

Film-Tech

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SONY®

The Projectionist's Guide to the DFP-3000

Revision 1, July 2001

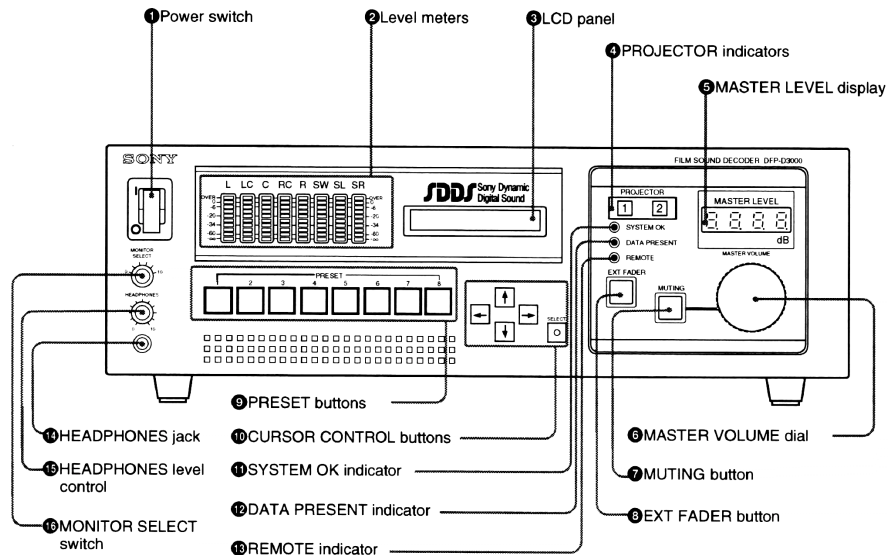
SDDS Sony Dynamic
Digital Sound

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1 Normal Day to Day Operation



1.1 Presets

The front of the D-3000 has 8 switches for preset selection. These are set up by the installation engineer. Examples of these could be:

- 1 Microphone (PA system)
- 2 Non Sync (CD player input)
- 3 Mono Optical
- 4 NR 1 (Compatible with Dolby A)
- 5 NR 2 (Compatible with Dolby SR)
- 6 AUX 1 (often used for DTS or SRD)
- 7 AUX 2 (often used for DTS or SRD)
- 8 SDDS

To select a preset, it must be pressed twice. Pressing once displays a helpful list of all presets. If a preset is selected by automation, it switches with only one pulse.

1.2 Levels

The large round knob sets the master volume. The current level is displayed in yellow. 0.0dB is the reference "dubbing theatre" level, equivalent to fader 7 on other cinema processors. The table over shows other settings:

SDDS	Others
+ 10 dB	10
+ 6.6 dB	9
+ 3.3 dB	8
0.0 dB	7
- 3.3 dB	6
- 6.6 dB	5
- 10 dB	4
- 30 dB	3
- 50 dB	2
- 70 dB	1
- 90 dB	0

Within the range of –10 dB to + 10 dB, each click on the knob is 0.1 dB. Below –10dB the steps vary. This is to make all level adjustments smooth and unnoticeable. For quick adjustments, it's best to use an external pot. This can be a simple 100k linear pot, wired to the "remote fader" connector.

Please note that each presets' level can be trimmed up or down. Adjusting these trims does not change the master level display.

The **Mute** switch lights very bright red in operation. This mutes all channels instantly. The non-sync preset can be faded in and/or out, as discussed later.

The **Remote Fader** switch activates the remote fader, obviously. The front panel level knob is disabled when this is lit.

1.3 Indicators

Projector indicator

Indicates the selected projector in a changeover installation. Note: Refers to SDDS digital changeover status only. This will flash if there is no reader attached.

System OK indicator

The indicator is lit when the DFP-3000 system operates normally. It goes out if a system error has occurred, such as lack of backup battery, faulty reader unit or faulty cooling fan.

