StudioComm for Surround

STUDIO TECHNOLOGIES INC.

Model 780-01 Central Controller / Model 790 Control Console

Overview

Creating and distributing eight channel (7.1) surround audio material has become common for entertainment, cinema, and allied applications. As such, the ability to simply and effectively monitor these sources is imperative during the recording and post-production process. Studio Technologies has addressed these needs with the StudioComm for Surround Model 780-01 Central Controller and the Model 790 and Model 71 Control Consoles. With digital audio inputs, digital monitor outputs, support for multiple user control surfaces, and an extensive set of resources it's a simple task to integrate a monitoring system into virtually any facility. The carefully selected group of features, including two surround (7.1) and one stereo input, configurable input-source time delay, LFE low-pass filter, pre- and post-fader surround outputs, configurable downmix and mute/solo functions, and bass management, along with a multi-format sync input, make the system powerful yet simple to operate. And by using the best of contemporary technology, as well as following rigorous design practices, the system's audio quality is excellent.

Model 790 Control Console

Key Features:

- 7.1 surround and stereo balanced digital audio inputs
- 7.1 surround balanced digital outputs
- Balanced digital audio capability
- Allows use of multiple control consoles
- Superior audio quality

A StudioComm for Surround system starts with the Model 790 Control Console. It's the system's "command center" and is designed to reside at a user's location, allowing fingertip selection of all monitoring functions. Numerous LEDs provide complete status information. A 4-digit numeric display indicates the level of the post-fader monitor output. A major strength of the Model 790 is its ability to configure, under software control, many important operating parameters. Intended for secondary monitoring locations that don't require all of the Model 790's features, the Model 71 Control Console is a compact user control surface. It provides three of the most basic functions: a rotary level control, dim on/off button, and reference level on/off button.

Most installations will use only one Model 790 Control Console. However, up to three additional Model 790 or Model 71 Control Consoles can also be connected. This provides multiple users with control over a facility's monitor system. And to make installation simple, the Model 780-01 provides power for all connected Model 790 or Model 71 units.

The core of this StudioComm for Surround system is the Model 780-01 Central Controller. The one-rack-space unit contains circuitry that supports balanced digital audio inputs, balanced digital monitor outputs, digital audio and control processing, and interfacing for the user control surface(s). The Model 780-01 provides two surround (7.1) and one stereo digital audio inputs. These balanced digital inputs are AES3-compliant; sources of this type are ubiquitous in many post-production and audio facility environments. The inputs allow a sample rate of 44.1, 48, 88.2 or 96 kHz and a bit depth of up to 24 to be supported. Circuitry associated with the stereo input provides sample rate conversion (SRC) capability, allowing a wide range of digital audio sources to be monitored. To compensate with processing delays (latency) associated with associated video displays up to 340 milliseconds of input delay can be selected. For flexibility, two delay values can be configured, allowing real-time selection as desired. A number of different signals can serve as the Model 780-01's digital audio timing reference. For synchronization with a master timing reference a dedicated source of word clock, DARS (AES11), bi-level video, or tri-level video can be connected. Alternately, the L/R connection of the actively selected surround or stereo input source can serve as the timing reference.

Model 780-01 Central Controller Front Panel

Model 780-01 Central Controller Back Panel

Two surround (7.1) digital monitor outputs are provided. The pre-fader monitor output can be used with metering systems that require signals that aren't impacted by level control or other monitoring functions. The post-fader monitor output is intended for connection to the inputs on a monitor loudspeaker system. Both the pre- and post-fader monitor outputs are compatible with equipment that requires balanced AES3 digital audio signals with an output impedance of 110 ohms and a signal level of 5 volts peak-to-peak (Vpp).

A sophisticated bass management function is integral to the Model 780-01's design and can be enabled if desired. The overall goal of bass management is very simple: ensure that the entire audio bandwidth of all channels can be accurately monitored. Many loudspeaker systems have inherent low-frequency limitations, preventing a true sonic "picture" of the source material from being presented. To overcome this, the low-frequency energy from the seven channels associated with the surround inputs and the two channels associated with the stereo input can be separated and routed to the subwoofer (SUB) channel of the post-fader monitor output. Several of the bass management functions can be configured to match the requirements of specific installations.

