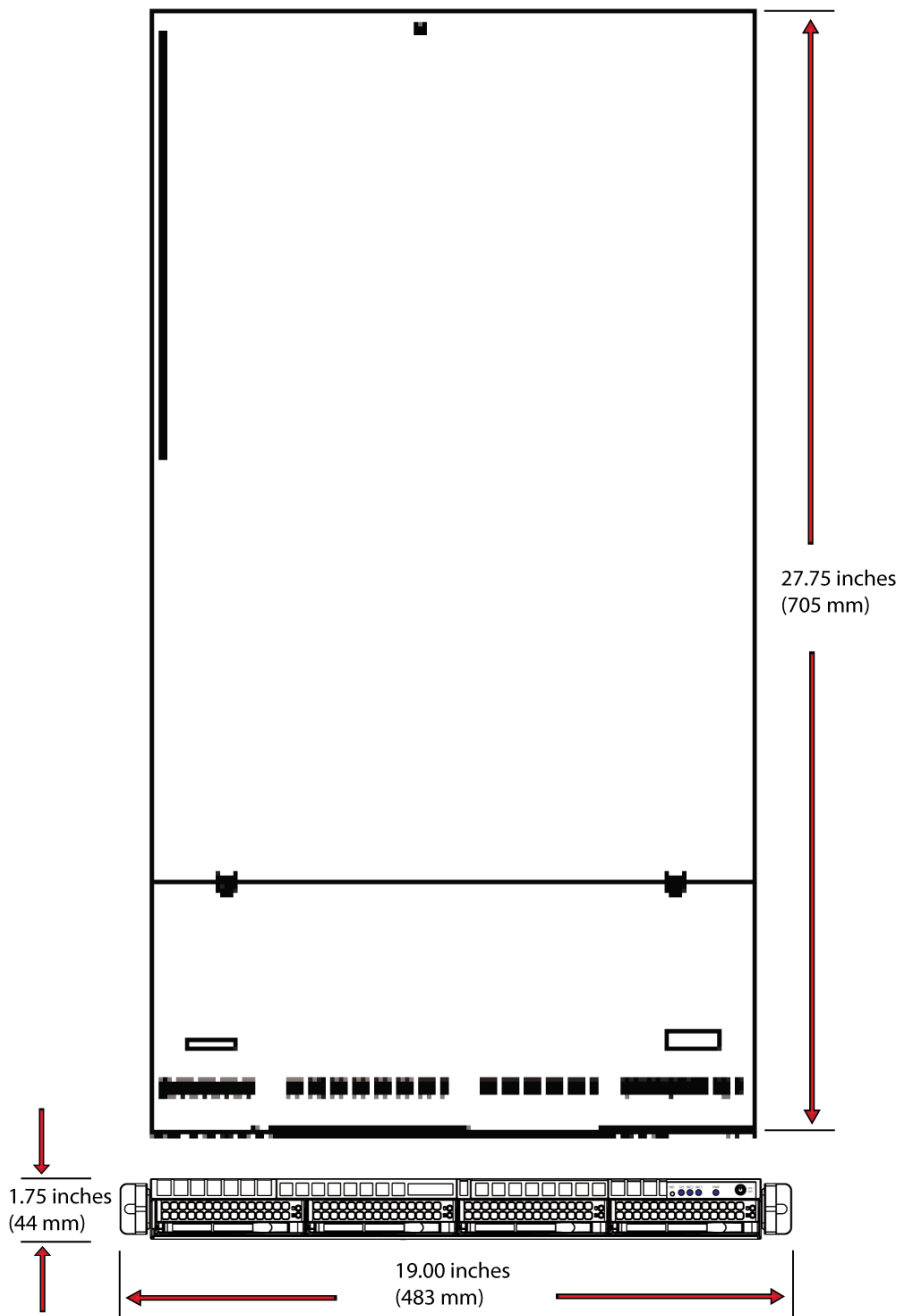


Figure 47: Dimensional Drawing

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