Film-Tech

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Sony DFP-3000 Cinema Processor System Quick Start Guide

Tech Notes

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SDDS Sony Dynamic Digital Sound

PRELIMINARY

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Tech Note

A list of all available Tech Notes.

Product:
S/N:
Document: **TN99070701**, CC
Summary: A list of all available Tech Notes.

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Tech Note

Audio and automation wiring between the Sony DFP-D3000 and the Dolby® DA20 digital sound decoders.

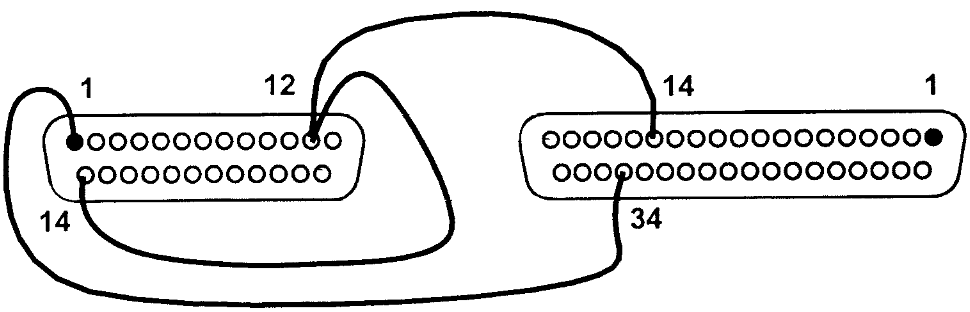
Product: DFP-D3000.
S/N: All units with firmware version 2.20 and higher (including v3.00).
Document: **TN99020101**, TS
Summary: Describes in detail all the connections required to connect a DA20 to a DFP3000.

The DA20 should be configured for 'CP200'; refer to the DA20 Installation Manual.

DA20 Sense/control connector (J6) (DB25 Male)	**DFP-D3000 Automation I/O connector (DB37 Female)**
Pin 12: GND Pin 14: sense0	Pin 14: logic common
Pin 1: Ctrl0 (low when digital is OK)	Pin 34: AUX1 active (pin 35 if AUX2 is used)
Pin 25: changeover status input (for changeover systems only)	Pin 19: changeover command output (for changeover systems only)

DA20
Sense/Control (J6)
25-pin D-Sub (male)

DFP-D3000
Automation
37-pin D-Sub (female)



The connections below only apply to changeover installations.

DA20 Motor start connector (DB9 Female)	**DFP-D3000 Automation I/O connector (DB37 Female)**
Pin 1: motor start, projector 1	Pin 12: motor 1
Pin 9: motor start, projector 2	Pin 13: motor 2
Pin 5: GND	Pin 16: tally common

DA20 CP Audio connector J8 (DB25 Male)	DFP-D3000 AUX INPUT 1 (DB25 Female)
NC	1 Left ground
14 Left out	2 Left hot
NC	4 Center ground
20 Center out	5 Center hot
NC	7 Right ground
17 Right out	8 Right hot
NC	9 Left surround ground
4 AGND	10 Left surround cold
3 AGND	11 Right surround cold
12 AGND	12 Sub woofer cold
NC	13 Sub woofer ground
1 AGND	14 Left cold
8 AGND	17 Center cold
5 AGND	20 Right cold
NC	21 NC
NC	22 Right surround ground
15 Left surround out	23 Left surround hot
2 Right surround out	24 Right surround hot
24 Subwoofer out	25 Subwoofer hot

All audio grounds should be connected to the shield of each twisted pair at the D3000 end only.

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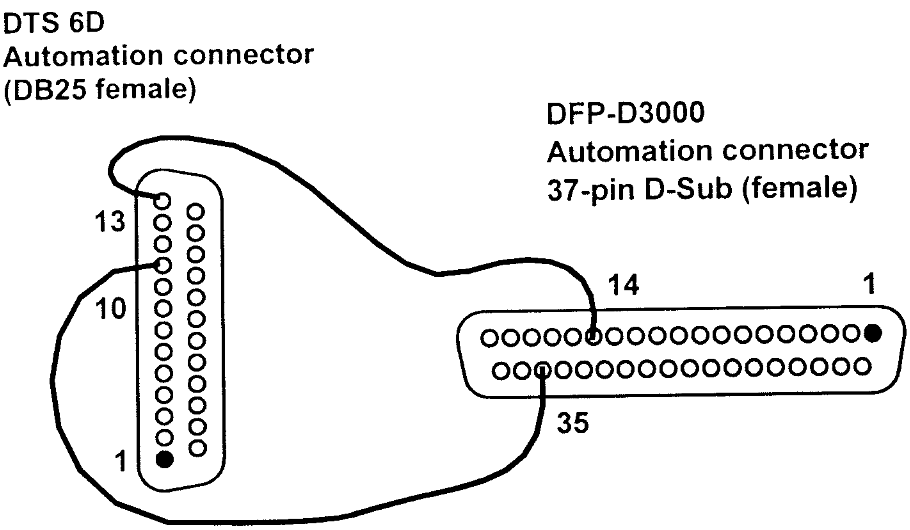
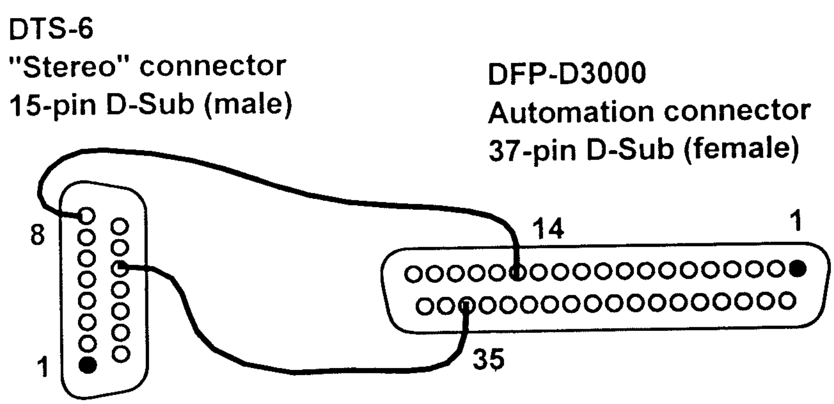
Tech Note

Audio and automation wiring between the Sony DFP-D3000 and the DTS® 6 and 6D digital cinema processors.

Product: DFP-D3000.
S/N: All units with firmware version 2.20 and higher.
Document: **TN99020103-2**, TS
Summary: Describes in detail all the connections required to connect a DTS-6 or DTS-6D to a DFP-D3000.

DTS 6 "Stereo" connector (DB15 male)	DTS 6D Automation connector (DB25 female)	DFP-D3000 Automation I/O connector (DB37 female)
Pin 8: Ground	Pin 13: output common	Pin 14: logic common
Pin 13: DTS S/W enable	Pin 10: GND when DTS in digital	Pin 35: AUX2 active (pin 34 if AUX1)





No DTS automation interface board is necessary. Please note that the DTS 6 system must be configured for 'CP200' by setting the two internal dip switches on the DTS output board to the "off" position by referring to the DTS 6 Installation Manual.

If the D3000 is configured for a multiple fallback structure, such as SDDS → SR-D → DTS → NR2, the DTS player must remain switched ON at all times, even with no DTS film playing, to avoid a mute condition in fallback mode.

DFP-D3000 AUX INPUT 1 or 2 (DB25 female)	**DTS 6D Analog out (DB25 male)**	**DTS 6 Adapter to JM21 "DTS6 to CP500"**
1 Left ground	1 audio return	1 com
2 Left hot	14 Left	14 Left
4 Center ground	Not connected	Not connected
5 Center hot	20 Center	20 Center
7 Right ground	Not connected	Not connected
8 Right hot	17 Right	17 Right
9 Left surround ground	Not connected	Not connected
10 Left surround cold	10 audio return	1 com
11 Right surround cold	11 audio return	1 com
12 Sub woofer cold	12 audio return	1 com
13 Sub woofer ground	Not connected	Not connected
14 Left cold	1 audio return	1 com
17 Center cold	8 audio return	1 com
20 Right cold	5 audio return	1 com
22 Right surround ground	Not connected	Not connected
23 Left surround hot	15 Left surround out	15 Left surround out
24 Right surround hot	2 Right surround out	2 Right surround out
25 Subwoofer hot	24 Subwoofer out	24 Subwoofer out

All audio grounds should be connected to the shield of each twisted pair at the D3000 end only.

For the audio output of the DTS 6, the necessary IDC to D-sub adapter can be supplied by your DTS representative under the product name "DTS6 to CP500 adapter".

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Tech Note

Connections between the DFP-3000 and the Dolby® SA10 Surround EX™ processor.

Product: DFP-D3000.
S/N: All units with firmware version 2.60 and higher; does not apply to v2.10.
Document: **TN99042601-3**, CC/TS
Summary: Describes in brief the connections required to connect an SA10 to a DFP-3000.

