Film-Tech

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- Advanced, Patented Circle Surround System with 5 channel capability for future formats

- Full Octave EQ on Left Wall, Rear Wall and Right Wall Channels

- EQ and Level controls accessible from front panel

- Front Panel Security Cover to discourage tampering

- Presence LED indicates Rear channel signal

- Built-in Bypass System

- Works with all brands of digital players and with processors that have digital players attached

- One rack unit height - Easily replaces a vent panel in crowded racks

- DB25 interface for optional external 1/3 octave equalizer

- Easy interface to processor automation to select digital or optical formats

CENTER SURROUND 3X MULTI-CHANNEL SURROUND PROCESSOR

INSTALLATION AND OPERATION MANUAL

SMART
Devices, Inc.

CE

WARNING: If you do not make the proper connections to the format terminals, the CS-3X will NOT go into the proper format for digital soundtracks, and you will NOT get the full benefit of the product.

See the automation hookup section on Page 7.

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Circle Surround is a registered trademark
of SRS Labs, Incorporated, Santa Ana CA

CONTACT

SMART can be reached by telephone from 8:00 AM to 5:00 PM Monday - Friday if you have questions or need technical support regarding this or any other SMART product. The toll free number is 1-800-45-SMART
The FAX number is 1-770-449-6728

SMART is also available by e-mail at the following addresses:

service@smartdev.com for service questions or tech support
sales@smartdev.com for sales questions
engineering@smartdev.com for tech support

Visit the SMART WEB site at
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CENTER SURROUND 3X
OPERATION AND INSTALLATION MANUAL

INTRODUCTION

The SMART Center Surround 3X processor enhances the presentation of Digital Soundtracks by providing Left Rear and Right Rear Surround channels in addition to the normal Left Wall Surround and Right Wall Surround channels. This effect is available with ALL digital releases and is greatly magnified with the Digital Soundtracks which have been mixed to take advantage of the additional Rear Wall Surround channel. In addition, separate SP1 and SP2 channels are available which can be used for future improvements such as Overhead Surround channels or Offstage channels.

The CS-3X processor uses the patented Circle Surround matrix that provides very high separation between the Left, Center, and Right surround channels. Another similar product uses the older home matrix decoder chip that has a "center pile-up" effect if not receiving specific encoded material. For this reason the CS-3X will work with any digital soundtrack that has a phantom center channel without center channel "wandering." The CS-3X samples the center phantom signal and drives a signal "Presence" lamp on the front panel of the product that tells the operator that mid surround information is present.

Full octave band equalization is included to tune the speaker/room combination for the Left Wall, Rear Wall, and Right Wall Surround channels. Input and Ouput level trimpots are provided to match levels between normal operating modes and Bypass. A Rear Surround channel PRESENCE LED on the front panel indicates when Rear Surround channel material is present.

A Bypass mode allows the Left Surround and Right Surround channels to feed straight through while at the same time mixing into the Rear Wall Surround channel outputs. Automatic format switching circuitry connects to the format terminals on your stereo processor.

The Center Surround 3X is a one rack space product that connects between the stereo processor surround outputs and the surround power amplifier inputs. One or two additional channels of amplification will be needed for the Rear Wall Surround speakers, and the surround speakers may have to be rewired to create an array of Rear Wall Surround speakers. See the INSTALLATION section for details.

CONCEPTS

Digital Audio tracks are discrete, that is, each track can contain information that is totally separate from the information on other tracks. Since they are discrete tracks, it is possible to apply a matrix encoding process to any two of these tracks, just as it is done for optical stereo prints. Therefore, multiple channels of audio can be encoded into the two selected tracks. The Digital Left Surround and Digital Right Surround tracks have been selected to receive the matrix encoded signals. The new digital prints have an additional surround channel encoded into the Left Surround and Right Surround tracks. While
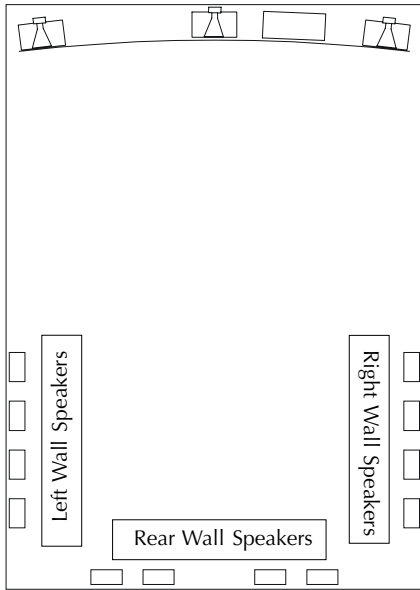
digital recording is a fine storage media, at some point the digital signals have to be converted back to analog to be heard. A properly designed matrix is not going to significantly affect the quality of the resulting analog signals.

