Film-Tech

Digital Theater Systems

Installation and Operation Manual

DTS-ECP Expandable Cinema Processor

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DTS Part #9301DECP002/10

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SECTION 1   INTRODUCTION AND SPECIFICATIONS

1.1.   ABOUT THE DTS-ECP

1.1.1.   How the DTS-ECP Works

The DTS-ECP is an *expandable cinema processor* that enables playback of motion picture sound tracks. The standard unit combines the functions of a 6-track analog sound processor and booth monitor. The unit is capable of audio playback in stereo optical (A-type or SR-type noise reduction), mono, and (stereo) NONSYNC formats. It also allows for automation interfacing and playback of an external 6-track source. The unit has individual channel controls and emergency BYPASS Mode. Individual channel EQ accomplished by the use of a laptop PC and DTS CP Setup Software. The unit can be configured (via jumpers) for external or internal crossovers. WIDEBAND is used for external and when internal is used, the customer specifies the resistor pack value required. Other programmable (via jumpers) features include: Balanced or unbalanced external NR, balanced or unbalanced output, screen loss EQ, and time alignment delay.

The unit is designed to be "expandable" meaning that <u>DTS digital playback</u> can be added as an <u>option</u>. This option is added by installing the Model DPP.

1.1.2.   Adding DTS Digital Upgrade (Model DPP, <u>D</u>igital <u>P</u>rocessing <u>P</u>ackage)

When the DTS digital package (Model DPP) is added, the following items are changed: Addition of three CD-ROM drives, the front display is changed, software is changed, and the CPU board is changed. A DTS timecode reader and cable will be issued as well as one reader for platter systems and two readers (with "Y" cable) for dual projectors (change-over systems).

Once DTS digital is added, the DTS-ECP uses DTS time-coded film to synchronize DTS digital 6-track sound (on DTS movie discs) to each frame of film projected. The DTS reader sends timecode information on the film to the DTS-ECP. The DTS-ECP uses the timecode to play the correct sound, on matching movie discs loaded into its CD-ROM drives, to the picture projected. The projectionist simply inserts the movie disc(s) into the DTS-ECP and threads the film though the DTS timecode reader. Once the film is started, the DTS system checks a keyed serial number in the timecode and on the movie disc(s) to assure the correct sound is being played with the movie being shown. Films released in the DTS digital sound format also contain a traditional analog (optical) sound track (SR, A-TYPE, or MONO) which serves as a back-up sound source. If a problem occurs in the DTS digital playback, the DTS-ECP switches out of digital and reverts to the analog sound format that the film was recorded in. And at the end of the show, the DTS-ECP automatically switches from DTS digital playback to NONSYNC.

The DTS digital sound process for motion pictures is designed for the digital sound release of motion pictures in 6-track theaters. It is a dual system in that the digital audio data is recorded on CD-ROM discs. DTS timecode is printed on the motion picture print along with a conventional stereo optical soundtrack. The timecode is used by the DTS system to synchronize the sound and picture. The timecode lies between the picture and optical sound track, and is printed onto the release print from the soundtrack negative. There is a single inventory of prints.

1.1.3. After DTS Digital (Model DPP) is Added

The DTS digital provides left, center, right, stereo surrounds, and subwoofer channels. The system allows for play times up to 5 hours. They are completely automatic and fail-safe in operation requiring no action by the projectionist. The systems automatically start and stop, and track film breaks and change-overs. The digital audio data is sampled at 44**.**1K samples per second. APTX100 digital audio data compression (4:1) is used. Transfer into the process can be made from conventionally mixed analog or digital sound masters.

1.1.4. DTS-ECP Standard Features

The following standard features are available on the DTS-ECP system:

- Two stereo optical pre-amplifiers
- Dual projector ready
- Dual status and control connections to automation systems
- Selectable crossovers**:** Internal or external. **If internal, customer selects value when ordering**.
- Both SR-TYPE & A-TYPE optical and MONO sound formats, NONSYNC, and external 6-track
- Sound format control switches and status display
- Front panel BYPASS mode indicator light, master fader level display and volume control
- Built-in booth monitor speaker, volume control, and channel select switches
- External noise reduction loop
- Internal pink noise generator
- Automatic adjust AC input from 85 VAC to 264 VAC between 47 Hz and 64 Hz
- Auxiliary (DC) power input
- L, C, R mix (center weighted) hearing impaired output
- NONSYNC stereo input
- Remote fader and DTS remote front panel (E342) connections
- Magnetic sound print master ready**:** Stereo, Lt/Rt (4**:**2**:**4 matrix), or 6-track
- Programmable (via jumpers) surround speaker delay
- Automatic emergency BYPASS functions
- Individual channel level controls
- Individual channel equalization via DTS CP Setup Software (WINDOWS™ based) and laptop PC (PC customer supplied)
- DTS 70mm capable. **Used with special order DTS 70mm readers.**
- Trim feature allows user to balance volume of feature film and trailers
- RS232 connection to laptop PC To run DTS CP Setup Software.
- SP/DIF digital audio 6-track output
- RS422 communications to automation systems (future)

1.1.5. DTS Digital (Model DPP) Features

- One DTS 35mm timecode reader standard; 70mm, second reader (for dual projector) special order
- DTS 6-track digital output **=** 5**.**1 standard and 6**.**0 special order
- Three CD-ROM drives
- Full status display and software programming screen
- Expanded audio software programs (as available on DTS-6AD unit).