Data present indicator

The indicator is lit when the unit is reading SDDS digital audio signals. It flashes if SDDS data is lost while the film is still running through the reader with the correct speed. It will only light when SDDS is first detected after power on.

Remote indicator

The indicator is lit when the DFP-D3000 is controlled by external equipment over the RS-232 serial port.

1.4 Preset levels

Each preset can be trimmed up or down in level. This is used to set level relationships between presets. For example if the preset for non-sync always needs to be 5dBs lower than the film presets, then the non sync preset can be easily “trimmed” to – 5.0dB. The master volume control can then be left in the same position throughout. The non-sync is always 5 dBs lower, wherever the master is set.

Here's how:

Activate the preset you want to change. For example NR2. Press ↓ to access preset options.

NR2:	↑
TRIM: 0.0 dB	MENU

Make sure the 0.0dB is flashing. The preset trim can now be changed by turning the master volume knob. When you're happy with the level press ↑ to return to the main display. The preset trim is stored automatically.

1.5 Non Sync fade in/out

If you want the non-sync signal to fade in and out rather than cutting abruptly when the preset is changed, the fade time can be set, in a similar manner to the preset trim adjustment.

Activate the Non Sync preset. Press ↓ as before. Then press → so that **0 SEC** is flashing. This is the fade in/out time. Whether fade in, fade out or both occurs is set by the installation engineer.

NONS:	↑
TRIM: 0.0 dB 0 SEC	MENU

Use the master volume knob to change the value (0 Sec is off).

Remember that having the Fade in/fade out function activated is going to affect the preset switching as follows: When you switch from non-sync to film, it doesn't switch immediately, but fades out first, then switches. From film to non-sync, it does switch immediately, and then fades in.

1.6 Playing film

If there is more than one digital playback reader connected, the unit is usually set up for “digital fallback”. This means that the system automatically plays the available digital sound, or analogue optical as appropriate. For instance, preset 8 could be configured for SDDS → DTS → SRD → NR2. This will play in SDDS if available, then it will look for DTS, then SRD, finally analogue. This system has two benefits. It means, on a poor print, the sound is more likely to stay in digital if all three digital formats are in use. It also means that you can leave the unit on preset 8, and needn't worry about automation commands to change presets. The fallback structure is configured by the installation engineer.

The unit will indicate the "desired" sound format (preset name) on the top line of the display. If this format is unavailable, the actual sound reproduced is displayed on the bottom line. If SDDS is reproduced, the film title may be displayed on the bottom line.

1.7 Checking the firmware version and running hours

With any preset in selected, press ↓ to access preset options.

The trim value will now be flashing. Press → so that MENU is flashing.

Press the SELECT button.

STATUS will be flashing. Press SELECT again.

The power on and film run times plus the firmware version will now be displayed.

Press → to see the serial numbers.

2 Care of Film and Reader

2.1 Care with SDDS tracks on film

SDDS is printed on both edges of the film. The two sides are not the same, but digital sound can play from one side (DCM – digital concealment mode). The two sides are called S and P (sound and picture). If the S side is lost, the film title will disappear on the DFP-D3000 display.

Care must be taken when making up films that the SDDS tracks are not damaged. If reel ends need to be marked, then the mark should be no longer than 1 frame. Chinagraph and paint are not recommended. Chinagraph coats the projector rollers and film print, and paint obliterates the sound track and can run into the picture area. If longer marks must be made, use a UV security marking pen and a portable UV torch. This is completely invisible to the SDDS reader.

It has been found that a well-printed SDDS track will last as long as the picture. Our well-used installation/test reels are testament to this.