Great care was taken in designing the system's architecture, ensuring that the character of the audio input signals was preserved. All audio processing, including bass management, is performed in 32-bit logic using a high-speed field-programmable gate array (FPGA) integrated circuit. High-performance integrated circuits are used to perform input, output, and clocking tasks.

The Model 780-01 occupies one space (1U) in a standard 19-inch rack. Digital audio sources are interfaced with the Model 780-01 using one 25-pin female D-subminiature connector and one 3-pin female XLR connector. A BNC connector is used to interface with an external sync source. Pre- and post-fader digital monitor output signal connections are made using a 25-pin female D-subminiature connector. One 9-pin female D-subminiature connector is used to connect the Model 780-01 with a maximum of four Model 790 or Model 71 Control Consoles. A second 9-pin "D-sub" connector is used to interface with remote control signals. AC mains power is connected directly to the Model 780-01, with an acceptable range of 100 to 240 V, 50/60 Hz.

Model 71 Control Console

Additional Details

The Model 790 provides three buttons and associated LEDs for selection of the source to be monitored. The choices are the two surround inputs and the stereo input; only one source can be monitored at a time. It's interesting to note that while the surround inputs have an LFE channel associated with them, the corresponding post-fader monitor output channel is designated as subwoofer (SUB), rather than LFE. This terminology was selected to highlight the fact that this output channel may include more than just LFE content. The bass management function, if enabled, will redirect low-frequency energy from the main channels, combine it with the contents from the LFE input channel, and route the combination to the post-fader monitor output's subwoofer (SUB) channel.

An LFE low-pass filter function is provided as a means of checking the audio content in the LFE channel of a selected surround input. The user can enable and disable the function as required, helping to ensure that the proper signals are being mixed to the LFE channel. Having the correct audio content in the LFE channel can be critical as the LFE channel is typically band-restricted during distribution.

The post-fader monitor output levels can be controlled by way of a large, easy-to-use rotary control. The control, actually a digital encoder, allows level selection in precise 0.5-dB steps. The auto mute all function causes the post-fader monitor output channels to automatically mute whenever the output level control reaches maximum attenuation. Using the reference level function, the post-fader monitor output levels can be set to a pre-configured value. This is provided for audio-with-picture applications that require a specific monitor output level. The reference level is easily configured by taking an electronic "snapshot" of the desired monitor output level. For user confirmation, the 4-digit LED display will show the level of the post-fader monitor output channels. To match the needs of a facility, the display can be configured to show either the attenuation level or the sound pressure level (SPL).

The dim function allows the post-fader monitor output level to be reduced by a fixed dB amount. The dim level is configured from among four available values. A mute all function allows the post-fader monitor output channels to be simultaneously muted. The input mute/solo section allows an input channel to be muted or monitored as desired. Multiple channels can also be simultaneously selected for muting or "soloing."

Two output mute functions are also provided. One button allows the seven main channels of the post-fader monitor output to be muted. A second button allows the subwoofer (SUB) channel of the post-fader monitor output to be muted. The output mute functions, along with the input mute/solo function, allow a user complete flexibility when checking an input source and its path to the loudspeaker system. These mute and solo resources are crucial in a multichannel environment, especially when signals are passing through the bass management function.

Three downmix functions allow the selected input source to be checked for compatibility with common audio channel formats. This can help ensure that surround and stereo mixes correctly "fold down" into formats that utilize less channels than the original. Errors can be quickly identified and then corrected. The downmix functions, To 5.1 and To Stereo, apply only to the two surround (7.1) sources. The To Mono downmix function applies to the surround and stereo inputs. Several of the downmix parameters can be configured to best meet the needs of an application. The downmix functions always impact the post-fader monitor output. A configuration setting allows the pre-fader monitor output to be selected for pre- or post-downmix operation.

For flexibility, the StudioComm for Surround system is designed to easily integrate with equipment such as production intercom systems, on-air or recording tally signals, and audio consoles. Two remote-control inputs provide access to the mute all and dim functions. By providing access to these functions, talkback or slate activity from an audio console or other communications system can control the level of the post-fader monitor outputs.