1.2.   DTS-ECP TECHNICAL SPECIFICATIONS

Frequency Response   • L, C, R**:** 20 Hz to 20 kHz
                                 • LS and RS**:** 80 Hz to 20 kHz
                                 • Sub bass**:** 20 Hz to 80 Hz

Dynamic Range: 96 dB, all channels

Size: • 7 inches [17.78 cm] high (4 rack units)
                                 • 19 inches [48.26cm] long rack mount
                                 • 15½ inches [39.37cm] deep

Weight: 28 LBS. [10.45kg]   (includes unit, shipping carton, accessories, and manual)

Fuse (AC supply)   2 amp slow blow, 3AG

Digital EQ: • Screen channels**:** Third octave EQ bass and treble
                                 • Surround channels**:** One octave EQ bass and treble
                                 • Subwoofer**:** Selectable one-2/3-1/3 octave EQ. OBE may be disabled, if desired

Analog Input: • D744 jumper selectable**:** Balanced or unbalanced, all 6 channels and external
                                   noise reduction loop
                                 • D744 jumper selectable**:** Normal or bi-amped, all 6 channels
                                 • D744 jumper selectable**:** Time alignment for screen channels
                                 • D744 jumper selectable**:** Screen loss compensation, screen channels only

External 6-track
 Analog Input: Balanced 300mV

AC input: 85 VAC to 264 VAC between 47 Hz and 64 Hz

Internal Crossover   • 500Hz, 800Hz, 1200Hz standard.
 Selections: • Other frequencies available by special order

Automation   Two Status/Control connections available, P15 and P16.   See Appendix A for
                                  details.   **P11 (RS422 to digital automation systems) not enabled at this time**.

Internal Noise
 Reduction: Two channels each for SR-TYPE and A-TYPE optical sound formats

External Noise   Balanced or unbalanced (D744 jumper selectable), 300mV
 Reduction In/Out:

External Microphone Unbalanced 300mV (although there is not a dedicated connector for this feature, it can be
 Input Level: accomplished several ways, see Section 2).

NONSYNC Input: Unbalanced, 300mV level for left and right channels

Hearing Impaired   Unbalanced, 300mV output**:** Center weighted mix of Left, Center, and Right
 Output: channels.

External Speaker Out: Requires 8 ohms, self-powered. DTS-ECP outputs 300mV nominal signal.

Auxiliary Power In: Requires ±12 VDC to ±15 VDC at 2 amps. Used for emergency back-up power.

1.2.   DTS-ECP TECHNICAL SPECIFICATIONS (continued)

An external **six-track analog input** is available for a 300mV external source. The two status/control connectors connect to theater's **automation** system and to external digital playback systems for sense and control functions. An **external noise reduction** loop connection is selectable for balanced or unbalanced and can be fed into external noise reduction or to output another Lt/Rt signal such as magnetic print-master playback. Matrix may be disabled through software programming, for pure stereo playback.

The **main output** provides user selectable **wideband** or **bi-amped** outputs. Jumpers on D744 analog board allow use of outputs for THX sound systems or speakers with built-in crossovers. If **internal crossovers** are desired, plug-in resistor headers determine crossover frequency**:** 500Hz, 800Hz, and 1200Hz standard, other frequencies can be special ordered. Jumpers also select **balanced** or **unbalanced outputs** for all channels, as well as **screen loss compensation** and **time alignment delays** for the screen speakers.

Equalization for screen channels and surrounds is accomplished with laptop PC and DTS CP Setup Software in the digital domain along with both A-type and SR-type noise reduction. Three **SP/DIF digital** audio pairs are available for left, center, right, subwoofer, and left & right surrounds.

B-chain alignment is easily accomplished via a laptop PC and DTS CP Setup Software (WINDOWS™ based). Each channel has bass and treble control as well as third/single-octave EQ adjustments. Individual output levels are set with trim-pots, and on-screen level adjustment allows SPL fine-tuning.

A-chain alignment is easily accomplished using test film, a laptop PC, and DTS CP Setup Software. Separate solar cell adjustments are available for the two projector inputs.

Built-in **booth monitor** buttons select one or a combination of all six output channels, and are selectable between DTS-ECP output and return from power amps. An additional button turns internal speaker on/off. An external speaker connector is available on the rear panel ("MONITOR OUT").

There is an overall **master fader** on the front panel and **remote fader** connections on the rear panel. Also on the rear, is a **remote front panel** connection (made for DTS E342, Remote Control panel).

A **NONSYNC** source connector is available and its trim level is menu driven.   NONSYNC signal routing can be used for audio coverage when curtains are closed.

While in the **BYPASS** mode, the signal from the solar cell is routed to the screen channels, and a separate trimpot on the D744 board is used to adjust volume. A toggle switch (on the D744 board) can enable the BYPASS mode.   The DTS-ECP will also automatically go into the BYPASS mode if a fault occurs on CPU or DSP boards. When BYPASS is enabled, a red LED (on the D744 board) lights to indicate the DTS-ECP is in the BYPASS mode. The D744 board is located behind the control module on the front panel.

A universal fused **power supply** allows connection to all AC power sources. A standard power cord is provided. An optional DC supply may be used via the "AUX POWER" connector and is used for emergency backup power (± 12 VDC to ± 15 VDC at 2 amps).

1.3.   REGULATORY NOTICES

EMI NOTICE

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Canadian Department of Communications compliance statement:

This equipment does not exceed Class A limits per radio noise emissions for digital apparatus set out in the Radio Interference Regulation of the Canadian Department of Communications. Operation in a residential area may cause unacceptable interference to radio and TV reception requiring the owner or operator to take whatever steps are necessary to correct the interference.

Avis de conformite aux normes du ministere des Communications du Canada:

Cet equipment ne depasse pas les limites de Classe A D'emission de bruits radioelectriques pour les appareils numeriques telles que perscrites par le Reglement sur le brouillage radioelectrique etabli par le ministere des Communications du Canada. L'exploitation faite en milieu residentiel peut entrainer le brouillage des receptions radio et television, ce qui olbigerait le proprietaire ou l'operateur a prendre les dispositions necessaires pour en eliminer les causes.

PATENTS

The DTS system has been granted the following patents:

   United States of America Patent Nos. 5155510, 5386255, 5450146, 5751398
   Australia Patent Nos. 652965, 661614
   Europe Patent Nos. 0551424, 0615631, 0473677, 0632922, 0666495
   Japan Patent Nos. 2033555, 2708961
   India Patent No. 181427
   Russia Patent No. 2088962
   Korea Patent Nos. 153028, 0185423
   France Patent Nos. 8906807, 9114963
   Canada Patent No. 2016028

As of July 16, 1999

1.4.   UNPACKING

The packaging is designed to handle normal shipping and handling. Upon receipt of shipment, check for signs of damage before opening and report all damage to the carrier. All shipments made from DTS are customer responsibility once they leave our premises.