2.2 Reader maintenance

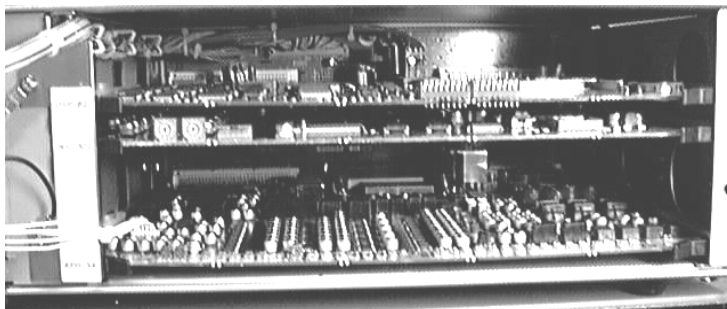
The reader must be kept spotlessly clean. Clean the lenses and LEDs with a dry cotton bud or blower brush. Clean the rollers with pure isopropyl alcohol.

To ensure continued high performance and reliability, it is important that a service engineer check the SDDS readers on an annual basis and adjust video levels and replace LEDs where necessary.

2.3 Decoder maintenance

There is a back-up battery on the DSP82 board. This should be changed every two years. If it runs down completely, the system OK light will go out. If this happens leave the unit on until a service engineer can download the internal settings and then change the battery. On no account remove or insert boards with the power on.

Behind the front panel door there is a filter. This should be kept clean, by washing or vacuum cleaning. Clogged air filters can cause hardware failure due to excessive heat.



← DSP82 – central processor

← DEC102 – SDDS decoder

← APR34 – Analogue I/O

2.4 Screwdrivers

Note that Sony cinema processors use Japanese cross head screws. These can be irreparably damaged by normal Philips or Pozidriv™ screwdrivers. Please use Japanese "JIS" screwdrivers. Sony supplies these, if you have trouble obtaining them. These inexpensive screwdrivers with wooden handles are a standard Sony Corporation part, number 7-700-749-03, though they are listed as "Phillips" screwdrivers. The Vessel Part Number is 310-P.1-75 and the cost is about US\$2.00 each.

3 SDDS Fader Automation

The DFP-D3000 has a feature which will store film titles and trim levels. This allows the unit to “remember” levels for various films and use them whenever that film is encountered. It stores trims for up to 99 films.

When SDDS is played back, the film title will be displayed on the LCD panel. The title may be flashing at times due to temporary lack of data.

SDDS SDDS Installation Reel ↓

To assign a level offset to the film title, press ↓ to access preset options. The playback level can now be changed by turning the master volume control. The default playback level for film titles not already in the fader automation library is 0.0 dB.

SDDS Installation Reel ↑ AUTO: 0.0 dB MENU

Note that the master volume display remains unchanged, when the automation offset level is adjusted.

The DFP-3000 will remember this level **offset** for future screenings of this film. Note that the associated fall back formats for this preset will also use this offset.

Important: Please note that the SDDS Fader Automation feature is primarily designed to reduce playback levels on loud trailers and other single-reel film elements. If you also use this function for your feature presentation, please be sure to set the level offset for every single reel. Failure to do so may cause variable playback levels throughout the film, since one reel may be labelled differently than another by the sound negative camera operator, hence causing the SDDS decoder to anticipate a new film title.

To disable SDDS Fader Automation, press ← to make “AUTO” flash. With the master volume control, “AUTO” can be toggled to “TRIM”. In trim mode, the selected level offset works exactly like the other preset trims and is not film title dependant. Note that the film title is no longer displayed.

SDDS: TRIM: 0.0 dB MENU
--

4 Optical Level Setting

4.1 Accessing the Optical Level setting page

Enter the projectionist's access password in order to adjust optical preamplifier gains. *The default A-Chain password is "SONY".*

Access the "MENU" command as described earlier and press SELECT.

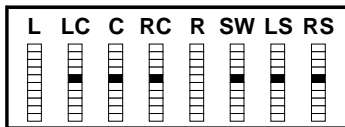
Press → so that CONFIG is flashing. Press SELECT.

The unit prompts for a password. Use the master volume control to select the letter and the SELECT button to confirm. Enter "SONY".