This information is provided to users of the DFP-3000 to assist them in connecting to a Dolby SA10. As of April 1999 the specifications of the SA10 were incomplete. See your Dolby representative for up to date details.

Step by step.

The following steps are recommended for setting up the SA10 with a DFP-3000; see the SA10 manual and your Dolby representative for specific details:

1. Set SW1, located on the daughter board of the SA10, to the "CP65" position.
2. Set the outside front panel "Surround" switch to OUT (EX decode mode)
3. Set the Inside front panel "Alignment 602" switch to IN (Normal in Dolby terminology). Note that the SA10 does not have a bypass mode or any form of hard bypass.

Logic connections.

The following connections should be made between the logic connectors of the two units:

DFP-3000 Automation (37-pin D-Sub female)	**SA10 J3, Control Input (25-pin D-Sub female)**
Pin 14; Logic Common	Pin 12; GND
Pin 32; SDDS OK, pulse pulldown	Pin 5; CTRL 4, EX decode mode
Pin 36; SDDS NG, pulse pulldown	Pin 2; CTRL 1, non-decode mode

Cautions and limitations.

These connections from the DFP-3000 will cause the SA10 to go to decode mode when SDDS data is valid and to go to non-decode mode as soon as valid SDDS data is no longer present. Note that these logic outputs will appear no matter which preset is selected, even non-SDDS presets, so long as the film contains SDDS data. Note also that the SA10 has no hard bypass function.

Automation from external digital processors

When external digital processors are installed and a multiple digital fallback structure is utilized (for instance SDDS→DTS→SR-D→NR2), the need for the SA10 to be disabled whenever SDDS data is no longer present is limited, since in practice it is unlikely that three digital systems will fail simultaneously. It is therefore recommended the D3000 be configured with two SDDS presets, one SDDS/FILM non-ex (e.g. Preset 1) and one SDDS/FILM EX (e.g. Preset 8). The SA10 will then be enabled as long as preset 8 is active. This has the advantage that the cinema automation system can distinguish between EX and non-EX encoded films without the need for manual operation of the SA10 from title to title. To utilize this approach, set the SA10 processor selector switch (SW1) to the "CP500" position, and follow the wiring table below:

DFP-D3000 Automation DB37 Female	**SA10 J3 Control Input DB25 Female**
Pin 4; Preset 1 (SDDS)	Pin 2; Ctrl 1
Pin 5; Preset 2 (NONS)	Pin 3: Ctrl 2
Pin 7; Preset 4 (NR1)	Pin 4; Ctrl 3
Pin 8; Preset 5 (NR2)	Pin 5; Ctrl 4
Pin 9; Preset 6 (AUX 1)	Pin 6; Ctrl 5
Pin 10; Preset 7 (AUX 2)	Pin 7; Ctrl 6
Pin 11; Preset 8 (SDDS-EX) EX mode	Pin 8; Ctrl 7
Pin 16; Tally common	Pin 12; GND

The second approach is to let all the digital systems trigger the SA10 on and off, depending on the status of the playback of the digital track(s). Note that this strategy may cause unwanted enabling and disabling of the SA10 if more than one digital system is active at a given time.

If the DFP-D3000 has a Dolby Digital processor connected to one of the AUX inputs, which should trigger EX playback according to this approach, an external interface has to be added. This is necessary because the DA20 is configured for level logic in order to interface with the DFP-D3000, whereas the SA10 is designed for pulse logic. Dolby supplies the Cat. 845 adapter, which should be connected as follows:

DFP-D3000 Automation (DB37 female)	**Cat. 845 (to be connected to SA10 J3, control input)**
Pin 34; AUX1 Digital Data OK (AUX2: pin 35)	Red wire (pin 1)

Note that the Cat.845 adapter is not a true level to pulse logic converter (constant levels are still present). As a consequence, output pulses from the DFP-D3000 will be ignored by the SA10, as long as the Cat. 845 adapter is connected to the SA10. As a countermeasure, external switching could be installed to disable the Cat. 845 whenever SDDS or DTS is played back with EX. Contact your Dolby representative for assistance and technical details.

A third party solution.

Another solution is to use the SDDSA300 interface board available from Smart Devices Inc, which is a true level logic to pulse logic converter. The following connections should then be done:

DFP-D3000 Automation (DB37 female)	Smart ® SDDSA300 (in: DB37 female / out: terminal block)	SA10 J3, Control input (DB25 female)
Pin 34; AUX1 Digital data OK (AUX2: pin 35)	Pin 32; Data present	N.C.
Pin 14/15: Ground	Pin 19; Tally common	Pin 12; GND
N.C.	"OPT"	Pin 2; CTRL 1, non-decode mode
N.C.	"DIG"	Pin 5; CTRL 4, EX decode mode

DTS processors.

If the D3000 has a DTS 6/6D processor connected to one of the AUX inputs, which should also trigger EX playback, the automation connections below must be added:

DTS 6 "to BS22" connector (IDC 10-pin female)	DTS 6D Automation connector (DB25 female)	SA10 J3, Control Input (DB25 female)
Pin 6: relay common	Pin 13: output com.	Pin 12; GND
Pin 9: Out (N.O.)	Pin 11: logic SR	Pin 2; CTRL 1, non-decode mode
Pin 7: IN (N.O.)	Pin 25: logic DTS	Pin 5; CTRL 4, EX decode mode
	Pin 6: Force SR+ Pin 9: +5V output	
	Pin 19: Force SR- Pin 22: 5V GND	

Multi-format digital prints.

If a multi-format print is played, assure that any digital systems which are not currently active are disabled, either by switching off the digital decoder or by bypassing the reader when lacing the film. This is necessary to avoid unwanted switching of the SA10 decoder. Note, however, that the DTS6/6D player must be kept on at all times if DTS is assigned as a fallback format for SDDS. This is to prevent unintentional signals arising from the state of its output logic circuits when it is not powered on.

If a multi-format fallback architecture is used, such as SDDS → DTS→ SR-D → SR, all digital systems could be kept active, as long as an external selector switch is added to the system. This selector switch should interrupt the non-decode pulses from any unwanted digital system that is not the last valid one in the fallback chain.

In the example above, the selector switch should interrupt the pulses from the SDDS system (pin 36) and the DTS system (pin 11) as long as the film carries all digital tracks and all digital systems are installed.

Audio connections.

The audio connections are made from the left and right surround outputs DFP-3000 SYSTEM OUTPUT connector, according to THX® pinout conventions.

DFP-3000 System Output (37-pin D-Sub male)
Pin 9; L Surround GND
Pin 10; L Surround COLD (–)
Pin 11; R Surround COLD (–)
Pin 22; R Surround GND
Pin 23; L Surround HOT (+)
Pin 24; R Surround HOT (+)

Note that these connections are balanced. Sony recommends that these connections not be made directly to equipment with unbalanced inputs. The Dolby SA10 has unbalanced inputs and outputs. Many products are available to interface balanced equipment to unbalanced equipment. See your Dolby representative for assistance with maintaining professionally balanced environments when using the SA10.

Note also that the current SA10 manual requires setting the input levels to the SA10 to 120mV (-16dBu) using the Dolby Cat. No. 69T test film played into the primary cinema processor. With a DFP-D3000, it is instead recommended to activate the internal 1kHz signal generator of the surround channels and adjust the output level to 145 mV.

The DFP-3000 output trims span +/-10dB. This means that if you are using the +4dBu reference level of the DFP-3000, you must construct a pad somewhere in your circuits to reduce the level into the SA10, which has no input trims. Even if a reference level of –10 is selected on the DFP-3000, a pad incorporated in the balanced-to-unbalanced interface is desirable to maintain best signal to noise ratio, which in any case deteriorates by about 12dB (a factor of four) due to the SA10's electrical specifications.

The SA10 Installation Manual also recommends removing all room equalization from equipment feeding the SA10. This means foregoing the 28-band graphic EQ in the DFP-3000 and using the more limited trim-pot type 7-band equalizer in the SA10 for surround channel equalization. See the SA10 Installation manual and your Dolby representative for specific alignment recommendations.

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Tech Note

Connecting the Sony DFP-3000 to the Dolby™ CP500 with the DFP-D3000 as master.

Product: DFP-D3000.
S/N: All Sony units with firmware version 2.60 and higher; Dolby CP500 units with firmware v1.51 or higher and control board cat. 684 Rev 1 or higher.
Document: **TN99061401**, TS/CC
Summary: Connecting the Sony DFP-3000 to the Dolby CP500 with the DFP-3000 as master.

Connecting the DFP-3000 to the CP500 is complicated by the possibility of various firmware versions. This document describes the approach when using the most recent versions for each product. Each step must be followed very carefully to avoid problems. If you have earlier versions of firmware, see your Sony or Dolby representative to receive the latest versions.

Functions of the CP500.