Before installation is begun it is suggested that a complete inventory be taken to minimize problems or questions during installation. Additionally, save all packing material until installation is complete in the unlikely event that a component(s) requires return to the factory. Use the packing slip that came with your unit to verify received inventory.

The following is a sample packing list:

- DTS-ECP processor and power cord
- Installation Hardware (mounting screws, and two each 25-pin & 9-pin "D" connectors w/solder cups)
- Manual

NOTES:
  Reader head(s) provided when system upgraded to "digital"

If any of the items on your packing list cannot be found in shipping carton, contact DTS with the P/N and description of the missing item(s). Refer to **"**RETURNS**,"** before sending any product back to DTS.

RETURNS

For warranty repair, exchange or getting replacement parts, please call your local DTS office or dealer.

A DTS **R**eturn **A**uthorization number is **required** before sending any item back to the factory. At the time of the call, DTS will require that you provide the serial number of any unit(s) or reader(s) for return **before** warranty replacement units will be sent. All return packaging should be clearly marked with the Return Authorization number on the outside of the package.

Please send all returns to:

North America
Digital Theater Systems, Inc.
5171 Clareton Drive
Agoura Hills, California 91301-4523   USA
Telephone: (818) 706-3525
 or toll free in USA: 800-959-4109
Customer Service Fax: (818) 879-2746

Europe
DTS SA
Unit 5, Tavistock Industrial Estate
Ruscombe Lane
Twyford, Berkshire RG10-9NJ UK
Telephone: 44-1189-349199
Fax: 44-1189-349198

Japan
DTS Japan (Liaison Office)
AT Communications KK
2-14-4 Shinonome, Koto-ku
135-0062 Tokyo, Japan
Telephone: +81(0)3.5564.7156
Fax: +81(0)3.3520.1022

FACTORY WARRANTY FORM

The following is a list of information necessary for every location where the DTS-ECP system is installed.

THEATER NAME / CIRCUIT: _____

THEATER LOCATION: _____

SCREEN NUMBER: _____

THEATER CONTACT / TELE #:   _____

LOCAL TECH / TELE #:   _____

DTS-ECP SERIAL NUMBER: _____

PROJECTOR TYPE: _____ Single   Dual   (circle one)

CROSSOVERS: (circle one)   EXTERNAL   INTERNAL   _____ ohms

SPEAKER SYSTEMS   SOUND AMPLIFIERS

Screen (model): _____   Amp (model): _____

Surrounds (model): _____   Amp (model): _____

Subwoofer (model): _____   Amp (model): _____

Surrounds: _____   Subwoofer: self powered? _____

DTS requires the above information in order to provide you proper and timely technical support. **PLEASE fill page out and send to DTS, attention Customer Service, fax (818) 879-2746.**

Digital Theater Systems, Inc**.**
5171 Clareton Drive
Agoura Hills, California 91301-4523   USA
Telephone**:** (818) 706-3525 / (800) 959-4109 (toll free USA only)
`www.dtsonline.com`

Thank you for choosing DTS!

1.5.   WARRANTY INFORMATION

Equipment manufactured by Digital Theater Systems, Inc. is warranted against defects in materials and workmanship for one year from date of purchase. There are no other expressed or implied warranties.

Digital Theater Systems, Inc. obligation is restricted to repair and replacement of defective parts. Under no circumstances will Digital Theater Systems, Inc**.** be liable for any other damage, either direct or consequential.

All requests for repairs or information should include the unit serial number to ensure rapid service.

1.6.   DTS AUTHORIZED SERVICE CENTERS

DTS has service centers around the world. Please contact your local DTS office for more information.

1.7.   DTS TECHNICAL SUPPORT

North America (corporate headquarters in California)
Telephone: (818) 706-3525 or continental USA**:** (800) 959-4109
Fax: (818) 706-1868
DTS engineers are available to assist you. If you have an emergency after business hours, please leave a message on the answering service and we will return your call as soon as possible.

Europe (UK)
Telephone: +44-1189-349199
Fax: +44-1189-349198

Japan
Telephone: +81(0)3.5564.7156
Fax: +81(0)3.3520.1022

INTERNET users may email DTS technical support at the following address:

cinematech@dtsonline.com

DTS Web Site address: www.dtsonline.com

In the web site, there is a section called "cinema" "techcenter" that contains product information, manuals, technical bulletins, and email access to DTS field engineers. Use of this information is free to all internet users. Everyone is required to fill out the on-line questionnaire before access to the "techcenter" is granted. Once the questionnaire is completed, you will receive instant access to the DTS 'techcenter' and a password.

1.8.   REQUIRED EQUIPMENT, TEST FILM, and TOOLS

EQUIPMENT

The following equipment is required**:**

- DTS CP Setup software
- Real Time Analyzer (customer provided)
- Single calibrated microphone or mic multiplexer with set of calibrated microphones
- Laptop PC and a null modem cable (customer provided)
- DTS Upload/Download software
- SPL meter (customer provided)
- Oscilloscope   (customer provided)
- DTS technician's kit (purchased separately, not included with the DTS-ECP)
  The kit is required to adjust and check the DTS digital format. It consists of**:**
  - ☞ DS1, 6-track Setup *Disc. To verify digital levels, check automatic default switching, and verify operation of the CD-ROM drives (when installed)
  - ☞ "Buzz and Bill Show" Film and *Disc. To test the performance of DTS-ECP
  - ☞ Empirical Test *Disc.   To test theater's sound system through the DTS-ECP (when DTS Digital installed)
  - ☞ DTS trimpot tweeker. To adjust level trim pots
  - ☞ DTS T-Shirt. So you'll be looking *good* !

NOTES: *Disc requires the DTS Digital option to be installed.

TEST FILM

The following test films will be required to adjust and check the (A-chain) optical formats:

- 50% modulation tone test film
- Pink noise test film
- Buzz track film
- 1 kHz cross-talk cell alignment film

TOOLS

The following tools will be needed:

- Scope probe and test leads for A-Chain adjustment. The test leads should have dual-ended plugs at 0**.**080 inches long and be 2mm in diameter (example**:** Pomona 3901 or 3221).
- Multimeter
- Flat-bladed and Phillips screwdrivers, various sizes
- Adjustable wrench
- Wire cutters and strippers
- Soldering iron and solder
- Pliers
- Electrical tape
- Flashlight

DTS P/N 9301DECP0002/10

NOTES

Thank you for choosing DTS !