Now ADMIT will flash. You also have an option to change the password. (HINT: change it to "AAAA"!)

Press SELECT. You are now on the optical input calibration page. Projector 1 left is displayed. Use the up and down arrows to select right and projector 2. Use sideways arrows to choose gain or slit loss. **Make sure you don't adjust the SLIT LOSS settings.**

The meters now look like this:



The meters are in a high resolution mode. Play a tone loop and use the master volume control to adjust left and right gains so that the Left and Right meters match the row of LEDs in the centre of the meter display. Please note that the meters are extremely sensitive in this mode (0.1dB per segment).

This completes the A-Chain level alignment procedure. To return to the main LCD menu, use the arrow buttons to select the EXIT option and press the SELECT button. You may also press any PRESET button twice to exit all menus and return the decoder to normal operation.

5 Self Testing Diagnostics

5.1 What is it?

The D-3000 has a test mode which enables the projectionist to do a quick check to see if everything is working OK. There are two test sequences, A-chain and B-chain/theatre. The A-chain test involves threading various test film loops. The processor will assess the results and then pass or fail. The B-chain test requires an inexpensive microphone to be permanently mounted somewhere in the auditorium. The processor will send some tones into the cinema and compare the result with a "footprint" which was set up by the cinema installation engineer. It is intended to check for blown drivers and amplifiers.

5.2 Accessing the test menu

Access the MENU as before and select "TEST"

5.3 A-chain self test:

Choose "A-Chain" from the menu which follows to access the A-chain self test section.

LEVEL	PHASE
SLIT_LOSS	XTALK EXIT

Thread the required test film loop in the projector and choose the test parameter. Play the loop and then press the select key.

TESTFILM & push_SEL	
LEVEL	EXIT

After 1 second, the DFP-3000 indicates if the requirement is met by indicating OK or NG.

NG:	-91/ - 20 dB (REF)
	EXIT

If NG is the result of a level test, please perform optical level input calibration. Contact your service engineer if NG is displayed after any other A-chain test.

5.4 B-chain / Theater Diagnostics

This test function requires a permanently installed (inexpensive) microphone in the auditorium connected to the MIC2 input.

A_CHAIN	TheaterDiag
	EXIT

When selecting Theater Diagnostics, pink noise is cycled to all channels, and the measurement is compared to footprints set by the installer. It is designed to be a quick test of the speaker drivers and amplifiers.

If NG is the result of the Theater Diagnostics self test, check all the power amplifiers, crossovers and loudspeakers in the auditorium. If the error persists, contact your service engineer.

6 Bypass Operation

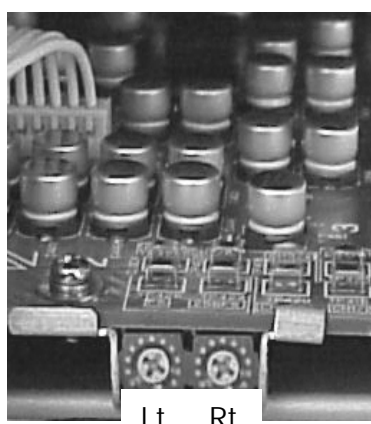
6.1 About the bypass function

The DFP-D3000 has a bypass audio circuit, which is fed by a separate power supply. Provided that the bypass power supply is switched on at all times, the DFP-D3000 will automatically enable this circuit if a major system failure occurs or if the mains power switch is in the off position. If this is the case, there will be an orange light in the centre of the SELECT button.

In bypass mode, the DFP-D3000 plays back the optical analogue track in the L, C and R channels.

6.2 Setting Bypass Levels

The **bypass level** setting is made by adjusting two trimmer potentiometers (for Lt and Rt) located at the left of the lower circuit board inside the DFP-D3000. These are adjusted to produce the same output level to L and R when the unit is powered off while playing a pink noise loop through the optical inputs. Loosen the two screws at the right of the front panel and swing it aside to reach these two trim controls.