With the firmware and cat. 684 card versions described above, the CP500 supplies output pulse tallies for every preset selected. When in fallback, the CP500 does not change its format status bit but instead actually changes presets and so sends pulse tally outputs that the DFP-D3000 can use to select presets within it to deal appropriately with the CP500's fallback.

Functions of the DFP-3000.

The DFP-D3000 has a very comprehensive fallback system. This system uses OK/NG tally inputs to tell the DFP-3000 whether attached digital processors are delivering correct audio outputs. Unfortunately, the CP500 (without internal modifications) fails to deliver level logic OK/NG signals. This means that the DFP-3000 fallback system cannot be used. However, the DFP-D3000 accepts pulse logic inputs to trigger preset selections. Although this is a less powerful approach than using the DFP-D3000's fallback system, the CP500 does produce output tally pulses which can be used to trigger preset changes in the DFP-D3000 and achieve results similar to using fallback logic.

Strategy.

Given the logic conditions described above, what must be done is to use tallies from the CP500 to tell the DFP-D3000 to select alternate presets when SRD data is invalid and also to use tallies from the DFP-D3000 to switch the CP500 out of Dolby Digital mode when SDDS data is valid. The instructions of this Tech Note imply that the CP500 will be used to play SR-D only and the superior processor and B-chain capabilities of the DFP-D3000 will be used as the master control for the theatre.

Logic wiring connections.

DFP-D3000 Automation I/O connector (DB37 Female D-Sub)	CP500 Automation connector (DB25 Female D-Sub)
Pin 8, Preset 5 select (NR2)	Pin 3, SK 3 format select (Dolby SR)
Pin 9, Preset 6 select (AUX 1)	Pin 4, SK 4 format select (Dolby Digital)
Pin 14, Logic common	Pin 12, Ground
Pin 11, Preset 8 select (SDDS) - shorted to - Pin 32, SDDS Data OK	Pin 6, SK 6 format select (Non Sync 1)
Pin 36, SDDS Data not OK	Pin 2, SK2 format select (Dolby A)
Pin 15, Logic common - shorted to - Pin 34, AUX1 Digital Data OK	

Audio wiring connections.

DFP-D3000 AUX INPUT 1/2 (DB25 Female D-Sub)	CP500 Main / LF Output Connector (15 pin Phoenix type, Male)
1 Left ground	NC
2 Left hot (+)	1 Left Channel
4 Center ground	NC
5 Center hot (+)	5 Center Channel
7 Right ground	NC
8 Right hot (+)	3 Right Channel
9 Left Surround ground	NC
10 Left Surround cold (-)	8 Signal Ground
11 Right Surround cold (-)	10 Signal Ground
12 Subwoofer cold (-)	12 Signal Ground
13 Subwoofer ground	NC
14 Left cold (-)	2 Signal Ground
17 Center cold (-)	6 Signal Ground
20 Right cold (-)	4 Signal Ground
22 Right Surround ground	NC
23 Left Surround hot (+)	7 Left Surround Channel
24 Right Surround hot (+)	9 Right Surround Channel
25 Subwoofer hot (+)	11 Subwoofer Channel

Note that the inputs of the DFP-3000 are professionally balanced, whereas the outputs of the CP500 are not. All DFP-D3000 audio grounds should be connected to the shield of each twisted pair at the D3000 end only.

Procedures for setting up the CP500.

Confirm that the CP500 is equipped with firmware version 1.51 or higher

The CP500 must be set up with the "auto digital" function enabled by referring to the CP500 Installation Manual. The only source format for "auto digital" should be Dolby A (SK 2), whereas the target format should be Dolby Digital (SK4). It is crucial that Dolby SR (SK3) is not assigned as a source format for auto digital. These instructions assume that the CP500 is configured for Dolby A on SK2, Dolby SR on SK 3, Dolby Digital on SK 4 and Non Sync 1 on SK6.

Audio levels and the CP500.

Make sure that the output levels on all channels of the CP500 are set to the reference input level (-8.2 dBu, which is about 300 mV or –10dBV) of the AUX 1 input.

During operation, ensure that the master fader on the CP500 is disabled or kept at 7.0 at all times.

Setting up the DFP-3000.

The automation wiring table above is made with the assumption that the DFP-D3000 is configured for SDDS on Preset 8 and that Dolby Digital is on Preset 6 (using the AUX1 input). We recommend that you don't change Preset assignments from the defaults unless there is a strong requirement for doing so. If Preset assignments are to be changed, we recommend setting up the theatre completely and confirming that all is working correctly before making the reassignments.

The following fallback structure must be set in the DFP-3000:
SDDS → [AUX 2] → NR2

If any theatre EQ is set up in the CP500, make sure that the theatre EQ for the applicable preset (Preset 6) on the DFP-D3000 is switched off. The same applies to surround delays. Generally, the EQ and surround delay settings of the DFP-3000 should be used in preference to those of the CP500.

Changeover wiring.

For changeover installations, make the following connections to forward the necessary motor start and changeover information to the CP500.

DFP-D3000 Automation I/O connector (DB37 Female D-Sub)	CP500 Motor start connector (DB9 Female D-Sub)
Pin 12, motor 1	Pin 1, motor start, projector 1
Pin 13, motor 2	Pin 9, motor start, projector 2
Pin 19, c/o command, tally	Pin 3, changeover relay
Pin 16, tally common	Pin 5, GND

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Tech Note

Connecting the Sony DFP-3000 to the Dolby™ CP500 with the CP500 as master.

Product: DFP-D3000.
S/N: All units with firmware version 2.60 and higher.
Document: **TN99061402**, TS/CC
Summary: Connecting the Sony DFP-3000 to the Dolby CP500 with the CP500 as master.

Connecting the DFP-3000 to the CP500 is complicated by the possibility of various firmware versions. This document describes the approach when using the most recent versions for each product. Each step must be followed very carefully to avoid problems. If you have earlier versions of firmware, see your Sony or Dolby representative to receive the latest versions.

Considerations.

Sony does not advise customers to use the CP500 as theatre master and the DFP-3000 only for playback of SDDS film tracks. There are a number of reasons for this.

1. The SDDS analog output will be processed by the analogue output circuitry within the CP500 which does not meet Sony's high standards of audio quality.
2. The powerful theatre control features and easy setup of the DFP-3000 A- and B-chain will be partly lost.
3. The balanced interface of the DFP-3000 to external playback equipment will be lost and problems may be encountered when unbalancing Sony's professional outputs with the unbalanced inputs of the CP500.
4. Channel level trims of the CP500 will affect the SDDS channels.
5. The course analogue bass and treble controls will also affect SDDS playback.

In some cases, customers may chose to install the DFP-3000 using the CP500 as master temporarily. They may do this to ease wiring changes or to use optional crossover cards in the CP500 (even though these cards may prevent THX theatre certification).

Logic wiring connections.

DFP-D3000 Automation I/O Connector (DB37 Female D-Sub)	**CP500 Automation Connector (DB25 Female D-Sub)**
Pin 16; Tally Common	Pin 12; Signal Ground
Pin 32; SDDS Data OK - wired to - Pin 11; Preset 8 select	Pin 6; SK 6 Format Select Input *
Pin 36; SDDS Data not OK	Pin 4; SK 4 Format Select Input *

* These connections are valid only if Dolby Digital is assigned to SK 4 and SDDS (User 1 or higher) is assigned to SK 6 on the CP500. On the DFP-D3000, SDDS must be assigned to Preset 8.

Audio wiring connections.

DFP-D3000 System Output (DB25 Male D-Sub)	**CP500 Analog Accessory Rack Connector (DB37 Female D-Sub)**
1 Left ground	NC
2 Left hot (+)	7 X10 (Left)
4 Center ground	NC
5 Center hot (+)	6 X11 (Center)
7 Right ground	NC
8 Right hot (+)	5 X12 (Right)
9 Left Surround ground	NC
10 Left Surround cold (-)	26 Signal Ground
11 Right Surround cold (-)	27 Signal Ground
12 Subwoofer cold (-)	28 Signal Ground
13 Subwoofer ground	NC
14 Left cold (-)	36 Signal Ground
17 Center cold (-)	34 Signal Ground
20 Right cold (-)	29 Signal Ground
22 Right Surround ground	NC
23 Left Surround hot (+)	2 X15 (Left Surround)
24 Right Surround hot (+)	3 X14 (Right Surround)
25 Subwoofer hot (+)	4 X13 (Subwoofer)

Note that the outputs of the DFP-3000 are professionally balanced, whereas the inputs of the CP500 are not. Sony does not advise connecting the outputs of the DFP-3000 to unbalanced inputs, but when this is a necessity proper wiring techniques must be used to minimize complications. All DFP-D3000 audio grounds should be connected to the shield of each twisted pair at the CP500 end only.

Setting up the CP500.