SECTION 2   INSTALLATION, JUMPERS, AND INTERFACING

2.1.   INSTALLING THE DTS-ECP INTO THE SOUND RACK

DTS-ECP *expandable cinema processor* is designed to mount into a standard 19" wide sound rack. The processor is 7" (4U) tall and 17" deep. Select a space in the sound rack where the processor will be at eye level for most operators. Bolt the DTS processor into the rack. One rack unit of space should remain open above and below the unit in observance of ventilation requirements.

- The ambient temperature within the rack may be greater than room ambient temperature. The maximum temperature for the equipment in this environment is 50°C. Consideration should be given to the maximum rated ambient.

- Installation should be such that the amount of air flow required for safe operation is not compromised, and that a hazardous condition is not achieved due to uneven loading.

- Check nameplate ratings to assure there is no overloading of supply circuits that could have an effect on over-current protection and supply wiring.

- Reliable grounding of this equipment should be maintained. Particular attention should be given to supply connections when connecting to power strips, rather than direct connections to the branch circuit. Connect earth ground wire to #6 terminal provided on the DTS-ECP back panel.

- A quality surge / spike suppresser power strip is recommended to protect the DTS-ECP processor.

- **Never block the side vents of the DTS-ECP.** Free air flow within the unit prevents over-heating and keeps dirt from being sucked in through the CD-ROM drives (when installed).
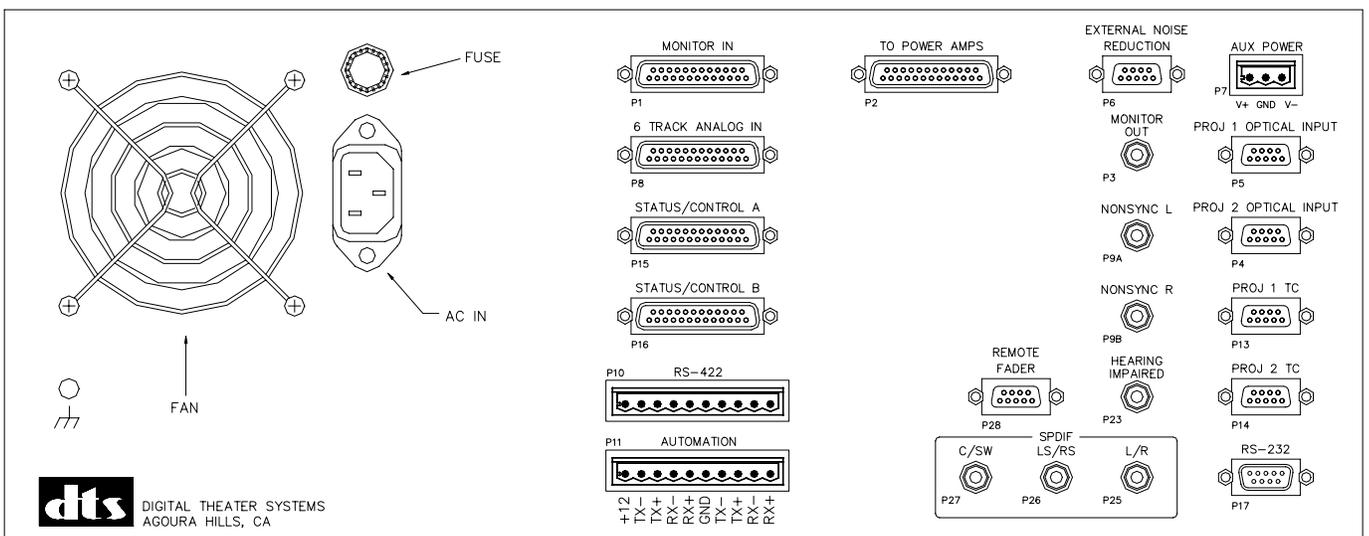
2.2.   CONNECTING THE DTS-ECP

Refer to Section 9 Wiring Diagrams or Appendix A Pin-out Tables when making cables. Connections to the DTS-ECP are made primarily via 9-pin or 25-pin "D" connectors, Phoenix and RCA-type connectors.

- **Ensure that the DTS-ECP front panel power switch is in the OFF position.**

- **Lift off the display panel and verify that all three circuit cards are fully inserted.**

The **solar cell** from the projector is connected to P5 "PROJ 1 OPTICAL INPUT". If there is a second projector, it is connected to P4 "PROJ 2 OPTICAL INPUT". Connect a (DTS supplied) **ferrite suppressor** around each cable going to a solar cell (on projector).

Main **audio output** is available at P2 "TO POWER AMPS". This connector contains 12 output signals**:** High and low frequency outputs for *bi-amping* each of the six channels. Installations with external crossovers use the *wideband* (HF) outputs only (LF outputs are not used for wideband applications). **The D744 analog board jumpers must be set for either "bi-amp" or "wideband".** See Section 2.3

The **internal crossover** frequency is set by plug-in crossover resistor packs in D744. Consult speaker manufacturer for crossover frequency requirement. See Appendix B for available resistor packs – these must be removed if using unit in WIDEBAND mode.

To verify sound at the speaker amps, connect their outputs to P1 "MONITOR IN". The enables the use of the front panel **monitor** speaker and its selector switches. Wideband applications use P1 HF inputs only.

As the built-in monitor speaker is for reference only, it will be desirable to attach a self-powered amplified speaker to the P3 "MONITOR OUT" RCA-type connector. The addition of an **auxiliary monitor speaker** provides higher volume capabilities and better frequency response.

A **NONSYNC** source, such as a CD player, connects to P9A "NONSYNC L" and P9B "NONSYNC R" inputs. These are RCA-type connectors and accept 300mV (line level) unbalanced signal. The NONSYNC signal can be a normal stereo or matrix encoded source.

Timecode connectors are not used until the DTS Digital (Model DPP) is added.

Any **six-track analog** source at a 300mV can be connected to P8 "6-TRACK ANALOG IN".

