

**DD Dolby**  
**Model SDU4**  
**Surround Decoder**

**User's Manual**

Issue 2

Part No. 91413

# User's Manual

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# Model SDU4

## Surround Decoder

### Dolby Laboratories Incorporated

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SDU4-CE  
Issue 2  
Part No. 91413

## TABLE OF CONTENTS

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<b>SECTION 1–INTRODUCTION .....</b>	<b>1-1</b>
1.1 The SDU4 .....	1-1
1.2 Specifications .....	1-2
1.3 Regulatory Notices .....	1-3
<b>SECTION 2–INSTALLATION &amp; CALIBRATION .....</b>	<b>2-1</b>
2.1 Monitor Setup .....	2-1
Front Loudspeaker Arrangement .....	2-1
Surround Loudspeakers .....	2-2
Equalization .....	2-2
2.2 Mains Fuse and Voltage Selection .....	2-2
2.2.1 230V-Only SDU4 .....	2-2
2.2.2 Multi-Voltage SDU4 .....	2-3
2.3 Audio Connections .....	2-3
2.3.1 External Facilities Connector (J503) .....	2-4
2.4 Set-Up Options .....	2-4
Center Speaker Switch.....	2-5
Wake-Up Mode Selection .....	2-6
External Master Level Control Switch .....	2-6
Surround Delay Setting on the Cat No 150.....	2-6
2.5 Input Level Setting.....	2-7
2.6 Output Level Setting .....	2-8
Output Level Adjustments .....	2-9
Master Level Control .....	2-9
<b>SECTION 3–OPERATION .....</b>	<b>3-1</b>
3.1 Operating Modes and Applications .....	3-1
Mono .....	3-1
Stereo .....	3-1
Dolby Surround .....	3-1
3.2 Detailed Applications.....	3-1
Broadcast .....	3-1
Music Recording For Dolby Stereo Films .....	3-3
Surround Productions .....	3-3
<b>SECTION 4–BLOCK DIAGRAM .....</b>	<b>4-1</b>

## SECTION 1 INTRODUCTION

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### 1.1 The SDU4

The Dolby SDU4 is designed for reference monitoring of Dolby encoded film formats or Dolby Surround program material in broadcast, audio-for-video, and music recording applications. The unit contains a reference 2:4 matrix decoder, like that used in the Dolby monitoring equipment found in film production centers. The 2:4 decoder takes a two-track matrix encoded signal as its input and generates four output signals (Left, Center, Right and Surround). The SDU4 is designed for monitoring rooms where the electro-acoustical response conforms to international standards for wide-range audio monitoring. The input program material can originate from any two-channel, reasonably phase-stable source, such as video tape, video disk, motion picture film, or stereo broadcast.

Broadcast applications include evaluation of air-masters of program material originally recorded for theatrical Dolby release. Using the SDU4, the engineer can check for compatibility in mono, conventional stereo, or in a fully decoded surround playback. Music studios will find the SDU4 invaluable when monitoring material intended for integration into Dolby film soundtracks as it provides accurate reproduction of two-channel material in its final dimensional perspective. The SDU4 can also derive a center output signal for monitoring the mono compatibility of conventionally produced stereo material.

An internal calibrate mode, using channel-sequenced pink noise, allows easy verification of monitor levels and equalization. Internal logic allows the correct reproduction of program material either with or without a center loudspeaker. Other features include extended monitor functions, balanced inputs and outputs at professional levels, monitor level control, remote control of all functions and external interface capability.

The SDU4 is designed for use with a Dolby Surround encoder, the SEU4. A first step in equipping a post-production facility for future surround productions should be the installation of the SDU4 and the establishment of a correct monitoring environment.

## 1.2 Specifications

### Layout:

Rack-mount unit incorporating a professional surround decoder module, interface circuitry, and power supply.

### Signal Connections: (on rear panel)

Lt (Left Total) and Rt (Right Total) XLR inputs for two-channel encoded signal; Left, Center, Right, and Surround XLR outputs. Additionally, Lt, Rt, and Left, Center, Right, and Surround monitor points are provided at a 25 pin female D connector.

### Front Panel Controls and Indicators:

One toggle switch and three push-button switches control system operating modes and internal test signals. A single rotary knob controls four-channel master level. Screwdriver adjustable controls recessed behind panel for adjustment of input and output levels. LED meters indicate Lt and Rt input level. Signal present LEDs indicate Left, Center, Right, and Surround decoder outputs.

### Input Circuit: (0 dBr=0.775 V rms)

Two balanced floating transformerless inputs. Input gain adjustment will accommodate a range of 300 mV (-8.2 dBr) to 2 V rms (+8.2 dBr). Input impedance is greater than 10 k ohms. Maximum common mode voltage 4 V rms, 5.8 V peak.

### Output Circuit:

Four balanced floating transformerless outputs. Output gain adjustment will accommodate a range of 250 mV (-9.8 dBr) to 2.5 V (+10.2dBr) at the normal master level control setting. Output impedance 25 ohms.

Maximum output voltage +26 dBr into balanced 600 ohm load, less into lower impedances. Maximum output +20dBr into unbalanced 600 ohm load.

### Operating Modes:

*Dolby Surround, conventional stereo, and mono* modes, selected by front panel pushbutton or remote control.

### Pink Noise Calibration Function:

Pink noise from the SDU4's internal generator can be sent to the outputs in several ways. Noise can be automatically cycled between Left, Center, Right, Surround, remaining for 3 seconds at each output (LCRS sequence); or cycled between Center and Surround remaining for 3 seconds per output (CSCS sequence); or to any desired channel under manual control. The system should be adjusted so this signal produces a sound pressure level (SPL) of 85dBc at the desired monitoring position.