On the CP500, make a custom user format derived from Format 5 (SR). Then perform the following CP500 commands:

1. After copying existing format (5), press "Accessory Rack" and select "Xmit/Receive enable"
2. Press "Channel Mute". A double cross point table is then accessed.
3. Open all cross points
4. The first cross point table is called "Accessory rack". Make connections from L to L, C to C and so on.
5. The second cross point table (named "Normal") should be left open.
6. Store the user format as User 1 (or other) and configure the format selector so that this user format is assigned to SK 6.

With the automation wiring specified above, the DFP-D3000 will automatically force the CP500 to SK6 once SDDS data is detected.

Make sure that the appropriate user format is not assigned as a source for Auto Digital on the CP500, since this will disable SDDS playback whenever a dual digital format print is played back.

Audio signal adjustments.

Since the channel output adjustment and the course bass and treble control of the CP500 is done on the output board (in the analog domain), these settings will also affect SDDS. Therefore, adjust the B-chain of the CP500 prior to the B-chain of the D3000.

To obtain an optimum gain structure, select −10 dBu as the D3000 reference output level, and increase the channel level trims to approximately +2 dB to match the 300 mV reference input level of the CP500.

With this set-up, the master level control of the CP500 will not affect the playback levels for formats played through the DFP-D3000 and vice versa.

Changeover logic wiring.

For change-over installations, connect the motor start and changeover relays to the D3000 automation port and follow the table below to make the D3000 pass this information on to the CP500:

DFP-D3000 Automation I/O connector (DB37 Female D-Sub)	**CP500 Motor start connector (DB9 Female D-Sub)**
Pin 12, motor 1	Pin 1, motor start, projector 1
Pin 13, motor 2	Pin 9, motor start, projector 2
Pin 19, changeover command, tally	Pin 3, changeover relay
Pin 16, tally common	Pin 5, GND

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Tech Note

Uploading new firmware into the DFP-D3000 using a PCMCIA (PC Card) flash memory card or a connected computer.

Product: DFP-D3000.
S/N: All units with firmware version 2.10 and higher.
Document: **TN99042802-1**, CC
Summary: Procedures for uploading new firmware into the DFP-D3000

Uploading using a computer only.

There are two ways to load new firmware into a DFP-D3000. One is to use a computer (laptop) having the latest setup software and two special files, and utilize the functions of the software under menus **Tools>Upload new firmware . . .** This procedure requires about 25 minutes, due to the limitations of the computer's serial port. As a part of the automatic procedure, the current theatre (Project Configuration) settings are saved to the computer then reloaded back into the DFP-D3000 after the new firmware has been uploaded. Instructions follow.

Uploading using a PCMCIA card.

The second means of installing new firmware is to use a special flash memory PC-Card (formerly called PCMCIA) card. This procedure requires opening the unit's front panel and changing a DIP switch. This procedure takes about 5 minutes and does not save current theatre settings, which must be manually saved using the setup software and then manually restored after the firmware upgrade is complete.

Cautions.

If power to the DFP-D3000 is lost at any time during either firmware upgrade procedure, the unit will be non-operational except for its PEC inputs (without NR2 or matrix decoding) until a Sony Cinema Products PCMCIA card can be used to reload new or old firmware, as above. Note that theatre settings files created with versions of setup software v2.043 and after are automatically compatible with earlier versions of firmware and setup software.

PCMCIA card procedures.

1. **Turn off power** to the unit. Before doing this, be sure to take all appropriate precautions with attached equipment and save your Project Configuration settings to a .DFP file on your attached computer, using the setup software.

2. Open the front panel and move DIP Switch 1 to its DOWN position. This is the leftmost switch in the two groups of red DIP switches on the upper PCB.

3. Insert the special Sony PCMCIA card containing the new firmware face up into the card slot at the right of the upper PCB.

4. Turn on the AC mains power. Wait 4 minutes or so until the LED's next to the DIP switches take on an obvious alternating, rather than sweeping or halted, pattern. If in doubt when you first perform this step, wait at least 5 minutes while observing the pattern.

5. Turn off the AC mains power, remove the PCMCIA card, restore the DIP switch, and close the front panel. Restore your previous Project Configuration file using the setup software. The unit may now be operated in the normal manner, but check documentation that describes new properties of the Automation connector.

Uploading new firmware using a connected computer.

This procedure begins with two floppy disks each containing a single file. These files may also be obtained by e-mail from Sony Cinema Products. The files are self-extracting compressed files named FILES.EXE (same for all software versions) and FIRM_XXX.EXE, where XXX is the version of firmware to be uploaded.

IT IS ABSOLUTELY CRITICAL THAT POWER IS NOT LOST OR TURNED OFF TO THE DFP-D3000 DURING THE PROCESS OF FIRMWARE UPLOAD. If this happens, the DFP-D3000 will become inoperative and you must call SCPC for a flash memory PCMCIA card in order to restore the unit. Also, if you fail to follow steps 6, 7, and 8 below before clicking on the **Start** button, the DFP-D3000 will similarly become inoperative. These instructions are very easy to follow, but you must follow steps 6, 7 and 8 carefully.

1. Copy FILES.EXE to a temporary directory on your computer. Launch FILES.EXE by double clicking on it in Windows, or by running it from the command prompt in DOS or a DOS window. This will result in nine new files; you can now delete FILES.EXE. Install the setup software by double clicking on INSTALL.EXE in your new directory (you can locate it using Windows Explorer). Do not install the new software in the same directory that you used for FILES.EXE; we recommend using "DFP". You do not need to keep your old version of setup software, as all newer versions are backward compatible and automatically sense and adapt to whatever firmware version they are communicating with.

2. Follow the same procedure with FIRM_300.EXE. We suggest creating a directory named FIRM300. You will end up with two files: PROG.HEX and COEFF.HEX.

   If you wish, you can copy the two new files to a floppy disk and the other nine new files to another floppy disk. The files on these floppies can then just be copied to directories on other computers, skipping the extracting steps.

3. At this time it might be a good idea to back up the existing theatre settings file to your laptop or to floppy disks, if you have not already. This is good practice, even though these files will be automatically restored by the upload process.

4. Having connected the laptop to the DFP-D3000 with a null modem cable, launch the setup software by double clicking on its icon or on its executable file, which will be named DFP2044.EXE or something similar related to the version. Note that there is a red rectangle at the bottom of the window which says **Disconnected**. In the menu bar, select **Config>DFP**. When the dialog box opens, enter the serial number of the DFP-3000 and then click on **Connect**. The LCD window of the DFP-D3000 will say **PC CONTROLLED** and the red rectangle will turn green and indicate **Connected**.

5. Now select **Tools>Upload New Firmware . . .** A window will appear labeled **Firmware Uploading**. The text in this window is essentially repeated in the following instructions. Read the text and click on **Exit** to close the window. Note that the window that is uncovered has a line at the bottom indicating the software is connected to the DFP-D3000. If not, repeat step 3.

6. Click on **Select Directory**. Use the **Directories** scroll window to select **firm300**, or whatever directory you created in step 2 above. When you have done this, two familiar files will appear in the left **File to Locate** scroll window: **coeff.hex** and **prog.hex**. Click **OK** to close the **Select Directory** dialog box.

7. Carefully follow the next instructions. In the **DFP Firmware Upload** window, under **DFP Firmware File Selection**, click on the **COEFF.HEX** file name to select it. A window will appear; you must click on **Coefficient Data**. When you do, the window disappears and you will notice that the **Coefficient File: Not Selected** text under the **Firmware Processing Status** area has changed to **Coefficient File: COEFF.HEX** and that the associated radio button **Selected** is active. If this is not the case or you are not sure, repeat this step.

8. Continuing with care, select the **PROG.HEX** file name and click on the **Program Data** alternative in the pop up window. Confirm that the **Program Data: PROG.HEX** text appears and the associated **Selected** button is active. If this is not the case or you are not sure, repeat this step.

9. When both the **Coefficient File: COEFF.HEX** and **Program Data: PROG.HEX** text are visible and both **Selected** buttons are active (which should be the case if you have been successful with steps 7 and 8), click on the **Start** button. Be sure that steps 7 and 8 have been completed successfully before you select **Start** or the firmware upload process will hang up and the unit will be rendered inoperative. The remainder of the process is automatic.

The setup software will then establish communication with the existing firmware in the DFP-D3000 and will begin to upload the new version. You should see the processor LCD window indicating the progress of firmware transfer.

IT IS ABSOLUTELY CRITICAL THAT POWER IS NOT LOST TO THE DFP-D3000 DURING THE PROCESS OF FIRMWARE UPLOAD. If this happens, the DFP-D3000 will become inoperative and you must call SCPC for a flash memory PCMCIA card in order to restore the unit. Also, if you fail to follow steps 7 and 8 above before clicking on the **Start** button, the DFP-D3000 will similarly become inoperative.

10. When the file transfer process is complete, the setup software will instruct the DFP-D3000 to re-boot. During the re-boot process, the setup software automatically disconnects from the DFP-D3000. After the re-boot, the setup software will automatically reconnect to the DFP-D3000. At that time it will automatically reload saved theatre configuration settings back into the DFP-D3000. Do not interrupt this process.