The Center Surround 3X processor is a multi-channel matrix decoder that extracts the multiple channels from the Digital Left Surround and Digital Right Surround tracks and sends these signals on to the appropriate power amplifiers and speakers. By separating the surround speakers on the back wall of the cinema into a separate group, these speakers can deliver sounds from the rear wall channel which are separate from the left wall and right wall channels.

This concept can be extended even further because the matrix can decode additional channels from the original two channels. For example, speakers could be placed overhead so that passover effects
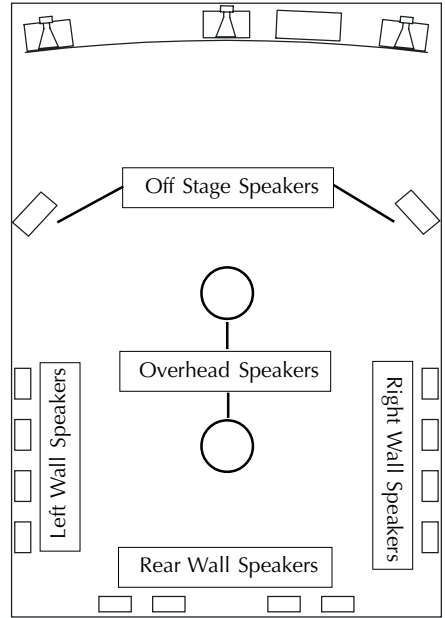
become much more realistic. These additional channels would have to be encoded on the soundtracks.

The overhead speakers, if used, do not have to be as high a quality as the surround speakers. In fact, if the overhead speakers high frequency response is limited in comparison to the stage and surround speakers, then the perception will be that the speakers are located higher up than they really are since high frequencies are normally attenuated more and more as the distance increases. This gives the illusion of distance which can contribute to the overhead effect.

Alternatively, mid-size full range off-stage effects speakers could be placed on the side walls, angled into the audience, between the screen and the surrounds so that voices or effects could be placed offstage. This all leads to a greater sense of reality in the audio presentation. These off-stage channels would have to be encoded on the soundtracks.

INSTALLATION

Find an appropriate place in the rack to mount the CS-3X. A good place is between the stereo processor and the power amps since the wiring will follow this path. Since the CS-3X is only one rack space high, often you can just use it to replace a vent or blank panel. This may be important if space is at a premium. If you are retrofitting an existing installation, you must also provide a place in the sound rack to mount another power amplifier for the required additional amplification channel(s) for the rear surround speakers. Depending on the existing setup, you may already have an additional amplification channel(s) available which can possibly be used for the new channel(s).

There are no particular ventilation requirements other than what is typical for other low level processing equipment. However, as always, it is a good idea to keep ALL electronic equipment running cool for best reliability and longest life.

WIRING

If you are placing this unit into an existing installation, the left surround and right surround wiring from the stereo processor to the power amps must be removed. Wire the left surround and right surround outputs from the stereo processor to the left surround and right surround inputs of the CS-3X. Wire the Left Wall, Right Wall, and Rear Wall outputs of the CS-3X to the appropriate power amplifier inputs. Use standard wiring practices for low level audio circuits.

OUTPUT MODES

The CS-3X can be used in one of two output modes. In the 3X format, there is no difference regardless of the ouput mode used. The difference appears only in the normal LS-RS format or in BYPASS.

Mode One requires that all rear wall speakers be wired as one channel and needs only one channel of amplification. This is the less expensive method of adding the rear channel to a system. In LS-RS format or BYPASS, the Left Surround signal appears in the Left Wall speakers AND in **all** the **rear wall** speakers. The Right Surround signal appears in the Right Wall speakers AND in **all** the **rear wall** speakers. This gives a partial wrap around effect to the individual Left and Right Surround sounds and does not maintain the channel separation as accurately as Mode Two.