Format pulses from an automation system are connected to either P15 "STATUS/CONTROL A" or P16 "STATUS/CONTROL B". Any of the six formats, mute, trim feature, or projector changeover can be selected from this connector. These connectors also contain LED drive voltages for a remote front (or status) panel.   NOTE: At this time, the RS422 connectors are not useable with digital automation.

P23 "HEARING IMPAIRED" output provides a center-weighted mix of the left, center, and right channels for use with a **hearing impaired** sound system.

Connect the **AC power** cable to the DTS-ECP processor. (NOTE: The DTS-ECP processor is a computer based system and as such can be susceptible to power line surges. **A good quality surge and spike suppressor made for computers is recommended**). Two power supplies provide power to the DTS-ECP unit. Both supplies are fused and automatically adjust to incoming AC mains voltages: From 100 VAC to 240 VAC, between 50 and 60 Hz.

If using a DTS E342 **remote front** panel, connect it to P11A/B RS422 connector (either one).

If using a **remote fader**, connect it to P28 REMOTE FADER connector.

2.3.   D744 ANALOG BOARD JUMPERS

Jumper Functions

Before powering the DTS-ECP, verify the jumpers on the D744 analog board are set for your application. The D744 board is programmable (via jumpers) for the following operations**:**

- Balanced **or** Unbalanced output for all six channels   Surrounds and sub don't use crossovers
- Wideband **or** Crossover output for all six channels   for 5.1, are available for 6.0 operation.
- Screen loss compensation for Left, Center, and Right channels
- Time alignment delay for Left, Center, and Right channels
- Balanced **or** Unbalanced input and output for external NR connector
- Wake-up state of the booth monitor (Rev. J D744 boards use dip switch instead of jumpers)

Factory Settings

Unless specified otherwise, the DTS-ECP will be shipped with the following settings**:**

- Balanced Output
- Wide-band Output
- Screen Loss Compensation = OUT
- Time Alignment Delay = OUT
- Balanced Input and Output for External NR connector
- Booth Monitor Wake-up Mode**:**
  - * Left, Center, Right = On,   Surrounds & Sub = Off
  - * AMPS = Off
  - * Internal Speaker = On

If any of the defaults are not the required configuration, change the jumpers accordingly. Use the "Jumper Settings" tables in Appendix B or drawing on 2-7 to identify and change the correct jumper.

Changing the Jumper Settings

- Turn off the power. The DTS-ECP must not be powered when removing the boards.

- Remove the front panel by turning the thumbscrews counter-clockwise. Once the screws are released from their sockets, the front panel can be removed and hung on the front of the chassis by **hooking its side catches to the two inside studs of the chassis opening**. See drawing on page 2-4.

- There are three circuit boards behind the front display. The top board is the **D744** analog board. It contains the jumpers and crossover headers that the user can modify. The middle **D741** board is for Digital Signal Processing. The bottom **D740** board is for CPU functions, stores software memory, and contains the RESET button. The middle and bottom boards require no adjustments and contain no user serviceable parts. They should not be removed during setup..

- Remove the smaller of the two ribbon cables (24-pin) from the display. This cable is permanently attached to the D744 board (top circuit board).

- The D744 board can now be removed by gently lifting the white levers on each side. You may now gently slide the D744 board out from the chassis. **Do not pull it out by the ribbon cable.**

- To change D744 settings, use drawing on page 2-7 to find appropriate jumpers and crossover headers. This information is also in Appendix B tables and charts.