6.3 Hearing Impaired output level

The single **HI** (hearing impaired) output level trim potentiometer is located to the right of the bypass level trim controls and is marked HI on the PCB. It adjusts the HI output from 0.7 to 7 V at the rear panel PHONES connector.

7 Troubleshooting

7.1 No sound at all

Check the following:

- Is the system muted?
- Check the power to the crossover and amplifiers.
- Check all the connections.
- Is the DFP3000 powered?

If the DFP3000 has developed a major fault, turn it off and use bypass mode. (Make sure the bypass power supply is turned on. It has a switch!). If there is still no sound, make sure the bypass level controls are turned up.

7.2 No analogue optical sound

Check the following:

- Cell connections
- Cell light source
- Cell preamplifier in the projector
- Changeover is switched to correct projector
- Preset trims are not turned down

If the problem persists it could be a faulty APR-34 or DSP-82 board. NOTE that if a DTS unit is in the "fallback chain" it must be switched on at all times or the system will not fall back to analogue.

7.3 Bad analogue optical sound

Check:

- Cell connections
- Grounding of projector/sound rack. Has the building earth spike dried out?
- Is extraneous light falling on the cell?
- A-chain alignment

7.4 No SDDS sound

Check the following:

- Is the correct preset selected?
- Does the print have SDDS tracks?
- Is the projector playing at the correct speed? (SDDS has a 5% tolerance window)
- Reader connections
- Is the correct projector number lit on the front panel of the DFP-3000?

Try rebooting the decoder (turn off then on). If problems persists it could be a faulty reader, DEC-102 or DSP-82 board

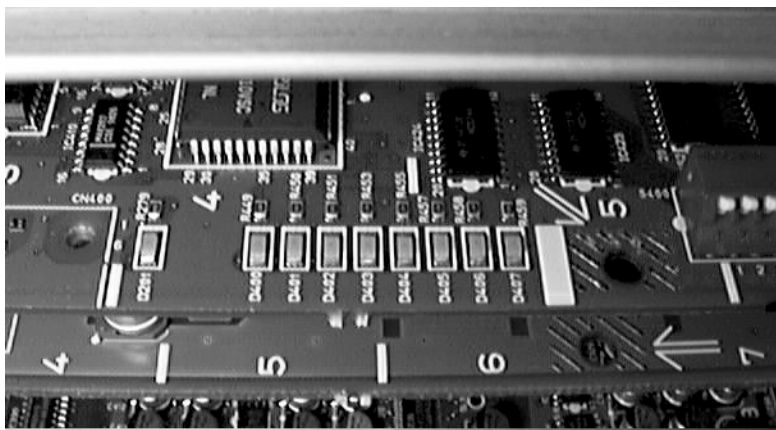
7.5 Unstable SDDS playback

If the SDDS playback is unstable (i.e. the DFP-D3000 switches frequently between SDDS and the fallback format, it is crucial to verify whether the problem is print or system related.

After the show, check with known good SDDS film material to accomplish this. Sony supplies an inexpensive SDDS Alignment Film loop, part number 1-759-836-11, which is useful for this purpose. Any other loop of film with good SDDS data will also do.

Make sure that the reader lenses and the light source fibre optics are clean before playing your SDDS test loop.

Then open the hinged front panel door of the DFP-D3000 and monitor the bank of red LED indicators on the top board, labelled DSP-82 (or DSP-94). The two LEDs labelled D400 and D401 indicate the condition of the S and the P data reading.



With a good SDDS print played on a fully working SDDS system, these two LEDs should be on all the time, apart from through splices. Frequent dark bursts indicate a faulty print or a faulty SDDS system.

With your SDDS reference loop, the LEDs should stay on at all times apart from through the splice. If this is not the case, please contact your service engineer to have your SDDS system checked.