At the end of the complete process, the LCD display on the DFP-D3000 will indicate **PC CONTROLLED**. If you had theatre settings stored in the unit which were created under firmware v2.10, the setup software will show a report telling you what adjustments were made to your settings to make them compatible with the new firmware. The only manual entries required when upgrading from firmware v2.10 to v3.0 is the requirement to individually enter subwoofer low pass filter settings in each preset configuration; this is because v3.0 allows different settings for each preset.

This is the end of the setup software firmware version upgrade process.

SONY

Sony Cinema Products Corporation

Tech Note

Special screwdrivers for Sony electronic products.

Product: All products.
S/N: All units.
Document: **TN99043001**, CC
Summary: Special screwdrivers are best for Sony equipment, here's how to obtain them.

Sony, and other Japanese electronics manufacturers, use a machine screw standard which resembles a Phillips head, but is actually slightly different. This standard is called JIS (Japanese Industry Standard). If a conventional Phillips screwdriver is used with such screws, it is very easy to damage the slots in the head of the screw. The best approach is to use JIS screwdrivers, but these are sometimes difficult to locate outside Japan.

Special screwdrivers from Sony.

Sony Cinema Products maintains a small stock of JIS screwdrivers manufactured by Vessel in a single size suitable for most screws on and in Sony products. 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.

From elsewhere.

A number of electronics tool distributors sell JIS screwdrivers because they are commonly needed for service of Japanese professional and consumer electronics products. One such American vendor is Jensen (800-426-1194, www.jensentools.com). Jensen supplies five different JIS screwdrivers in sizes from #00 to #2. These have plastic handles and hardened tips, and are made by Hozan of Japan. The most suitable size is the #1; Hozan part number D-150-100, Jensen Cat. No. 8-104. The cost is about US$5.00.

SONY Sony Cinema Products Corporation

Tech Note

Setting the subwoofer level.

Product: DFP-D3000, DFP-2000.
S/N: All units.
Document: **TN99051701**, CC
Summary: An overview of the process of setting the digital and analog subwoofer levels and approximating a match between them, step by step.

The topic of setting subwoofer levels is the subject of numerous articles and even more numerous opinions, but of only a single proposed standard (SMPTE RP 200, and ITU 10-11R/Temp/11-E). There are many reasons for this. First, the use of the modern digital audio subwoofer is unique in comparison to the other channels and it is recorded with a different monitoring reference. The purpose of the subwoofer has changed with the evolution of cinema sound, from compensating for the poor low frequency response and bass power capability of older screen speakers, to adding power to low frequency effects even in theatres having full range screen speakers and capable amplifiers. Secondly, different post production facilities and even different engineers have followed their own alignment conventions. Finally, equipment and even meter standards are different when comparing the USA, Europe, and elsewhere. This wordy Tech Note is only an overview and is not meant to comprise a specific calibration process or set of instructions.

1. Establishing the electrical reference level on the dub stage.

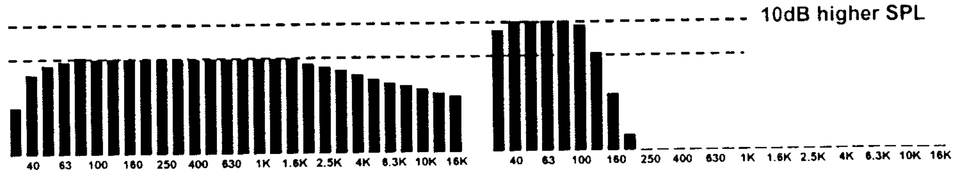
On the dubbing stage, a calibration tone is used in the console and recorders to establish the reference level through both, making sure they correspond. Generally, this *electrical reference* will be 0 VU = +4dBu, -20dBfs = +4dBu, 0 VU = -10dbV, or some other recognized reference convention. The digital subwoofer channel (called LFE, for Low Frequency Effects) is aligned to the same recording reference level as the digital screen speaker channels.

2. Setting the acoustical reference level on the dub stage.

A signal, generally wide band pink noise, is sent through the dubbing console to each of the monitoring system's screen speakers at the *electrical reference* level. Using a real time multi-channel analyzer, the monitor system is adjusted for the preferred acoustical response at each loudspeaker, given the properties of the loudspeaker, the room, the screen, and the "X-curve" of SMPTE 202M. The electrical gain of each channel in the monitoring system is then adjusted to give an *acoustical reference* level in the room from each screen speaker. Almost always this is 85dB C-weighting, slow response, measured with a wide-band SPL meter; RP 200 calls for an rms responding meter with a frequency response of 22Hz to 22kHz. The actual electrical gain is not material to this setting, but this procedure ties the *electrical reference* , measured electrically, to an *acoustical reference*, measured acoustically.

3. Setting the subwoofer acoustical gain using a screen speaker as a reference.

The subwoofer used for LFE (low frequency effects) in the dubbing theatre is then adjusted as above, except that the SPL is measured differently. To make this adjustment properly, a multi-channel real time analyzer must be used. Analyzer bands in the flat-response region of a screen speaker (generally, the center speaker) are taken as a reference. These bands will not individually measure 85dB SPL, but will be somewhat less, depending on the bandwidth of the analyzer's bands, typically about 70 dB SPL for a 1/3-octave analyzer as required by SMPTE 202M. This flat-response region, between the low frequency roll off caused by the loudspeaker cabinet and the high frequency roll off due to the screen and X-curve, is referred to as the in-band (*acoustical*) response of the monitor speaker. The LFE subwoofer electrical gain is adjusted such that the analyzer channels in it's in-band region are 10dB greater than those in the screen speaker's in-band region. This is referred to as "10dB of in-band gain" (subwoofer relative to the screen speaker).



Center channel loudspeaker response   Digital subwoofer (LFE) channel response

The measurement is made acoustically, not electrically. Typically, each band of the analyzer in the pass band of the subwoofer will then measure about 80 dB SPL. If a screen speaker and the LFE subwoofer loudspeaker are each measured with a *wide band* SPL meter, the subwoofer will typically measure *approximately* 5.5 dB higher.

Why we do it this way.

The reason for lowering the electrically recorded level of the subwoofer channel and making it up by turning up the playback gain dates back to 70mm film. The subwoofer recording level was lowered to prevent saturation of the magnetic track and the playback gain was increased to compensate. The loss of signal to noise performance was inconspicuous because the subwoofer signal was sent through a low pass filter and did not reproduce hiss. This level difference convention has been retained in the digital world, where it serves to give additional effective headroom for the playback of low frequency sound effects through the subwoofer loudspeaker.

What it means.

The consequence of having 10dB more *acoustical* gain in the subwoofer monitoring channel is that the dubbing engineer will tend to turn down the *electrical* recording level of the subwoofer by about 10dB compared to what she would have done without the increased monitor gain. However, unlike the screen speaker channels, the engineer does not use a console meter to check the electrical recording level of the subwoofer (except perhaps to guard against overload conditions). There is no specific electrical reference for the subwoofer signal, which reflects the artistic purpose of this channel and the wide range of factors that affect any subwoofer's electroacoustical response.

4. Setting the digital screen speakers in the cinema.

In the cinema, the screen speakers are adjusted in the almost same manner as they were on the dubbing stage. This calibration, which encompasses the cinema processor's main fader, equalizers, power amplifiers, crossovers, loudspeakers, screen, and room response, is referred to as the B-chain alignment. Consider the digitally driven loudspeaker alignment first, as it is the most important. An *electrical reference* signal, generally wide band pink noise generated within the cinema processor at a specific level, is used to align each of the screen speakers to give the desired response (X-curve, etc) and *acoustical reference* level for each individual speaker (again, 85 dBC, slow response, measured with a wide-band SPL meter). This procedure ties the cinema processor's *electrical reference* to an *acoustical reference* in the cinema, similar to what was done on the dubbing stage.

5. Setting the digital subwoofer in the cinema.

In a similar way as on the dubbing stage in Step 3, the level of the digital subwoofer is set by using a multi-channel real time analyzer and adjusting the *electrical* gain of the monitor system to achieve 10dB of in-band *acoustical* gain, relative to a screen speaker. The consequence of this adjustment is that signals which were recorded approximately 10dB lower for the subwoofer will now play back in the cinema at the same acoustical level as they did when the dubbing engineer recorded them on the dubbing stage, because the playback conditions have been acoustically matched between the dubbing stage and the cinema (as closely as variations in rooms and loudspeakers will allow).