How to remove and hang the front panel

STEP 1:
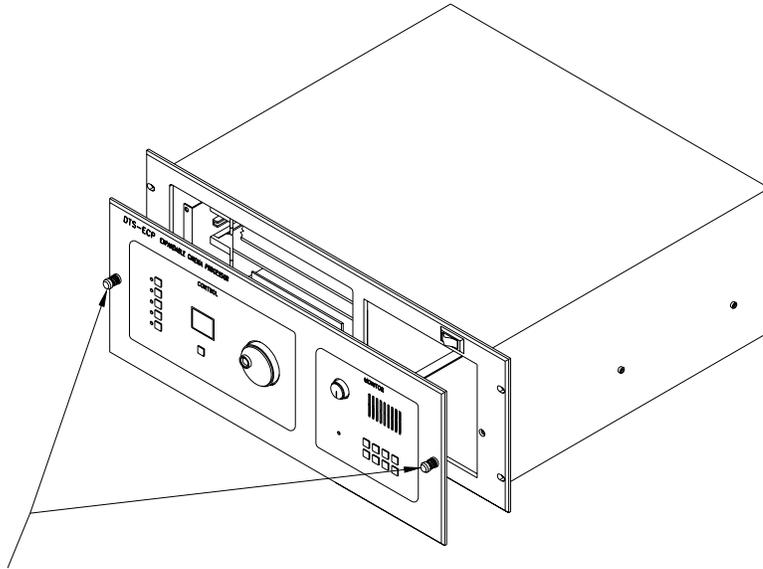
REMOVE THUMBSCREWS

STEP 2:
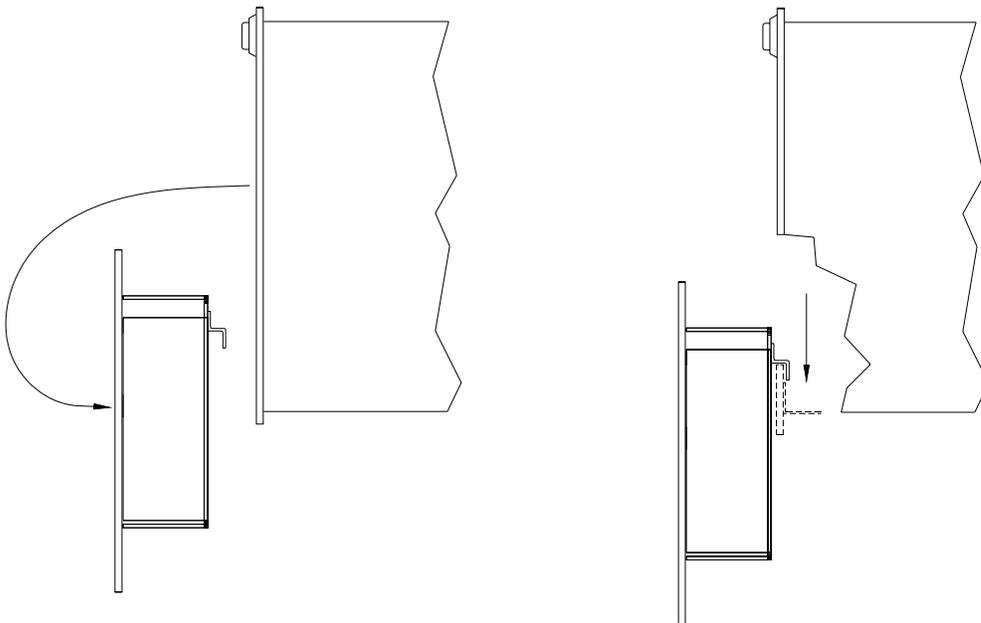
HANG FRONT PANEL ON INNER LIP

What is behind the front panel

D744 ANALOG BOARD

D741 DSP BOARD

* D740—01 DTS—EPC CPU BOARD

(KEEP FOLDED UNDER BOARD
UNTIL DTS DIGITAL OPTION ADDED)

PIN 1   PIN 1

RS232   FRONT   FRONT
                      PANEL

REAR   E307 COMPORT BRACKET

TO FRONT PANEL
"CONTROL"

RESET BUTTON

* NOTE: CPU BOARD UPGRADED
    TO D740 WHEN DTS DIGITAL
         OPTION ADDED.

CONTROL PANEL NOT SHOWN
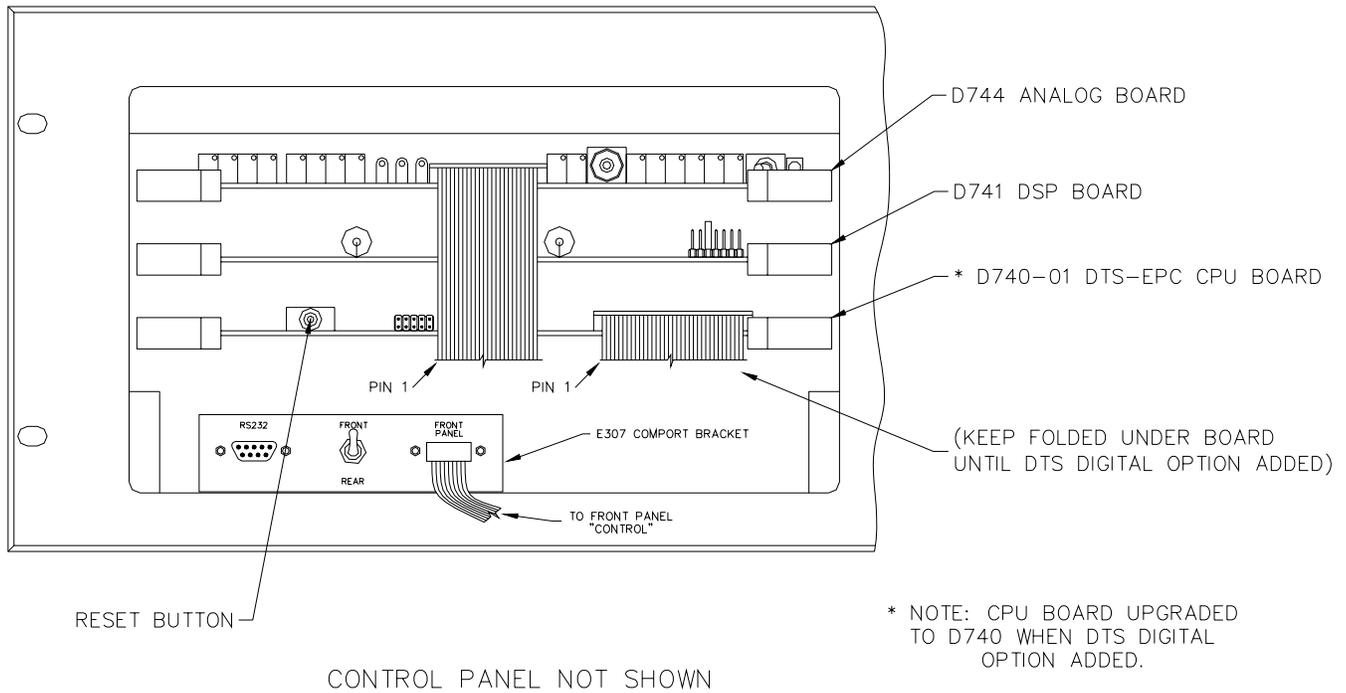
There are two **RS232** ports on the DTS-ECP. One is located on the rear panel and the other on the COMPORT panel, shown above. Both perform the same function of interfacing the DTS-ECP to a PC. Using a null modem cable, connect the serial port of your PC to either the front or back RS232 connector. Use one or the other, do not use both at the same time. After the DTS-ECP is fully booted, you may now start the DTS Upload/Download program **or** the DTS CP Setup Software program on your PC.

The **switch** on COMPORT panel is selectable for front or back**:**
  • Set to" back" when choosing to use the rear panel RS232 connector
  • Set to "front" when choosing to use the RS232 connector on the COMPORT panel

The "FRONT PANEL" **cable** connects to the front "CONTROL" panel.

The **RESET** button on D741 is used to reboot the DTS-ECP.

NOTE:
* The DTS-ECP D740-01 CPU board is not compatible with the D740 CPU board used on a DTS-6AD.