### Center Speaker In/Out:

Selected by an internal switch. Used to match either theater-style systems with three front channels or smaller systems with two front loudspeakers. The latter mode routes spatially decoded signals from the surround decoder as follows: left decoder output to Left main output; right decoder output to Right main output; center decoder output split to Left and Right main outputs at a reduced level; surround decoder output to Surround main output.

### Monitor Outputs:

Single-ended monitor outputs are provided for Lt and Rt and for L, C, R, and S signals. Dolby level is 500mV (-3.8dBr) at these outputs. Output impedance is 200 ohms or less, and these outputs can drive loads greater than 10 k ohms.

### Overall Frequency Response:

20Hz-20 kHz  $\pm$  1dB (L, C, and R)

100Hz-7 kHz  $\pm$  3dB (surround output)

### S/N Ratio: (referenced to Dolby level)

Greater than 80 dB (Left, Center, Right), CCIR/ARM weighted.

Greater than 70dB (Surround), CCIR/ARM weighted.

(Master level control at normal setting.)

### Distortion:

Total Harmonic Distortion (THD) at the main balanced outputs will not exceed 0.25% into balanced loads 600 ohms or greater at any output level up to 12.5 V rms at any master level control setting.

THD at Dolby level at 1kHz with input and output adjusted for +4dBr, 0.1% typical.

### Ambient Operating Temperature:

Up to 40 degrees C.

### Finish:

Bottom tray and cover clear alodine. Front panel black with white lettering.

### Size:

1 Rack Unit 43 mm (1.75") high, 260 mm (10.25") deep behind mounting surface; maximum projection in front of mounting surface 22 mm (0.875").

### Weight:

5 kg (11 lb.).

### Power Requirements:

The SDU4 consumes about 20 watts and is designed for operation from a centrally switched power source. 230 V version: 198-264 V ac, 50/60 Hz, uses one 20 mm T250 mA fuse. Multi-voltage version: 85-132 V ac, 50/60 Hz, uses one 1.25" 500 mA slow-blow fuse, or 187-264 V ac, 50/60 Hz, uses one 20mm T250 mA fuse.

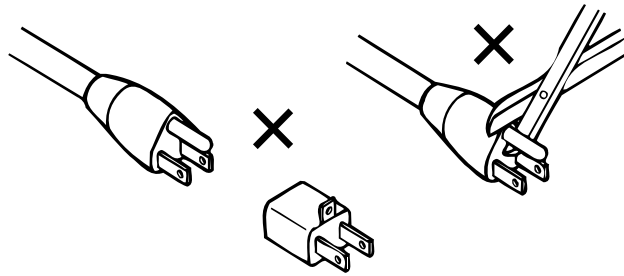
**Specifications subject to change without notice.**

## 1.3 Regulatory Notices

### UL

Troubleshooting must be performed by trained technicians. Do not attempt to service the unit unless you are qualified to do so.

**WARNING:** Check that the units have been set to the correct supply voltage and that the correct fuses have been installed. To reduce the risk of fire, replace the fuses only with the same type and rating. Do not use a ground-lifting adaptor and never cut the ground pin on the three-prong power plug.



### UK

Connections for United Kingdom:

**WARNING: THIS APPARATUS MUST BE EARTHED.**

As the colours of the cores in the mains lead may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows:

- The core which is coloured green and yellow must be connected to the terminal in the plug which is marked with the letter **E** or by the earth symbol  $\perp$ , or coloured green or green and yellow.
- The core which is coloured blue must be connected to the terminal which is marked with the letter **N** or coloured black.
- The core which is coloured brown must be connected to the terminal which is marked with the letter **L** or coloured red.

### EUROPEAN EMC

The 230V unit complies with the EMC requirements of EN 50081-1, EN 50082-1, prEN 55103-1 and -2 when installed in an E2 environment in accordance with this manual.

## IEC NOTICES

## IMPORTANT SAFETY NOTICE

This unit complies with the safety standard IEC65. To ensure safe operation and to guard against potential shock hazard or risk of fire, the following **must** be observed:

- Ensure the **voltage selector** is set to the correct mains voltage for your **supply**.
- Ensure **fuses** fitted are the **correct rating and type** as marked on the unit.
- The unit **must be earthed** by connecting to a correctly wired and **earthed** power outlet.
- The **power cord** supplied with this unit must be wired as follows:

Live—Brown Neutral—Blue Earth—Green/Yellow

GB

## IMPORTANT - NOTE DE SECURITE

Ce materiel est conforme à la norme IEC65. Pour vous assurer d'un fonctionnement sans danger et de prévenir tout choc électrique ou tout risque d'incendie, veuillez à observer les recommandations suivantes.

- Le selecteur de tension doit être placé sur la valeur correspondante à votre alimentation réseau.
- Les fusibles doivent correspondre à la valeur indiquée sur le materiel.
- Le materiel doit être correctement relié à la terre.
- Le cordon secteur livré avec le materiel doit être câblé de la manière suivante:

Phase—Brun Neutre—Bleu Terre—Vert/Jaune

F

## WICHTIGER SICHERHEITSHINWEIS

Dieses Gerät entspricht der Sicherheitsnorm IEC65. Für das sichere Funktionieren des Gerätes und zur Unfallverhütung (elektrischer Schlag, Feuer) sind die folgenden Regeln unbedingt einzuhalten:

- Der Spannungswähler muß auf Ihre Netzspannung eingestellt sein.
- Die Sicherungen müssen in Type und Stromwert mit den Angaben auf dem Gerät übereinstimmen.
- Die Erdung des Gerätes muß über eine geerdete Steckdose gewährleistet sein.
- Das mitgelieferte Netzkabel muß wie folgt verdrahtet werden:

Phase—braun Nulleiter—blau Erde—grün/gelb

D

## NORME DI SICUREZZA - IMPORTANTE

Questa apparecchiatura è stata costruita in accordo alle norme di sicurezza IEC 65. Per una perfetta sicurezza ed al fine di evitare eventuali rischi di scossa elettrica o d'incendio vanno osservate le seguenti misure di sicurezza:

- Assicurarsi che il selettore di cambio tensione sia posizionato sul valore corretto.
- Assicurarsi che la portata ed il tipo di fusibili siano quelli prescritti dalla casa costruttrice.
- L'apparecchiatura deve avere un collegamento di messa a terra ben eseguito; anche la connessione rete deve avere un collegamento a terra.
- Il cavo di alimentazione a corredo dell'apparecchiatura deve essere collegato come segue:

Filo tensione—Marrone Neutro—Blu Massa—Verde/Giallo

I

## AVISO IMPORTANTE DE SEGURIDAD

Esta unidad cumple con la norma de seguridad IEC65. Para asegurarse un funcionamiento seguro y prevenir cualquier posible peligro de descarga o riesgo de incendio, se han de observar las siguientes precauciones:

- Asegúrese que el selector de tensión esté ajustado a la tensión correcta para su alimentación.
- Asegúrese que los fusibles colocados son del tipo y valor correctos, tal como se marca en la unidad.
- La unidad debe ser puesta a tierra, conectándola a un conector de red correctamente cableado y puesto a tierra.
- El cable de red suministrado con esta unidad, debe ser cableado como sigue:

Vivo—Marrón Neutro—Azul Tierra—Verde/Amarillo

E

## VIKTIGA SÄKERHETSÅTGÄRDER!

Denna enhet uppfyller säkerhetsstandard IEC65. För att garantera säkerheten och gardera mot eventuell elchock eller brandrisk, måste följande observeras:

- Kontrollera att spänningsväljaren är inställd på korrekt nätspänning.
- Kontrollera att säkringarna är av rätt typ och för rätt strömstyrka så som anvisningarna på enheten föreskriver.
- Enheten måste vara jordad genom anslutning till ett korrekt kopplat och jordat el-uttag.
- El-sladden som medföljer denna enhet måste kopplas enligt följande:

Fas—Brun Neutral—Blå Jord—Grön/Gul

S

## BELANGRIJK VEILIGHEIDS-VOORSCHRIFT:

Deze unit voldoet aan de IEC65 veiligheids-standaards. Voor een veilig gebruik en om het gevaar van elektrische schokken en het risico van brand te vermijden, dienen de volgende regels in acht te worden genomen:

- Controleer of de spanningscarroussel op het juiste Voltage staat.
- Gebruik alleen zekeringen van de aangegeven typen en waarden.
- Aansluiting van de unit alleen aan een geaarde wandcontactdoos.
- De netkabel die met de unit wordt geleverd, moet als volgt worden aangesloten:

Fase—Bruin Nul—Blauw Aarde—Groen/Geel

NL

## SECTION 2 INSTALLATION AND CALIBRATION

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### 2.1 Monitor Setup

#### Front Loudspeaker Arrangement

The SDU4 is designed for monitoring rooms with either two or three front loudspeakers. The choice between using either two or three front loudspeakers depends upon the distance between the Left and Right speakers, (how large the stereo image is) and how the primary listening area is arranged relative to the front sound image. In most cases, three front loudspeakers are recommended with the center loudspeaker located immediately above or below the picture. The center loudspeaker should be the same type as the left and right loudspeaker to prevent audible shifts in tonal balance when effects are panned across the front.

Two front loudspeakers may be adequate in monitoring situations where the sound image is small to mid-sized (no more that eight feet apart) and the listening area is relatively small and located on axis between the two loudspeakers. In these situations, a “phantom” center can be used to reliably localize the center channel information near the center of the picture.

The need for a center channel in video playback increases as the picture size is reduced for a given playback situation. This is caused by the increased need to localize dialogue to the center of the sound image when a smaller picture is used. In the case where a phantom center (no center loudspeaker) is used, a smaller picture increases the likelihood that off-axis seating will cause the phantom to fall outside the picture area.

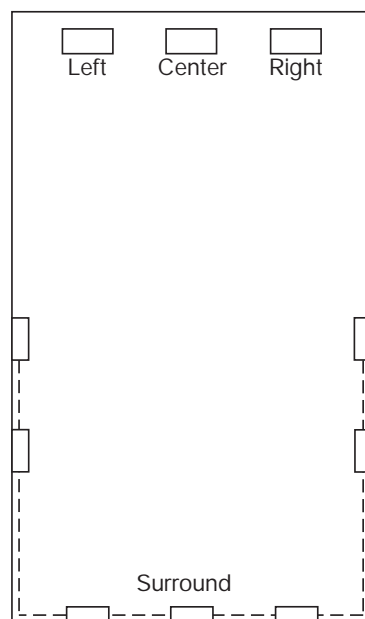


Figure 2.1 Typical loudspeaker arrangement



## Surround Loudspeakers

The surround loudspeakers are used to distribute a single channel of sound in a diffuse field behind the viewer. The number of loudspeakers needed, therefore, depends upon the size of the area to be covered. In smaller rooms, such as those used for video production and home surround installations, two loudspeakers generally provide sufficient coverage.

## Equalization

The monitor system used with the SDU4 should have its electro-acoustical frequency response adjusted to conform with international standards for wide-range audio monitoring. This standardized equalization is encouraged, as it allows program material to be interchanged between various monitoring rooms and, ultimately, the viewer's home, without apparent or objectionable shifts in program equalization.