Specifications

Model 780-01 Central Controller

General Audio:

Supported Sample Rates: 44.1, 48, 88.2, and 96 kHz

Word Length: 24 bits maximum

Internal Processing: 32 bits

Input-to-Output Latency: two samples (e.g., 0.042 milliseconds @ 48 kHz sample rate)

Digital Audio Inputs: 3 (18 audio channels total)

Configuration: two surround (7.1) and one stereo

Type: balanced AES3 (110 ohms, 5 Vpp)

Connector—Surround Inputs: 25-pin female D-subminiature (DB-25F), AES59-2012-compliant

Connector—Stereo Input: 3-pin female XLR

Sample Rate Conversion (SRC):

Application: available on the stereo input

Input Sample Rate Range: 8 to 216 kHz, limited to 1/6 to 6 times the output sample rate

Latency: 1 millisecond, nominal

LFE Input Channel Low-Pass Filter: –6 dB @ 120 Hz, 48 dB-per-octave, on/off selectable

Sync Source: configured to follow L/R of currently selected input or signal connected to sync input

Sync Input:

Compatible Sources: word clock, DARS (AES11), bi-level video, tri-level video

Jitter: 4 ns pp maximum

Connector: BNC (per IEC 60169-8 Amendment 2)

Termination: 75 ohms, selectable on/off

Digital Monitor Outputs: 2 (16 channels total)

Configuration: organized as two surround (7.1), one pre-fader, and one post-fader

Dynamic Range: >135 dB

Type: balanced AES3 (110 ohms, 5 Vpp)

Connector: 25-pin female D-subminiature (DB-25F), AES59-2012-compliant

Configurable Input Delay: 0 to 340 milliseconds @ 48 kHz sample rate (scales up or down depending on actual sample rate)

Post-Fader Monitor Output Level Offsets: each channel independently adjustable in 0.5-dB steps over a ±12-dB range

Bass Management:

Crossover Frequency and Type: –6 dB @ 40, 50, 60, or 80 Hz, symmetrical for low-pass and high-pass filters, maximally flat

Filter Slope: 12 dB-per-octave or 24 dB-per-octave

Overall Operation: on/off selectable

Downmix Functions: To 5.1, To Stereo, and To Mono

Control Console Interface:

Type: RS-485, 115.2 kbit/s, 8-1-N

Polling Interval: 50 milliseconds

Power: 12 Vdc, 500 mA maximum

Connector: 9-pin female D-subminiature (DE-9F)

Remote Control Inputs: 2

Functions: remote mute all, remote dim

Type: 3.3 Vdc logic, activates on closure to system common

Connector: 9-pin female D-subminiature (DE-9F)

AC Mains:

Requirement: 100 to 240 V, +10/–15%, 50/60 Hz, 15 W maximum

Connector: 3-blade, IEC 320 C14-compatible (mates with IEC 320 C13)

Dimensions:

19.00 inches wide (48.3 cm)
1.72 inches high (4.4 cm)
7.00 inches deep (17.8 cm)

Mounting: one space (1U) in a standard 19-inch rack

Weight: 3.6 pounds (1.6 kg)

Model 790 Control Console

Application: up to four Model 790 Control Consoles can be connected to a Model 780-01 Central Controller

Power: 12 Vdc nominal (9 Vdc minimum), maximum current 100 mA, provided by Model 780-01 Central Controller

Control Data:

Type: RS-485

Data Rate/Format: 115.2 kbit/s, 8-N-1

Connector: 9-pin female D-subminiature (DE-9F)

Dimensions (Overall):

7.20 inches wide (18.3 cm)
2.20 inches high (5.6 cm)
5.40 inches deep (13.7 cm)

Weight: 1.7 pounds (0.8 kg)

Model 71 Control Console

Application: up to three Model 71 Control Consoles can be connected to a Model 780-01 Central Controller

Power: 12 Vdc nominal (9 Vdc minimum), maximum current 35 mA, provided by Model 780-01 Central Controller

Control Data:

Type: RS-485

Data Rate/Format: 115.2 kbit/s, 8-N-1

Connector: 9-pin female D-subminiature (DE-9F)

Dimensions (Overall):

3.20 inches wide (8.1 cm)
2.20 inches high (5.6 cm)
4.10 inches deep (10.4 cm)

Weight: 0.8 pounds (0.4 kg)

Specifications and information contained in this Data Sheet subject to change without notice.

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