6. Setting the optical screen speakers.

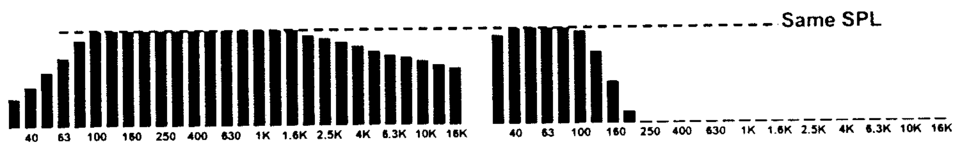
The equalizers, amps, and loudspeakers for optical playback are the same as for digital playback, of course. No additional B-chain adjustments are needed. In order to match the electrical level of the optical A-chain (the circuits and components in the signal flow prior to the cinema processor's main fader) with the previously established B-chain settings, a test film is played which has a reference sinewave modulation of 60% (according to SMPTE RP 200). After slit illumination, solar cell preamplifier gain, slit loss correction, and any other adjustments are applied, the resulting A-chain electrical level is matched to an internal reference in the cinema processor using a gain adjustment. If a 50% modulation alignment film is used, the acoustical level of the screen speakers should be set to 1.6dB less than 85dBC, or 83.4dBC SPL. In the DFP-3000, this electrical calibration process is done automatically by a software subroutine. Having completed the optical input calibration, analog and digital playback should result in identical screen speaker acoustical levels.

Optical subwoofer defined.

The optical subwoofer has a different function than the digital subwoofer. It serves to enhance the bass response of the optical playback. It is totally artificial, synthesized in the cinema processor by combining the L, C (-3dB), and R signals from the decoded optical Lt,Rt and sending the sum through a low pass filter. The cut off frequency of this filter may be 50Hz, 100Hz, 120Hz or some other frequency, depending on the cinema processor, the loudspeaker characteristics, and the installer's judgement. A high pass filter may also be applied, if it is not already a component of the optical preamplifier, to reduce low frequency artifacts caused by ground noise timing (GNR) errors and streaking noise on the print. The end result is a signal containing frequency components which overlap those being sent to, though not necessarily reproduced by, the screen speakers. In Hollywood, the dubbing engineer may not have listened to this signal on the dubbing stage (in part because the DS4 without a cat. 160 card does not create it) and so made no artistic decisions based on it. It is merely an enhancement *created in the cinema* to give the effect of more bass extension in the screen speakers, and it has no correspondence to a discrete signal on the dub stage. Note that it also has a much lower dynamic range than the digital subwoofer signal. The digital subwoofer signal, in contrast, was creatively recorded on its own discrete channel (LFE) of the print master and is used for specific low frequency sound effects.

7. Setting the optical subwoofer.

The optical (analog) subwoofer is adjusted to match the optical screen speakers' balance, again using a multi-channel real time analyzer to compare bands in the pass band of a screen speaker and the pass band of the subwoofer, and setting in-band *acoustical* levels accordingly. In contrast to the digital subwoofer, there is no in-band acoustical gain difference, as the subwoofer signal is just the low frequency components of the screen speaker signals.



Center channel loudspeaker response   Analog subwoofer channel response

Full range screen speakers need less help from the synthesized optical subwoofer than do older speakers with poor bass extension. Experienced cinema engineers may chose to reduce the nominal level of the optical subwoofer, lower the high pass filter, or even eliminate the synthesized signal altogether, depending on the capabilities of the screen speakers and the auditorium's acoustical response.

8. Balancing analog and digital.

Finally, the installer must make an aesthetic judgement regarding the optical subwoofer level adjustment. The goal is to have optical playback sound as close to digital playback as possible when playing actual films. Adjustments of the optical subwoofer level may be needed to achieve this and also to avoid excess bass in dialog. A final listening test with familiar material must be done to ensure that the low frequency region is smooth and natural, in addition to being extended. Keep in mind that the digital and optical subwoofer signals are very different. Also, the listening test signal reaching the subwoofer for the optical subwoofer calibration will be different from the listening test signal used to set the digital subwoofer, as they have completely different origins. Even though the digital LFE and optical subwoofer signals may be played back through the same loudspeaker cabinet, they will likely have different bandwidths and frequency spectra, and so will have different acoustical outputs and different measured wide-band SPL, apart from any nominal 10dB in-band gain difference.

When evaluating the digital subwoofer (LFE) level, no listening test is entirely definitive, because the amount of energy in the LFE channel is a creative decision made when the soundtrack of each film was mixed. For the same reason, the digital subwoofer (LFE) low pass filter setting has no relationship to the screen loudspeakers' performance. It merely serves to exclude undesirable sound from the subwoofer (LFE) cabinet. The actual sounds reproduced on the digital subwoofer (LFE) channel are determined by what is put there by the film's sound mixer, as long as the low pass filter's frequency is not set so low as to remove sounds the mixer intended to be included.

As a side note, it is often difficult to determine the correct polarity of the subwoofer, digital or analog. Even if pink noise is sent to the subwoofer and center channels simultaneously, in many cases there will be no apparent difference in combined wide band SPL measurement when switching subwoofer polarity. In the end the best polarity may come down to an aesthetic judgement on the part of the cinema technician, based on listening to actual films or familiar non-sync material.

Rule-of-thumb methods.

Measuring the level of a subwoofer with a wide-band SPL meter is of questionable value except as a rule-of-thumb method to re-check a theatre that has already been properly calibrated. The reason for this is that the measured acoustical output of a subwoofer (or any speaker system) depends on the bandwidth of the signal being measured. This will be affected by the bandwidth of the test signal, the equalizer settings, the auditorium's response, the loudspeaker cabinet response, and even the quality of the SPL meter used for the measurement. A subwoofer signal with a wider bandwidth may measure the same as another with a narrower bandwidth but higher level (as indicated by analyzer bands within the pass band of the subwoofer), using the same speaker cabinet. Considering the DFP-D3000, the bandwidth of the pink noise sent to the subwoofer is affected by a low pass filter that can be adjusted from 80Hz to 330Hz—a difference of three octaves. No standards exist for such wide band SPL measurements.

Although the measured SPL of wide band pink noise through the subwoofer will change if the subwoofer's low pass filter is adjusted, this will not change the actual playback level of the digital LFE channel from film. So long as the filter frequency is not set too low, the signals recorded on the dubbing stage will determine what is heard in the cinema when the proper in-band gain difference is established acoustically, as previously described. In general, a low pass filter setting for the digital subwoofer (LFE) of 125 Hz, 160 Hz, or even 200 Hz should serve in most installations and all should sound the same when playing digital material. A low pass filter setting of 125 Hz will give a wide band subwoofer SPL pink noise measurement of *approximately* 91 dBC. This rule-of-thumb result is only approximate and should not be used for the primary alignment of a theatre.

SONY

Sony Cinema Products Corporation

Tech Note

The Sony DFP-D3000 requires D-Subminiature connectors with metric jack screws. A kit of mating connectors is available.

Product: DFP-D3000.
S/N: All units.
Document: **TN99052301**, CC
Summary: The DFP-D3000 requires metric D-Sub connectors. A kit of these connectors is available. The Sony Part Number is STK-2202.

The Sony DFP-D3000 cinema processor uses 9-pin and 25-pin D-Subminiature connectors (commonly referred to as DB9 and DB25 D-Subs) which have metric jack screws. These jack screws are similar, but not identical, to the ANSI standard jack screws which are commonly used on D-Sub connectors in the USA. There is the potential for damage to threads if the wrong type of jack screws are used and these screw thread standards become intermixed. At the same time, Sony recommends using jack screws to secure the mating connectors to the DFP-D3000.

Sony Cinema Products provides a kit of the correct type of connectors at no charge, for each DFP-3000. This kit contains the electrical connectors of the proper type and gender, connector shells, and both ANSI and metric jack screws for all connectors. The part number for this kit is STK-2202.

Contents	Part Number
D-Sub 25s, Female connector (x2)	**DNT25SZ**
shell (x2)	**CT25M**
D-Sub 9p, Male connector (x3)	**DNT9PZ**
shell (x3)	**CT9M**
D-Sub 25p, Male connector (x2)	**DNT25PZ**
shell (x2)	**CT25M**
D-Sub 37p, Male connector (x1)	**DNT37PZ**
shell (x1)	**CT37M**

Additional quantities of these connectors can be obtained from the manufacturer; be sure to specifically request metric jack screws. Please contact

Atwater Electronics
P.O. Box 10127
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www.atwaterelex.com

SONY®

Sony Cinema Products Corporation

Tech Note

Connecting balanced and unbalanced circuits.

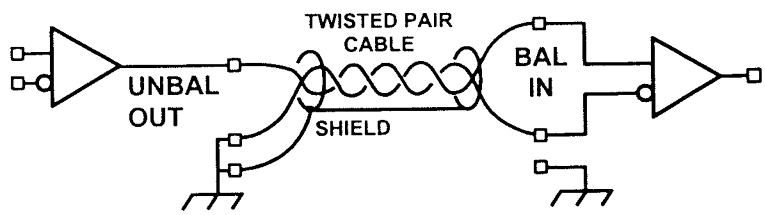
Product: All Sony cinema processors.
S/N: All units.
Document: **TN99060401**, CC
Summary: The best way to connect balanced or unbalanced inputs and outputs.