## 2.2 Mains Fuse and Voltage Selection

### 2.2.1 230V-Only SDU4

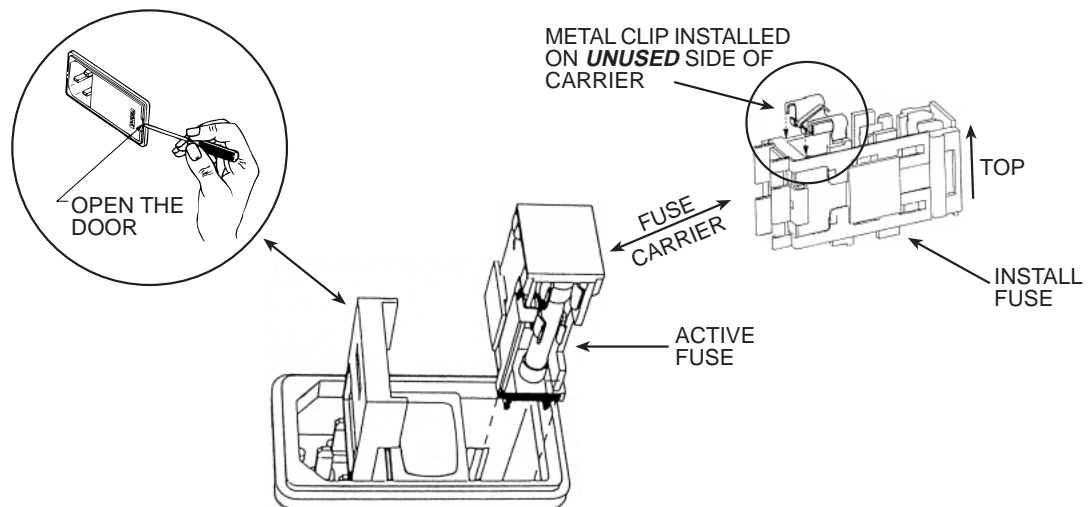


Figure 2.2 Fuse compartment, 230V unit

Open the fuse compartment door in the AC mains input connector with a small flat blade screwdriver (see Figure 2.2), and check that the fuse has the correct rating (T250mA 20mm time-lag). The fuse carrier must be inserted into the compartment with the orientation as shown. Do not force the carrier into the compartment. Damage will result.

## 2.2.2 Multi-Voltage SDU4

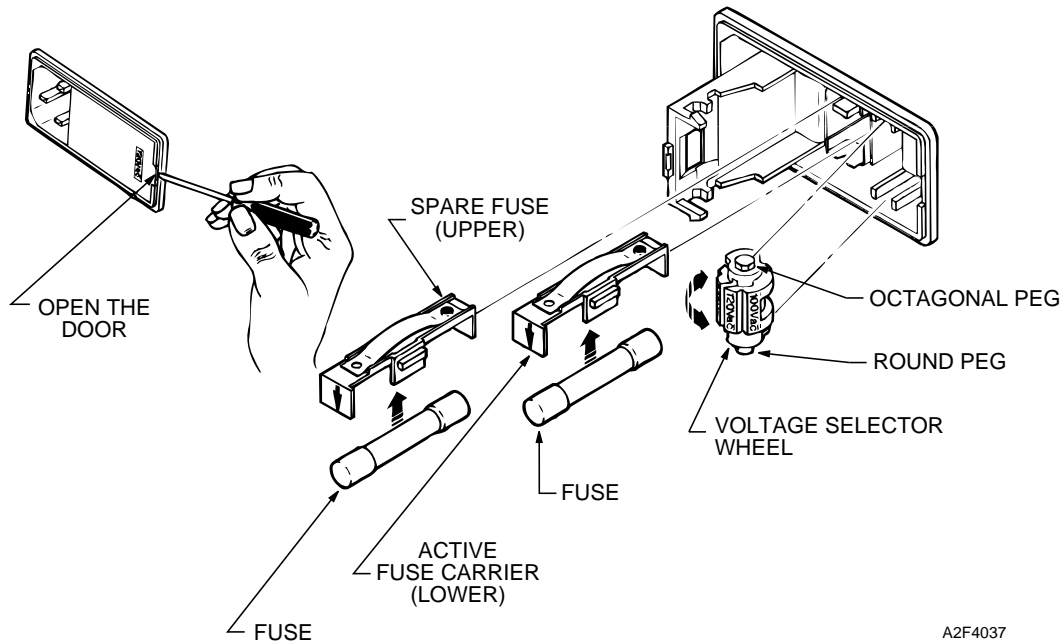


Figure 2.3 Fuse compartment, multi-voltage unit

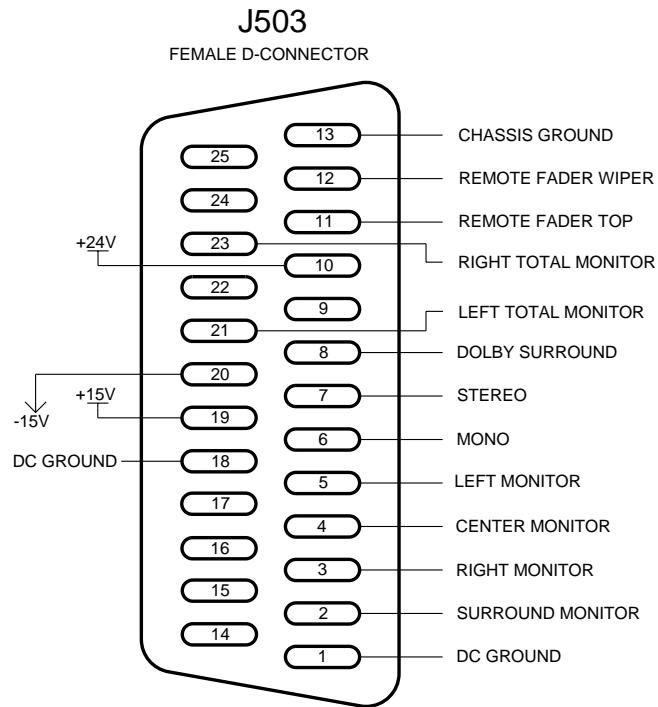
Open the fuse compartment door in the AC mains input connector with a small flat blade screwdriver (see Figure 2.3), and check that the fuse has the correct rating. If necessary, rotate the selector drum until it displays the correct voltage for the installation. (The drum may also be removed and replaced in the desired position. It will only fit one way around.) Snap the fuse compartment door closed.