Also check the following:

- The SDDS lenses and LEDs are clean
- The film speed is correct
- The film feeding system is stable and not scratching the edge of the print
- Check the entire film path for scratching and dirt.

If the system works normally with your reference film, but fails during the show, contact your print provider to let them know that they have delivered a faulty print. SDDS tracks are very resilient from wear and tear, so print problems are most likely caused by the printing or subtitling process. It is therefore instrumental that you let your print provider/film distributor know in order for such issues to be resolved.

7.6 SDDS out of sync

Check:

- The film path. Has a roller been missed?
- Is this one film or all films? If one, then the print may be faulty.

If all films are out of sync, contact your service engineer to reset the sync delay.

7.7 No sound for external digital formats

Check:

- Power to units
- Connections to "Aux" inputs
- The external units should be in "CP200" mode for correct fall back operation.

8 SDDS - The industry's best sounding format



Sony Dynamic Digital Sound® (SDDS®) is the motion picture industry's most advanced digital sound format, designed exclusively for cinema presentation. In developing SDDS, Sony applied decades of innovative experience in professional and home audio to deliver the highest quality sound presentation. SDDS has been engineered to give filmmakers increased creative freedom and ultimately to preserve the integrity of the master soundtrack. With SDDS, today's moviegoers can now experience a film's sound exactly as heard by the director and sound engineers on the mixing stage.

8.1 Hear the Difference

Digital sound has changed the way people see movies. The clarity and vibrance of SDDS truly heightens the movie going experience. While other digital formats are limited to the same 5.1 channels as home systems, SDDS provides movie audiences with up to eight channels of crystal clear discrete audio. The additional two channels increases sonic detail and headroom adding impact to the presentation.



8.2 System Basics

SDDS is a sound-on-film format comprised of the SDDS soundtrack, optically printed on both edges of 35mm film and the SDDS playback hardware – a reader and processor. As the film is projected, the SDDS soundtrack is scanned, its data is processed, and ultimately converted into analogue audio signals for the cinema's loudspeakers and amplifiers.

8.3 SDDS Products

Sony manufactures a range of products that fit the exhibitor's needs. For new cinemas, there is the DFP-D3000 system that includes analogue and control functions and can serve as the central processor in any cinema, also available as an analogue only processor.



For retrofit applications there is the add-on DFP D2500 that simply adds SDDS to any existing system.

Both systems use the DFP-R3000 Reader to scan the soundtrack. The reader mounts to the top of any 35MM projector.



8.4 Big Sound for the Big Screen

The days of narrow 'shoe box' small screens are over. Today, the emphasis is on making cinema going an event. There is a trend towards building, larger, wider screens to maximise the experience. SDDS enables filmmakers and theatre owners to fill big auditoriums with six or eight channels of discrete digital sound through five screen loudspeakers, two surround channels and a full-frequency sub-woofer channel. The glory days of 70mm big sound have returned with SDDS. None of the latest home theatre environments can compete.



8.5 Further details – Why is it the best sounding system?

In normal operation the SDDS playback equipment uses both sides of the film for playback. However, if one side is damaged, the unit will play in "digital concealment mode". This uses extra back-up tracks for the lost information. There is a back-up centre and subwoofer. The left and right channels are mixed to create left mix back-up and right mix backup. These are played through the appropriate speakers at coded volume levels. The effect of going into "DCM" is seamless. There is always a digital centre so dialogue is not disturbed. The two sides are separated from each other by about 17 frames.

The data rate off film is 2.2Mbits/sec, rather than 370kbits/second.