Mode One requires a jumper wire be placed on terminals marked CRW1 and CRW2. Mode two requires the CRW1 and CRW2 terminals have NO jumper on them. The factory default is MODE TWO.

Mode Two requires that the rear wall speakers be wired as two separate channels. This mode needs two channels of amplification. This is the more expensive method of adding the rear wall channels to a system because it requires two channels of amplification instead of one. However, you may need to add a dual channel amplifier anyway if you do not have a spare amplifier channel. If this is the case, then use Mode Two. In LS-RS format or BYPASS, the Left Surround signal appears in the Left Wall speakers AND in the **left rear wall** speakers. The Right Surround signal appears in the Right Wall speakers AND in the **right rear wall** speakers. This mode more accurately maintains the channel separation when the system is **not** in 3X format.

AUTOMATION HOOKUP

Wire the format terminals to the similar format terminals on your stereo processor. This will allow the automation to control the format switching. The format terminals have internal protection diodes to allow systems with pullup voltages higher than +5VDC to be safely connected to the CS-3X processor.

See the hookup diagrams on Page 9 for wiring information.

CAUTION: When connecting the CS-3X to a Dolby CP500, the CAT 684 board must be Rev 1 or higher. Rev E or lower must be changed. Also, the CP500 must have software version 1.51 or higher installed.

WARNING: If you do not make the proper connections to the format terminals, the CS-3X will NOT go into the proper format for digital soundtracks, and you will NOT get the full benefit of the product.

SETUP

Adjusting the CS-3X is a straightforward procedure. It consists of setting levels and adjusting equalization. A Real Time Analyzer is required to do EQ. A Sound Pressure Level meter is required to set levels. Remove the security cover from the front of the CS-3X to gain access to the EQ and Level trimpots and LED Indicators.

*PLEASE NOTE: The Optical Processor Surround Equalizers will **NOT** be used. These Surround Equalizers **MUST** be set to a flat response to avoid frequency and phase errors which will degrade the performance of the CS-3X. If possible, use the line inputs on the RTA to look at the surround outputs of the stereo processor and adjust the surround equalizers for the flattest possible response. Do NOT use x curve compensation if that option is available on the RTA. When using a PANASTEREO processor, simply set the Surround EQ bypass switches to the BYPASS position. The equalizers in the CS-3X will be used for the surround channels.*

This setup procedure uses 85dB SPL as the level on which all adjustments are based. If you use a different SPL, make the appropriate compensations in the example levels shown in the procedure.

Place the CS-3X POWER/BYPASS switch in the BYPASS position and select LS-RS mode (pushbutton out).

Turn the Rear Wall Amp volume controls all the way down.

Turn Left Wall/Right Wall Amp volume controls up to normal (usually 1/2 to 2/3 up).

Adjust the **Optical Processor** levels to your normal levels (e.g., 85dB). The Left Surround and Right Surround levels should match the stage levels (e.g., 85dB on each surround channel).

Place the CS-3X POWER/BYPASS switch in the POWER position and select LS-RS mode (pushbutton out). Set all CS-3X OUT LEVEL trimpots to mid position to start.

With the pink noise feeding the Left Surround and Right Surround channels, adjust the LS and RS IN LEVEL trimpots until the LS CAL and RS CAL LEDs are just beginning to come on. This sets the proper level feeding the input of the Circle Surround matrix circuitry.

Turn on only the left surround pink noise.

Adjust the LS equalizers on the CS-3X for proper frequency response on the Real Time Analyzer. After proper EQ has been obtained, set the L WALL OUT LEVEL trimpot for 2dB less SPL reading (e.g., 83dB) than you obtained earlier when adjusting the Optical Processor Surround output levels. Turn the Left Rear Wall Amp volume control up to obtain a 2 dB increase in SPL (e.g., 85dB)

Turn on only the right surround pink noise.

Adjust the RS equalizers on the CS-3X for proper frequency response on the Real Time Analyzer. After proper EQ has been obtained, set the R WALL OUT LEVEL trimpot for 2dB less SPL reading (e.g., 83dB) than you obtained earlier when adjusting the Optical Processor Surround output levels. Turn the Right Rear Wall Amp volume control up to obtain a 2 dB increase in SPL (e.g., 85dB)

Turn OFF the Left Wall/Right Wall power amp. *Don't adjust the volume controls.*

Select the CS-3X mode (pushbutton in).