NOTES

BALANCED OR UNBALANCED
FOR EXTERNAL NR

B   UB   — PLACE THE JUMPER BETWEEN THE CENTER AND THE LEFT (B) PINS FOR BALANCED OPERATION
         — PLACE THE JUMPER BETWEEN THE CENTER AND THE RIGHT (UB) PINS FOR UNBALANCED OPERATION

BALANCED OR UNBALANCED
OUTPUT

B   UB   — PLACE THE JUMPER BETWEEN THE CENTER AND THE LEFT (B) PINS FOR BALANCED OUTPUT
         — PLACE THE JUMPER BETWEEN THE CENTER AND THE RIGHT (UB) PINS FOR UNBALANCED OUTPUT

SCREEN LOSS EQ

         — PLACE THE JUMPER BETWEEN THE CENTER AND THE LEFT (O) PINS TO DISABLE SCREEN LOSS EQ
         — PLACE THE JUMPER BETWEEN THE CENTER AND THE RIGHT (I) PINS TO ENABLE SCREEN LOSS EQ

WIDEBAND OR BI-AMPED

B   W   — PLACE THE JUMPER BETWEEN THE CENTER AND THE LEFT (B) PINS FOR BI-AMPED OUTPUT
         — PLACE THE JUMPER BETWEEN THE CENTER AND THE RIGHT (W) PINS FOR WIDEBAND OUTPUT

TIME ALIGNMENT DELAY
SETTINGS

O   I   — PLACE THE JUMPER BETWEEN THE CENTER AND THE LEFT (O) PINS TO DISABLE THE TIME DELAY INDICATED NEXT TO THE JUMPER
         — PLACE THE JUMPER BETWEEN THE CENTER AND THE RIGHT (I) PINS TO ENABLE THE TIME DELAY INDICATED NEXT TO THE JUMPER

CROSSOVERS

SEE APPENDIX B FOR DETAILS

BACK

EXTERNAL NR

RIGHT

CENTER

LEFT

RT SURR

SUB

LT SURR

D744 REV J

dts

PROJECTOR 1

PROJECTOR 2

OPTICAL TEST POINTS

LT
RT
GND

BOOTH MONITOR

BYPASS LEVEL

MAIN OUTPUTS

BYPASS SWITCH

BYPASS INDICATOR LED

FRONT

L-GAIN L-HI R-GAIN R-HI

HI-LO AMP-DIR

L C R LS RS SUB

SEE APPENDIX B FOR DETAILS

SWITCH NO.	SWITCH CLOSED	SWITCH OPEN
UNITS AFTER S/N 1075	JUMPER "IN"	JUMPER "OUT"
S2-1	INTERNAL SPEAKER ON	INTERNAL SPEAKER OFF
S2-2	AMPLIFIER RETURNS	PROCESSOR OUTPUT
S2-3	LS & RS ON	LS & RS OFF
S2-4	CENTER ON	CENTER OFF
S2-5	LEFT & RIGHT ON	LEFT & RIGHT OFF

BOOTH MONITOR
WAKE-UP STATE
SELECTIONS

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2.4.   AUXILARY DC POWER SUPPLY CONNECTION

A separate 3-pin Phoenix connector is available for emergency power. A backup supply is highly recommended for failsafe operation. The BYPASS circuits on the D744 board require voltage of +12 VDC *and* –12 VDC to operate. If the internal power supplies fail, an external DC supply that has both positive and negative output is required. It connects to the rear panel AUX POWER P7A via a 3-pin Phoenix connector.
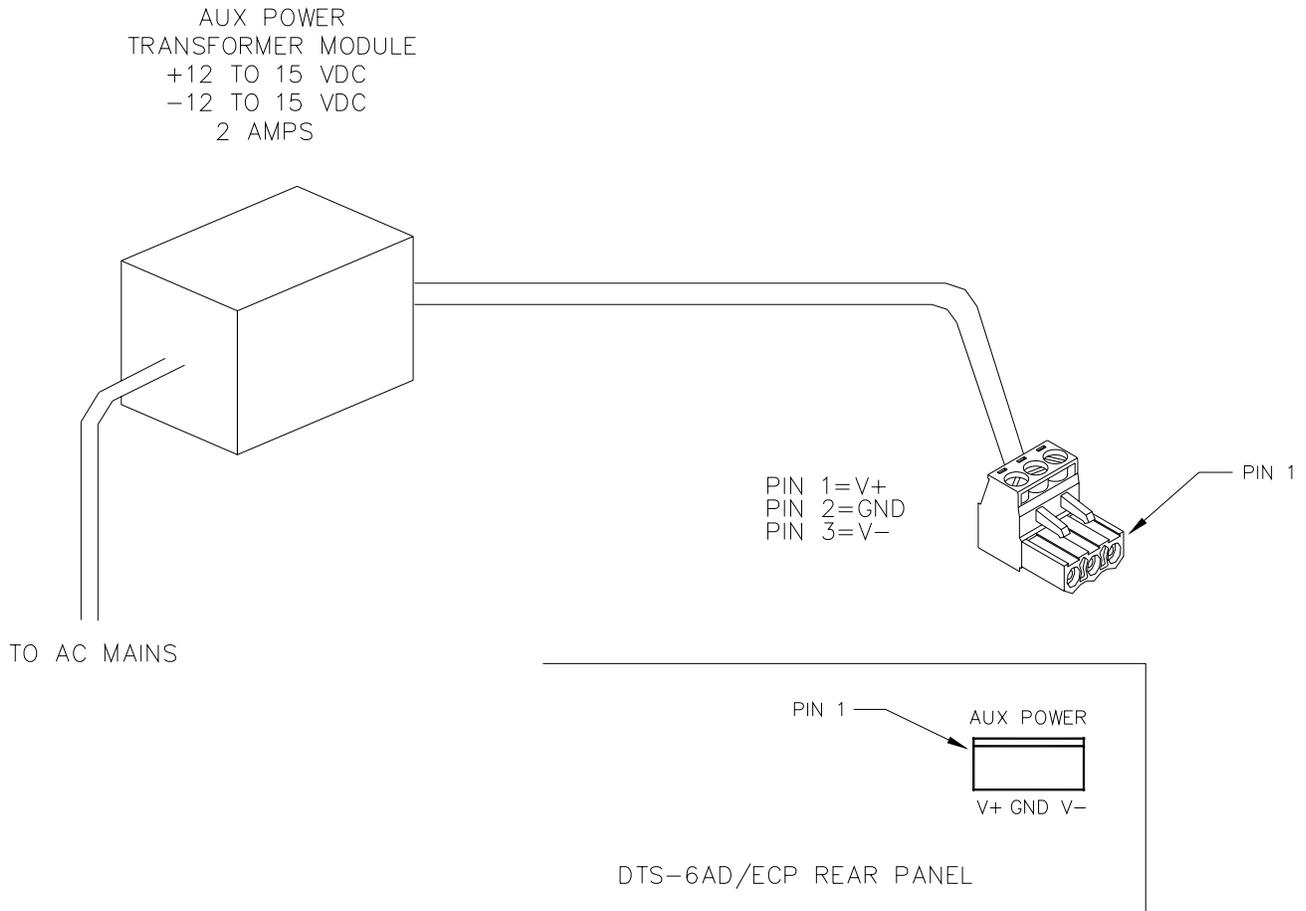
2.5.   INTERFACING TO OTHER SOUND SYSTEMS/SOURCES (see WDE237, Section 9)

Automation Interfacing

The "STATUS/CONTROL" connectors are available for interfacing to automation systems.