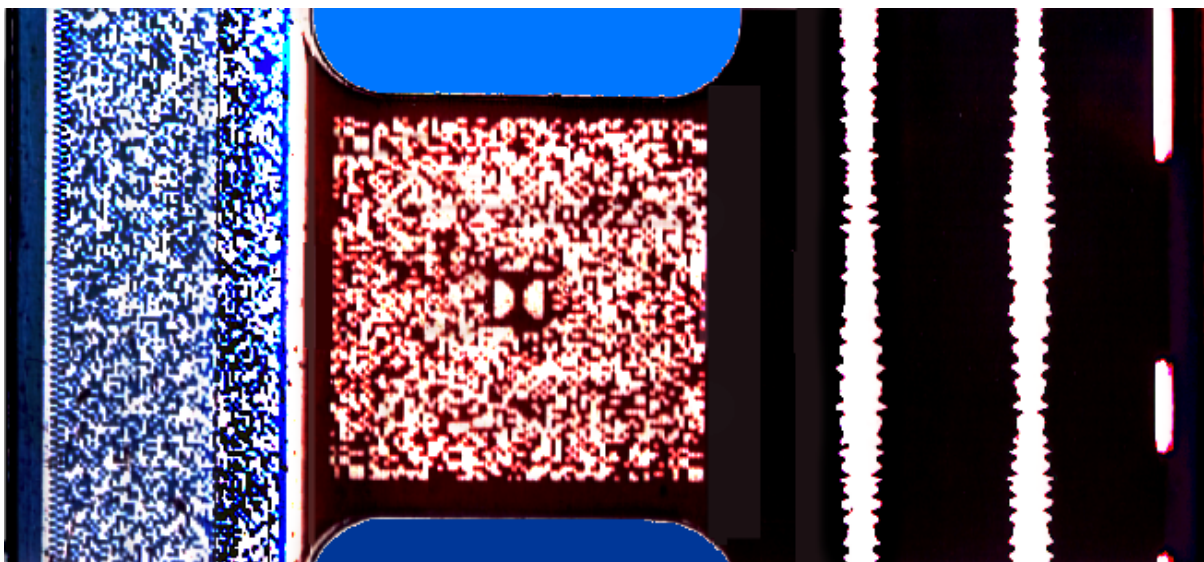
The data compression is Sony's acclaimed ATRAC, used in broadcasting and in minidisk players. The compression ratio is only 5:1, rather than 10:1 or 13:1.

There is no data sharing between channels, all channels are full range 20kHz (even the subwoofer).

The track is printed in the cyan layer. This is the deepest layer and therefore the most resistant to scratches. The readers also use patented diffuse light, which also counteracts scratches. In normal use, with a well-printed track, the SDDS track will last as long as the picture.

The cinema equipment is built to Sony's high broadcast standards. It features 28 band digital EQ on all channels (2 band parametric on the subwoofer). All I/O is balanced.

The picture below shows the high resolution, small dot size of SDDS (on the left).



8.6 Testimonials

"Eight channel SDDS is awesome! It makes a huge difference on Pearl Harbor. I've never heard a movie sound so real. By all means, seek out a theatre featuring SDDS 8 to experience Pearl Harbor the way we intended it."

Michael Bay, Director, Pearl Harbor

"The sense of being totally enveloped in high-detail sound was particularly noticeable on this (SDDS 8) soundtrack"

**François Groult, chief sound mixer,
"The Messenger: The story of Joan of Arc"**

"While the increased 'screen resolution' does indeed help with the definition of busy scenes, five channels have as much place on quiet films such as 'Erin Brockovich'. I always find that just having three screen speakers on intimate films forces me to play too many elements in the centre horn; otherwise, it's distracting to have sounds banging around the exit signs near the left and right speakers. With SDDS, I can use the left-centre and right-centre speakers for a natural-feeling, narrow stereo image throughout the whole movie, going wider as necessary for exterior scenes."

**Larry Blake, supervising sound editor & rerecording mixer,
Erin Brockovich**

"Movie theatres equipped to present films in eight full channels can build and maintain a greater marketing edge over home theatres."

"Listening to the three-channel music became an annoying and distracting disappointment, even with a 12 foot (wide) screen. Obviously my earlier notion had been mistaken. The SDDS eight-channel advantage will work in any theatre."

John F Allen, Boxoffice 1997

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