Turn on the left surround and right surround pink noise.

Adjust the Rear equalizers on the CS-3X for proper frequency response on the Real Time Analyzer. After proper EQ has been obtained, set the REAR LEVEL trimpot for 2 dB less SPL reading (e.g., 83dB) than you obtained earlier when adjusting the Optical Processor Surround output levels .
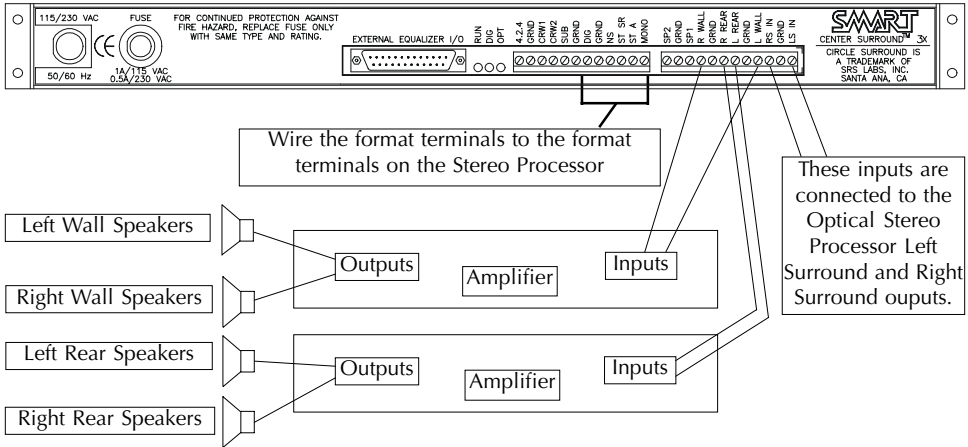
Turn ON all surround channels power amps.
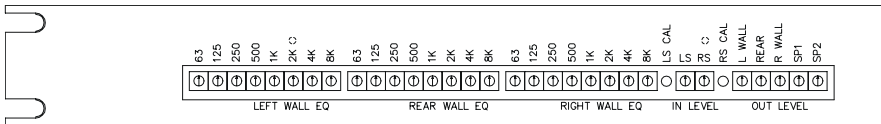
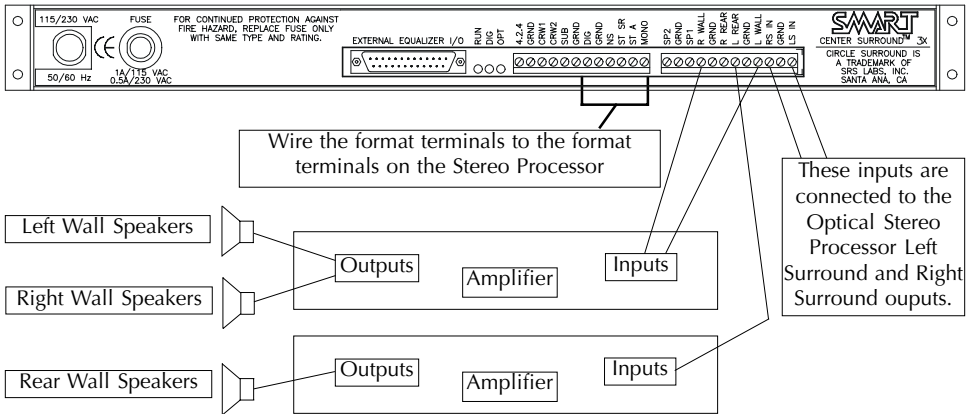EQ and Level Trimpot Section of Front Panel

Control Section of Front Panel
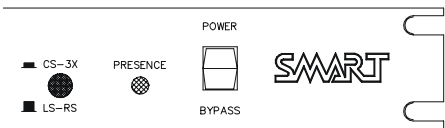
Rear view of chassis showing connections for Mode Two Output

Wire the format terminals to the format terminals on the Stereo Processor

These inputs are connected to the Optical Stereo Processor Left Surround and Right Surround ouputs.