For 85 to 132 Vac use 500 mA 1.25" slow-blow fuse.  
For 187 to 264 Vac use T250 mA 20mm time-lag fuse.

## 2.3 Audio Connections

The SDU4 has been designed to interface with professional audio equipment at commonly found studio operating levels. Connection to and from the unit are made using standard 3-Pin XLR-type connectors. Both the input and output stages are electronically balanced with pin 2 being positive and pin 3 being negative. For optimum immunity to radio-frequency interference, cable shields should be connected to the shells of the XLR connectors, not to pin 1.

### 2.3.1 External Facilities Connector (J503)



*Figure 2.4 J503 connections*

Connector J503 provides fixed level (500mV for Dolby level) monitoring points for Lt and Rt and for L,C,R and S signals, and various remote control functions; see Figure 2.4. For optimum immunity to radio-frequency interference all cables connecting to J503 should be shielded with the shields connected to the metal cover of the D-connector, not to pin 13 or 1.

## 2.4 Set-Up Options

To change any of these options (except surround delay), remove the front panel (2 screws on top and 5 underneath) and the top cover (2 screws each side). All

controls are on the right-hand module, Cat. No. 344, as shown in Figure 2.5.

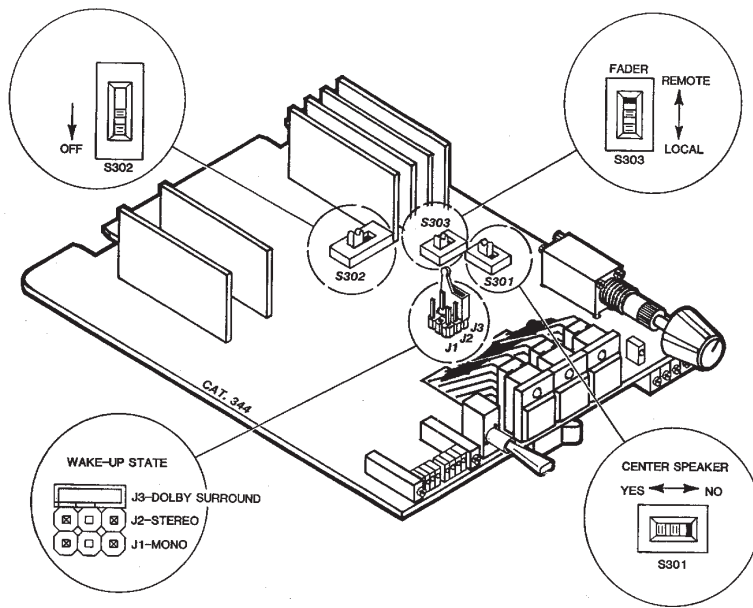


Figure 2.5 Cat. No. 344

### Center Speaker Switch

Switch S301 allows the SDU4 to be installed in monitoring rooms that have either two loudspeakers (labeled “center speaker, no”) or three loudspeakers (“yes”). The factory setting is “yes.”

While decoding Dolby Surround with the internal switch in the “yes position, the decoder’s Center output signal is sent to the center loudspeaker, as normal. With the internal switch in the “no” position, the decoder’s center output signal is divided and added into the Left and Right output channels, preserving a correct phantom center image.

With the SDU4 set to MONO mode, the internal center speaker switch determines where the mono output signal will be sent. With S301 switched to the “yes” position, the mono signal (a sum of Lt and Rt) is sent to the Center loudspeaker. In the “no” position, the mono signal is reduced in level by 3dB and sent to the Left and Right loudspeakers, thereby creating a phantom center image.

The following charts summarize the SDU4 output signals in the mono, stereo and Dolby Surround operating modes. Lt and Rt refer to the input signals. L,C,R, and S refer to the 2:4 decoder output signals.

#### SDU4 OUTPUTS CENTER—LOUDSPEAKER SWITCH SET TO “YES”

Mode	Left	Center	Right	Surround
Mono	—	Lt & Rt	—	—
Stereo	Lt	—	Rt	—
Dolby Surround	L	C	R	S

### SDU4 OUTPUTS—CENTER LOUDSPEAKER SWITCH SET TO “NO”

Mode	Left	Right	Surround
Mono	.707 (Lt & Rt)	.707 (Lt & Rt)	—
Stereo	Lt	Rt	—
Dolby Surround	L + .707 (C)	R + .707 (C)	S

### Wake-Up Mode Selection

The SDU4 can be set to default to any operating mode when power is first turned on. This is set using the internal jumpers J1/J2/J3. See Figure 2.5. The factory setting is Dolby Surround.

### External Master Level Control Switch

An external master level control may be added by connecting an external 100K linear potentiometer between pins 11, 12, and 1 on J503. (All three connections are required.) The external level control must be engaged by switching the internal switch S303 to the “remote” position. See Figure 2.6. The factory setting is “local.”