Sony cinema processors have professionally balanced input and output signals. Unfortunately, many other products have unbalanced inputs. This is a brief discussion of a recommended approach to interconnecting balanced and unbalanced equipment.

Unbalanced outputs.

The first thing to keep in mind is that the number of terminals that input or output connectors have is not an indication of whether the circuits behind the connectors are balanced or unbalanced. If you are uncertain, there are electrical tests that you can use to determine whether a signal is balanced; the best approach is to refer to the manufacturer's technical documentation.

Connecting an unbalanced output to a balanced input is a reasonable approach to interconnecting equipment. Most of the value comes from the balanced input, so long as the impedance of the output is low and grounding of the shield is properly handled. Here is a simple drawing, using basic amplifier symbols, showing an unbalanced output properly connected to a balanced input:



Notice that the output signal is unbalanced, even though it has three terminals, and the input circuit is balanced, even though it uses only two terminals.

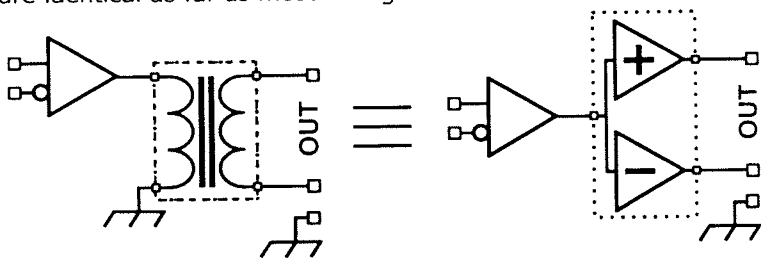
Avoiding hum caused by ground loops.

The shield of the twisted pair cable is shown connected to ground only at one end. This is done to prevent joining together the ground systems of the two pieces of equipment, as they may actually have different "ground" potentials, particularly if they are physically distant. You wouldn't want this ground voltage difference to become mixed with the audio voltages; the result could be audible hum at the AC mains frequency. The end of the cable to select for grounding the shield should be the one with the best earth ground, but sometimes you are forced to use the end where it is easiest to make connections. Even if you find that the ground terminals are not conveniently near each output pair, as with the THX® pinout convention, it is still necessary to ground the shield of each cable. In general, ground the shield only at the output end of cables.

If you do have hum problems, check to ensure no continuity exists between the chassis grounds of the equipment you have interconnected. This is often difficult to do in practice, especially if the equipment is in the same rack and if the line cord safety ground terminals are in place (*no not permanently remove these connections in efforts to eliminate ground loop problems*). Another approach to tracking down ground loops is to disconnect all audio connectors and confirm lack of continuity between the connector terminals which would go to ground.

Balanced outputs.

There are three types of balanced outputs that you may encounter: transformer balancing, true electronic balancing, and polarity inverted outputs. The first two are identical as far as most wiring schemes are concerned.

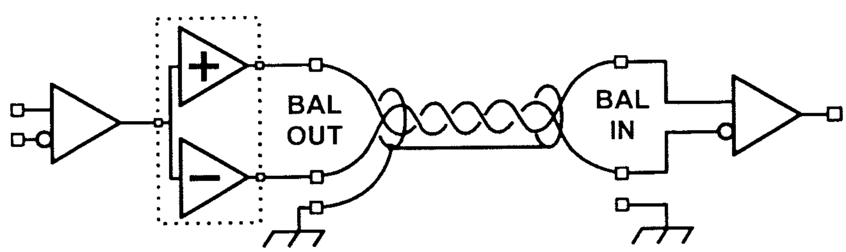


The circuit on the left uses a transformer to connect the output of an internal amplifier stage to the outside world without reference to its internal ground. The schematically illustrated circuit on the right uses a cross-coupled electronic circuit to achieve the equivalent result: true electronic balancing.

It is important to remember that these circuits must be treated identically. For example, you should never connect to only one polarity of the electronically balanced output any more than you would connect to only one side of the output transformer. For highest performance, Sony cinema processors use this type of electronically balanced output circuit.

Connecting to true balanced outputs.

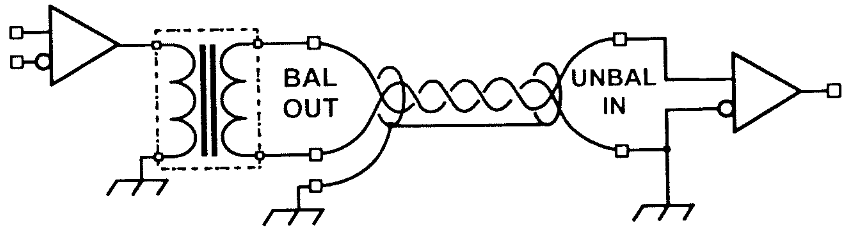
The proper way to connect either of the above true balanced outputs to a balanced input is the same (electronically balanced output shown):



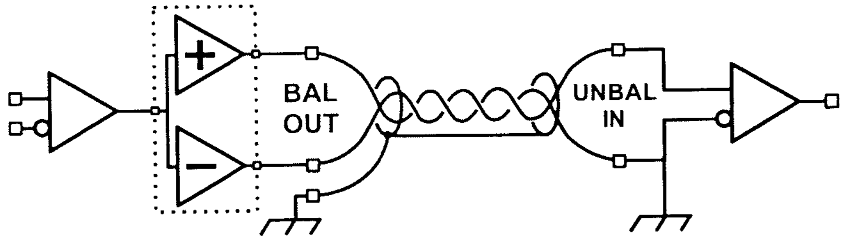
This circuit scheme gives the highest performance of all, because it offers the benefits of balanced outputs and the even greater benefits of balanced inputs. It is the approach taken in the design of Sony cinema processors at both their inputs and their outputs.

Balanced output to unbalanced input.

Connecting a true balanced output to an unbalanced input is not recommended; this approach will compromise the isolation between the units. This approach should only be considered if absolutely necessary and only if the units being connected are in the same physical rack. If it should becomes necessary, here is an illustration of the correct approach (transformer output shown):



Notice that this connection still provides electrical isolation between the chassis grounds of the two systems, providing that the cable's shield is properly managed. Here is an illustration of this approach with true electronically balanced outputs:



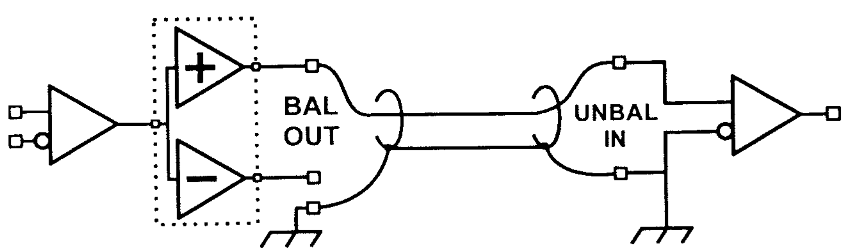
Here again, a true electronically balanced output must be properly terminated at the unbalanced input, and the cable's shield connection to ground must be properly managed in order to keep the equipment chassis grounds isolated. The net signal level should remain the same as with a balanced input, due to the design of the cross-coupled output circuit.

How not to do it.

Here are some DO NOTs to be aware of when making interconnections:

- Do not connect to only one side of a true balanced output.
- Do not connect the shield at both ends.
- Do not use the shield as a signal common.
- Do not use unshielded wires instead of shielded cable.

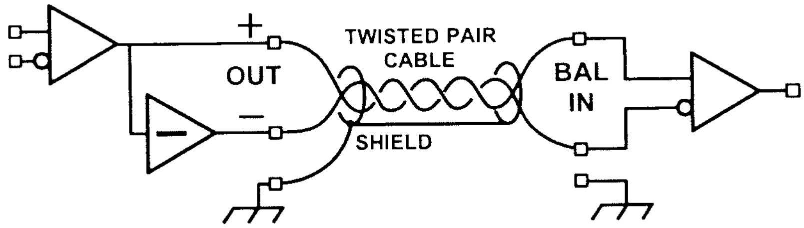
This is an illustration of the absolutely wrong way to make the interconnection between a true balanced output and an unbalanced input. *Do not wire your connections in this manner!*



This connection results in an undefined output signal, which could result in headroom and frequency response problems. It also connects the grounds of the two pieces of equipment together using the return path of the audio signal, forming a ground loop that could result in hum. Don't do it!

Quasi-balanced outputs.