Left Wall Speakers

Right Wall Speakers

Outputs   Amplifier   Inputs

Left Rear Speakers

Right Rear Speakers

Outputs   Amplifier   Inputs

Rear view of chassis showing connections for Mode One Output

Wire the format terminals to the format terminals on the Stereo Processor

These inputs are connected to the Optical Stereo Processor Left Surround and Right Surround ouputs.

Left Wall Speakers

Right Wall Speakers

Outputs   Amplifier   Inputs

Rear Wall Speakers

Outputs   Amplifier   Inputs

OPERATION

The CS-3X is automatic in its operation and requires virtually no operator intervention. Since the CS-3X format terminals are connected to the Optical Processor format terminals, all switching is done automatically.

There is a pushbutton which can be used to defeat the CS-3X operation if needed and force the unit into normal LS-RS operation. This will not need to be done except in rare instances where for some reason the digital soundtrack does not decode well.

It is important to leave the CS-3X/LS-RS pushbutton in the CS-3X position (in) at all times unless there is a need to defeat the 3X mode for some reason such as that mentioned in the above paragraph. If the pushbutton is put in the LS-RS position (out), and then pushed back in, the 3X mode will NOT be reselected until the automation, digital player, or optical processor has once again selected the digital format.

If there is a problem with the CS-3X such as distortion, noise, a dead channel, or some other problem, then the operator can simply press the POWER/BYPASS switch to the BYPASS position. In the BYPASS mode, the Left Surround and Right Surround signals are fed straight through relay contacts and on to the amplifiers. In addition, the Rear Wall channels are fed signals from the Left Surround and Right Surround Signals.

If the power supply in the CS-3X should fail completely, the unit will automatically go into BYPASS mode.

The PRESENCE LED on the front panel alerts the operator that REAR channel material is present on the digital soundtrack. When this LED is on, there is program material going to the REAR WALL speakers in the auditorium.

CS-3X/LS-RS Pushbutton
(normally pushed in)

POWER/BYPASS Switch

PRESENCE LED

OPERATOR CONTROLS

EXTERNAL EQ

If finer control over the Surround Channels EQ is desired, the CS-3X octave band equalizers can be bypassed, and 1/3 octave external equalizers , such as the SMART EQ6-1/3, can be patched in through the DB25 connector. The DB25 connector is male.

The pinout is as follows:

|	
Left Wall Send	Pin 25
Rear Wall Send	Pin 23
Right Wall Send	Pin 21
Left Wall Return	Pin 11
Rear Wall Return	Pin 9
Right Wall Return	Pin 7
Ground	Pins 2, 4, 6, 8, 10, 16, 18, 20, 22, 24
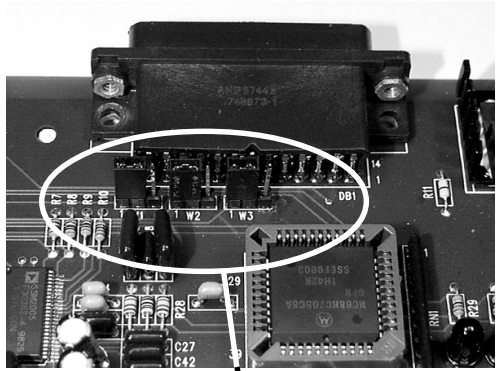
To bypass the internal EQ's, the top cover must be removed, and Jumpers W1, W2, and W3 must be changed to Pins 2 and 3. Normally, these jumpers are on Pins 1 and 2 as shipped from the factory.

Jumpers W1, W2, W3

VOLTAGE SELECTION AND GROUND LIFT

The CS-3X has soldered-in jumpers for voltage selection and ground lifting. These Zero Ohm Resistors are located at the right end of the board.

J1 and J3 should be installed for 110-120 VAC operation.
J2 only should be installed for 220-240 VAC operation.

Remove R32 if needed to lift the circuit ground from the chassis ground/AC ground. This may be necessary if your system has ground loops which can cause hum.

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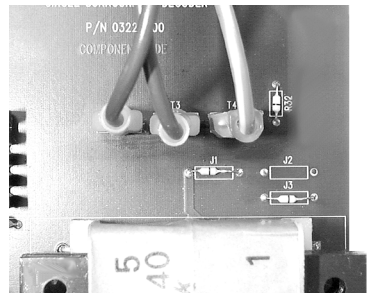
Center Surround EX
Installation and Operation Manual