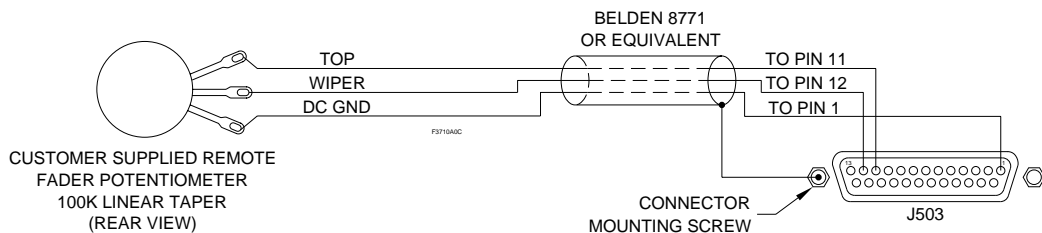


Figure 2.6 External fader connected to J503

### Surround Delay Setting

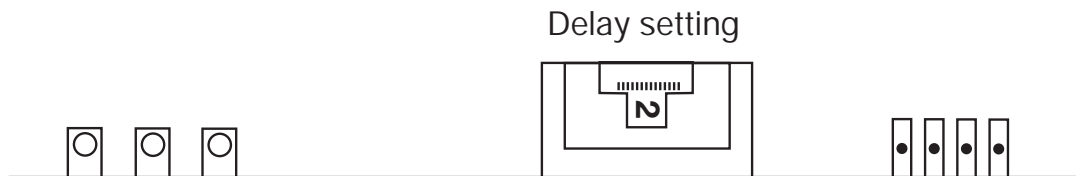


Figure 2.7 Cat. No. 150 delay adjustment

The Cat. No.150 decoder module has a single adjustment for setting the surround delay. The delay can be adjusted in 10ms steps. It is helpful to understand its purpose. The delay to the surround channel is used to reduce the audibility of crosstalk by offsetting it in time behind the arrival of the main signal coming from the front loudspeakers. This is particularly important with dialog information, where crosstalk would be particularly bothersome when heard coming from the rear. By delaying the surround channel so that common crosstalk information arrives at the listener about 15-20 ms after the main front signal, the audibility of the crosstalk signal is substantially reduced.

The delay setting can be estimated by using the following method:

1. Estimate the distance between the primary listening location and the nearest surround loudspeaker, in feet. If the metric system is used, convert the distance from meters to feet by multiplying by three (3).
2. Estimate the distance from the primary listening location to the front center loudspeaker, in feet. If the metric system is used, multiply the distance by three (3) to convert distance from meters to feet.
3. Subtract the distance measured in step 1 above from the distance measured in step 2, then add 20 and round the answer to the nearest 10. The result is the delay time, in milliseconds.

For example:

The listening location is 10 feet (3.3 meters) from the surround speakers.

The selected seat is 20 feet (6.6 meters) from the front center speaker.

The delay is set for  $(20-10) + 20 = 30$  milliseconds, switch setting 1.

The delay time for each switch setting is:

20ms	_____	0
30ms	_____	1
40ms	_____	2
50ms	_____	3
60ms	_____	4
and so on....		
150ms	_____	13

As the SDU4 will frequently be used in small rooms, it is likely that the delay will always be set to the minimum position (0).

## 2.5 Input Level Setting

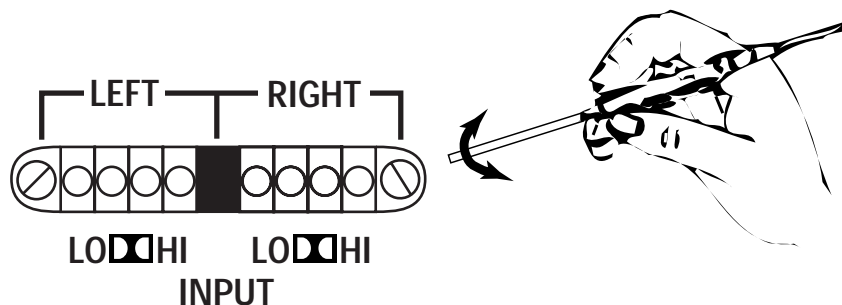


Figure 2.8 LED calibration meter and input adjustments

The SDU4 contains two four element LED calibration indicators for setting of input level.

The two input level potentiometers are set so that reference tone from the signal source, representing the studio's operating level, is equal to the SDU4's internal operating level.

Any level between  $-8$  dBr and  $+8$  dBr can be set to correspond with the internal operating level. This is indicated by the two green LEDs being equally illuminated. ( $0\text{dBr} = 0.775\text{V rms.}$ )

## 2.6 Output Level Setting

The SDU4 contains an internal pink noise generator that allows easy setting of the output level controls and the verification of correct operation of the monitor system. (Always select Dolby Surround mode before using the pink noise generator. If unintentionally you operate the toggle switch in one of the other modes, return it to the OFF position and select Dolby Surround to reset the internal logic.)

The generator has two modes of operation—manual and automatic—as selected by the front panel toggle switch. With the switch in the center, or “off” position, the SDU4 functions normally. In the DOWN, or manual, position, wide-band pink noise can be manually stepped to each output channel using the “noise sequence” buttons. The manual position is typically used during initial set-up, where correct monitor equalization is being set using a calibrated microphone and real-time analyzer. In the UP, or auto, position the pink noise is automatically sequenced through the output channels in two different patterns:

With the LCRS button pushed, wide-band pink noise is sequenced through all four outputs, as done with the manual mode, except no operator intervention is required. This is especially useful for verifying quickly correct monitor operation.

With the CSCS button pushed, the pink noise switches between the center and surround channels only. This allows easy and audible verification of surround level settings by providing an audible comparison with the center-front setting. In this mode, the pink noise is filtered to eliminate all but the mid-band frequencies. This bandlimiting helps prevent misjudging of absolute level caused by frequency response variations between the front and surround speakers.