Because of their inherent compromises, Sony cinema processors do not use quasi-balanced outputs made with polarity inverting circuits. You may encounter them in the field, so they will be mentioned briefly. Here is an illustration:

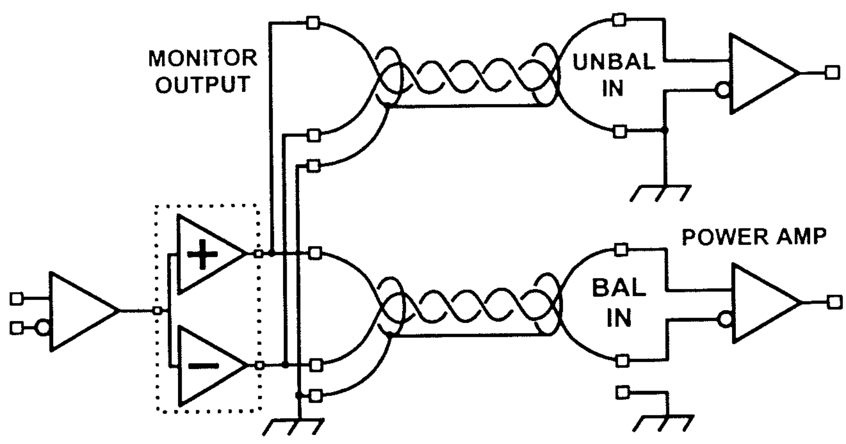


The schematic above shows a polarity flip output properly wired to a balanced input, such as those of the DFP-D3000. Neither polarity of output will be shorted to ground and equipment grounds remain isolated. The signal level is unaffected.

If you must connect a quasi-balanced output to equipment with an unbalanced input design, it is probably best to treat the quasi-balanced output as if it were two separate unbalanced outputs and connect to only one of them, leaving the inverted output unconnected and floating as opposed to shorting it to ground as you would with true balanced outputs. Unfortunately this lowers the net output level by half (-6 dB). Consult the equipment manufacturer's recommendations when quasi-balanced outputs must be connected to unbalanced inputs.

Multiple pieces of equipment.

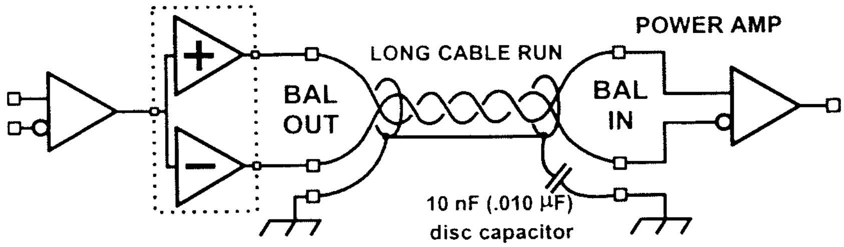
In the real world it is often necessary to interconnect several pieces of equipment which may have different styles of inputs and outputs. An example is connecting the balanced SYSTEM outputs of a DFP-D3000 to power amplifiers, which may have balanced inputs, and the DFP-D3000's paralleled MONITOR outputs to a booth monitor, which may have unbalanced inputs. Here is an illustration:



Notice that the unbalanced input of the booth monitor effectively unbalances the output of the DFP-D3000 as it connects its "cold" or out-of-phase side to the booth monitor's ground system. Nevertheless, if the wiring is done as illustrated, the power amplifiers will suffer no hum problems.

Advanced techniques for long cable runs.

On rare occasions when a long cable run is required, problems may be encountered with radio frequency interference. An example might be the cable run from a DFP-D3000 in a projection booth to a subwoofer power amplifier located near the screen in a theatre. The reason for the susceptibility to interference is that the ground at only one end of the cable may be insufficient to prevent the pickup of radio frequency interference if the cable is very long. In fact, a long cable shield can act as an antenna. A disc ceramic capacitor can be used across the open end of the shield to provide a radio frequency shorted connection to ground without creating a hum-causing ground loop at the mains frequency.



Real world installations.

Real installations can be much more complex than the simple examples illustrated in this Tech Note. Audio grounds, logic grounds, power grounds, and computer grounds can all become mixed. Finding the cause of interconnection problems can be very difficult. Sometimes the offender is a piece of unbalanced consumer equipment used for non-sync; sometimes it is a tally line that is closed to ground only under certain circumstances. If you encounter difficulties when installing Sony equipment, contact Sony Cinema Products' technical support staff for recommendations and troubleshooting assistance.

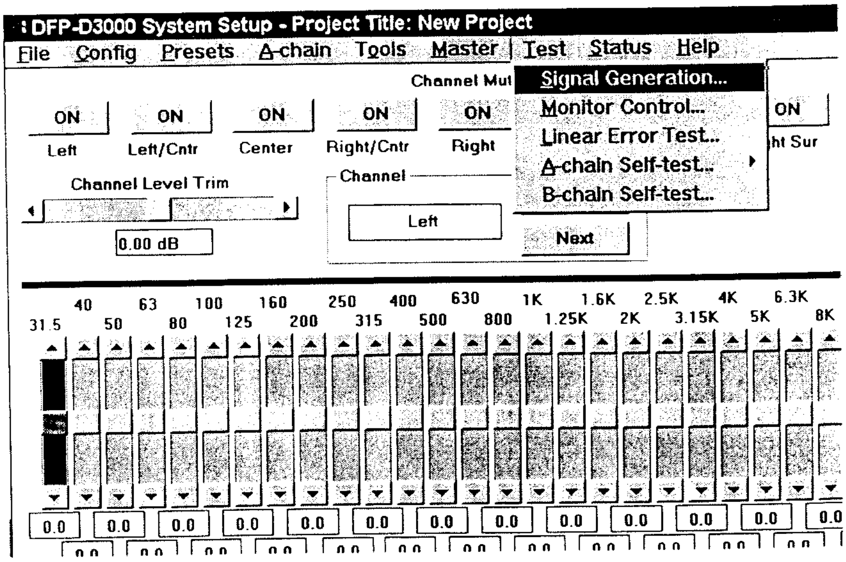
SONY Sony Cinema Products Corporation

Tech Note

Using Setup Software to test loudspeaker wiring and cautions regarding use of Theatre Diagnostics.

Product: DFP-D3000.
S/N: All units with firmware v2.74.
Document: **TN99091501**, CC/MO
Summary: Explains the recommended way to use Setup Software functions for loudspeaker testing and how to avoid problems with front panel Theatre Diagnostics.

The recommended means of using provisions of the DFP-D3000 to create output signals for checking that specific Decoder outputs arrive at the desired loudspeaker cabinets is to use the internal test signal generator controlled by Setup Software. This function is invoked through the **Test** pull-down menu of the Setup Software's main screen. Select **Test>Signal Generation...** and select the type of signal desired, such as pink noise. Also click to select the **Cycle signal through channels** option. You can also select the number of seconds you want the signal to remain at each channel's output.



In the past, theatre installers may have used the Theatre Diagnostics (B-Chain self-test) functions available through front panel menus of the DFP-D3000 to create output signals for checking that specific Decoder outputs arrive at the desired loudspeaker cabinets. However, in version 2.74 of DFP-D3000 firmware the Theatre Diagnostics function is not implemented. Attempting to use these functions will cause the DFP-D3000 to lock up. No damage is done, but the unit must be powered OFF and then back ON to clear this condition.

SONY

Sony Cinema Products Corporation

Tech Note

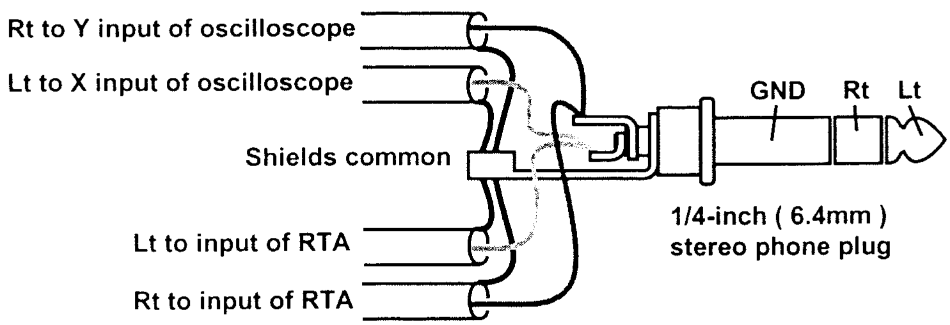
How to make a test cable for performing A-Chain calibrations using the DFP-D3000 and external test equipment.

Product: DFP-D3000.
S/N: All units.
Document: **TN99101201**, CC
Summary: Making an A-Chain test cable.

The DFP-D3000 provides a convenient, front-panel stereo ¼-inch phone jack with a selector switch. This jack can be used to connect an external real time analyzer (RTA) and dual channel X-Y oscilloscope to facilitate making A-Chain calibrations and adjustments. See the DFP-3000 Quick Start Guide for detailed instructions. This Tech Note describes how to make the necessary cable to connect your external test equipment to the phone jack.

Connections at the phone plug.

The following illustration shows how to make the necessary connections of the cables to the ¼-inch phone plug. The cover is removed to show wiring.



Use quality shielded cable and connect all the shields to the phone plug's sleeve common.

Connections at the external equipment.

Various brands of test equipment provide different input connectors and describing all of them is beyond the scope of this document. The connections to be made should be obvious, just be sure to connect the shields to the inputs' signal common.