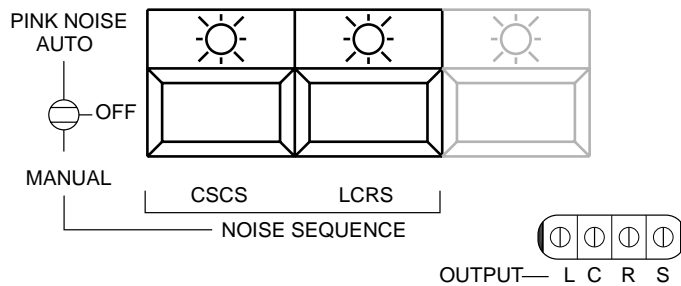


Figure 2.9 Pink-noise calibrate functions

## Output Level Adjustments

Output potentiometers are provided so that the decoder output level can be matched to the monitor system. Typically, the SDU4 output level is set using the internal pink noise source.

The front panel master level control is set to the “∇” mark (2 o’clock). Then the SDU4 output trims, (or alternatively, the level controls on the power amplifiers) are set so that the sound pressure level in the primary listening area is adjusted to the recommended level (usually 85dBc) with one channel at a time being driven with wide-band pink noise.

In cases where the SDU4 outputs are routed through a switching system and the outputs from other devices are connected to the power amplifiers, set the SDU4 outputs to an established house reference level (+4dB<sub>r</sub>, for instance) and make the final monitor level adjustments at the power amplifiers.

## Master Level Control

The SDU4 contains a four channel master level control that allows the overall listening level to be adjusted up or downward without upsetting the individual channel balance. The “∇” position should be considered the normal operating level.



## SECTION 3 OPERATION

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### 3.1 Operating Modes and Applications

The SDU4 has three modes of normal operation: Mono, Stereo and Dolby Surround.

#### **Mono**

The mono mode combines the Lt and Rt input signals into a single channel and routes it to the Center loudspeaker, if the internal switch S301 is in the "yes" position. If the internal switch is in the "no" position, the mono sum of Lt and Rt is sent to the Left and Right loudspeakers at a reduced level, thereby creating a correct phantom center image.

#### **Stereo**

The stereo mode is provided for conventional stereophonic reproduction of the input Lt and Rt signals. This mode, in effect, provides an electronic bypass, leaving the input buffers, master level control and line amplifiers in the signal path.

The position of the internal Center speaker yes/no switch has no effect in the stereo mode; there is no output from the Center loudspeaker in either case.

#### **Dolby Surround**

The Dolby Surround mode provides full decoding of the two channel input material using the internal Cat. No. 150 2:4 channel surround decoder module.

### 3.2 Detailed Applications

#### **Broadcast**

Broadcast applications include evaluation of transmission masters originally recorded for theatrical release. Additionally, selected television programs are now being produced using the Dolby Surround encoding format.

Broadcast of feature films originally released with Dolby encoded soundtracks are commonplace. The stereo audio tracks on the master videotapes are normally direct transfers of the original Dolby theatrical release soundtrack, and therefore surround information is included within the broadcast audio.

The matrix format used on Dolby soundtracks is compatible with both monophonic and conventional stereo playback.

Many home viewers have purchased Dolby Surround decoding equipment for use during playback of prerecorded videotape or videodisk program material. These consumer grade decoders are being manufactured by the many companies who are licensed by Dolby Laboratories. Viewers are finding that the Dolby Surround decoders are also capable of effectively decoding broadcasts of Dolby films and Dolby Surround productions. The SDU4 gives the broadcast station a means of monitoring the correct spatial decoding of this material in the professional broadcast environment.

The SDU4 is simply installed in the monitor system, typically between the stereo replay machine or stereo program buss. Its output is used to drive the monitor system's power amplifiers, either directly or through an audio routing system. Surround encoded material will usually be decoded using the Dolby Surround mode; however, it may be evaluated for conventional stereo and mono compatibility as well. Proper decoding of Dolby Surround encoded material is, of course, the preferred way of evaluating the overall quality of the material. All stereo program material, regardless of whether it is specifically surround encoded or not, can be evaluated for compatibility in mono, stereo and surround playback.

Conventionally recorded stereo material, i.e., originally recorded for two loudspeaker playback, may be checked for acceptability using the Dolby Surround mode. In this case, center and surround channels will be extracted from the stereo mix as if they were specifically encoded as such.

Note: If a center loudspeaker is not used, i.e., the internal Center speaker switch S301 is in the "no" position, the decoded center output is re-summed with the left and right decoder output signals, giving effectively the same front stereo image as with normal stereo playback. In this case, the decoder will extract the phase-difference information from the stereo input material and send it to the rear loudspeakers.

As most conventional stereo material contains some valid phase difference information, due to the microphone techniques, the reproduction of this phase difference information to the rear of the viewer will usually lead to an overall pleasing effect. On the other hand, artificially induced phase-differences, created either by alignment errors or by some special effects processors (such as stereo synthesizers) can cause erroneous and inappropriate sound elements at the rear of the viewer. Conventional stereo material may be evaluated for compatible playback using the Dolby Surround mode.

In audio post-production environments, it is recommended that all stereo material be evaluated through the SDU4 in the Dolby Surround mode as a means of verifying mono compatibility. Conventional monophonic recording, i.e., equal phase at equal level, can be considered a subset of the Dolby Surround encoding matrix, as its occurrence will be reproduced as

center channel information. This, in effect, will cause the mono-compatible elements of the mix to appear to always come from the center of the picture. On the other hand, the incompatible elements (those that would cancel if the two input channels were summed) would be reproduced around and behind the listener. This spatial effect is useful as it instantly alerts sound mixers to compatibility problems should inappropriate elements, such as on-screen effects, or dialogue, suddenly appear in the rear.

### **Music Recording For Dolby Encoded Films**

Music studios will find the SDU4 very useful when recording material intended for integration into Dolby encoded soundtracks as it provides accurate monitoring of two- or three-channel material in its final dimensional perspective.

Typically, the SDU4 would be installed into the monitor system during the music mix. Three equally balanced loudspeakers would be used in the front driven by the L, C and R outputs, with the surround channel optionally used to drive two or more speakers, wired as mono, in the rear.

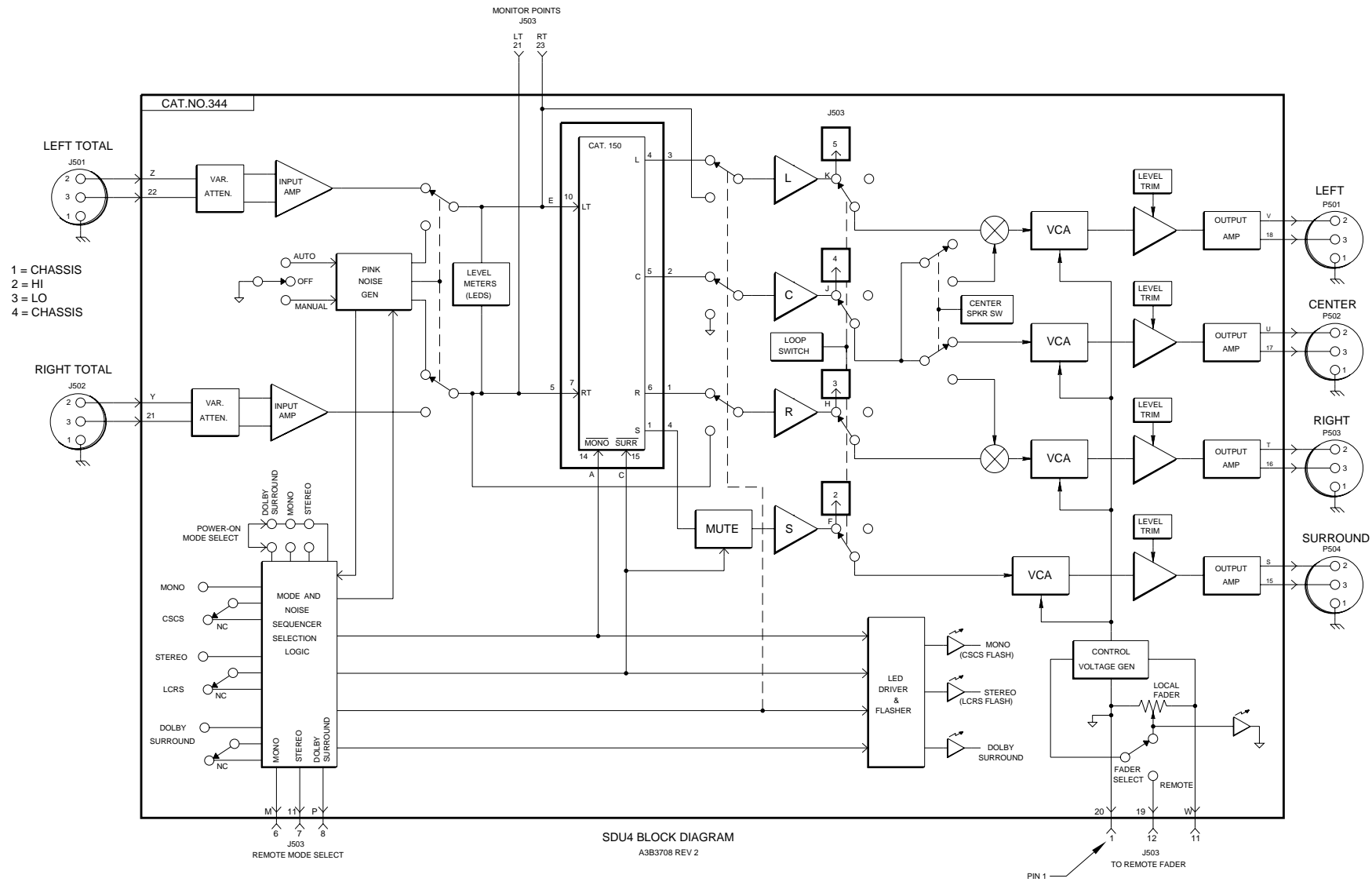
The music pre-mix is usually recorded as three tracks with assignment being made into L C and R tracks. Generally, no surround track is recorded in advance. The three tracks can be recorded directly from the console mix buss, but the discrete center track must be made into a "phantom". This requires the center track to be added back into the L and R channels at precisely -3 dB into each. From this point, these two channels are sent to the SDU4 Lt and Rt inputs for decoding into the spatially correct L,C,R and S channels.

This fairly simple procedure allows the studio to simulate the action of the Dolby encoder in respect to the generation of the center channel. It is not possible, however, to pre-record an accurate discrete surround track using this technique. Encoding of the surround channel requires the use of the surround encoder due to the precise nature of the phase matching necessary between the center and surround channels.

The three-track music mix would typically be transferred to magnetic film and, subsequently, matched to the edited picture. In the film re-recording studio it would be added with dialogue and effects keeping the same spatial imaging characteristics.

### **Surround Productions**

The SDU4 has been designed to interface with the Dolby Model SEU4 Surround encoding unit. Post-production facilities contemplating the production of surround encoded programs should consider the installation of the SDU4 and the establishment of a correct monitoring environment as the first step in equipping for future surround productions.



**SECTION 4**  
**BLOCK DIAGRAM**

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