External 6-Track

The 6-TRACK ANALOG IN connector, P8, on the back of the DTS-ECP, can receive any 300mV 50% modulation (85dB) analog sound source. Most common sources are from 6-track magnetic print masters, other digital sound systems, and external microphones (with a mic preamplifier).

Reference input level is **300mV** (each channel). The DTS-ECP master fader on the front panel controls overall playback volume. There is no individual channel level adjustment for EXTERNAL. Front panel "EXT 6 TRK" button controls access to this sound source.

Dolby™ Model DA-20

The Dolby Model DA-20 is used to supply the Dolby Digital™ sound track to the DTS-ECP. The DA-20 audio output connects to the DTS-ECP "6-TRACK ANALOG IN", P8, connector. It's sense control connects to one of the DTS-ECP "STATUS/CONTROL", P15/16, connectors.

The DA-20 sense circuit requires that a rotary switch (in the DA-20) be set so that the DTS-ECP will automatically switch to the sound format key used to access the Dolby Digital™ input at P8. In the DTS-ECP, this is normally the "EXT 6 TRK" button.

- In the DA-20, set the <u>top rotary switch</u> on the Cat. 611A "Cinema Processor Interface Card" to <u>setting 6</u> (CP45/65/500 Auto Digital Disabled). This is true for DA-20 units using new software. This will allow the Dolby Digital™ sound track to automatically switch in & out.
  NOTE: DA-20 units with old software, should set rotary switch to setting 2 (CP45/65/500 Auto Digital).

- Set up the DA-20 using instructions in the DA-20 Manual. Use "Dolby Digital Test Film" to test its operation with the DTS-ECP.

- See "External 6-Track Analog Source", above, for more details.

External Crossovers

The DTS-ECP allows the use of external crossovers. When used, the D744 channel jumpers are set for **WIDEBAND**, the crossover headers are open, and only the "**HF**" in/outputs are used.

Internal Crossovers

If internal crossovers are used, verify the value of the D744 crossover header resistors are appropriate for the crossover frequency required by your speaker's manufacturer. The D744 channel jumpers should be set for **BI-AMPED**. NOTE: If the jumpers are set for WIDEBAND, the speaker's high frequency drivers may be compromised.

(continued)

2.5.   INTERFACING TO OTHER SOUND SYSTEMS/SOURCES   (continued)

Remote Fader Option

A remote fader may be used to control the DTS-ECP overall playback sound. See SDE238 in Section 9 for circuit details. The remote fader is enabled when P28, pin 3 is grounded.

(Auxiliary) Monitor Speaker

A self-powered amplified speaker can be used as an external monitor speaker. When connected, it is always active. The MONITOR buttons control which channels are listened to and the sound source: From the amplifier or at the DTS-ECP output. For amplifier output, switch on the "AMPS" button. For the DTS-ECP output, the "AMPS" button should be switched off.

Digital Amplifiers

The SPDIF connectors: P25, P26, and P27 are used with digital amplifiers and speakers.

Digital Automation

Contact DTS for protocol specifications, Technical Notice E374.

External Microphone

An external microphone requires the use of a microphone preamplifier that delivers an output of **300mV**. The output of the preamplifier may be fed into either P9A/B = NONSYNC L/R **or** P8 = 6-TRACK ANALOG IN. The master fader on the front panel controls playback volume. The designated front panel button accesses the microphone input:

  • P8 uses the EXT 6-TRK button
  • P9A/B uses the NONSYNC button

NONSYNC

A NONSYNC stereo source of **300mV** such as a CD or tape machine may be used on the DTS-ECP at P9A/B = NONSYNC L/R.   Both connectors should be used. The NONSYNC output is controlled by the NONSYNC button. The master fader on the front panel controls playback volume.

NONSYNC signal routing to the surrounds is available via DTS CP Setup Software in Options, "NONSYNC MODE":

  • Screen   NONSYNC L heard screen left, NONSYNC R heard screen right
  • Surround   NONSYNC L heard in left surround, NONSYNC R heard in right surround
  • Screen &   NONSYNC L heard screen left and left surround, and NONSYNC R heard
    Surround   screen right and right surround.
  • Matrix   NONSYNC L and NONSYNC R signals are fed through the DTS-ECP's
                                matrix decoder to derive left, center, right and surround channel outputs.
                                This mode should be used to playback material that has been matrix
                                (surround) encoded such as pre-recorded video tape.

(continued)

2.5.   INTERFACING TO OTHER SOUND SYSTEMS/SOURCES (continued)

External Noise Reduction

External Noise Reduction may be used for stereo or Lt/Rt signals. The EXTERNAL NOISE REDUCITON connection, P6, is selectable for balanced or unbalanced on the D744 via programming jumpers. It can be fed into an external NR unit or be used with another Lt/Rt signal from a magnetic sound print master. **Matrix may be disabled via DTS CP Setup Software in Options, "DISABLE MATRIX".** Highlight box to enable this feature.

### DTS E342 Remote Front Panel (option)

Connect the DTS E342, Remote Front Panel, to P11A or P11B ("AUTOMATION") connectors. Once plugged in, both the remote and ECP front panels are active.

2.6.   POWERING THE DTS-ECP, BOOT-UP SEQUENCE.

Once the DTS-ECP is completely connected to the automation and sound systems, the power switch may be enabled. Once powered, the unit will progress through a boot-up sequence.

During the boot-up sequence, all the display LEDs will briefly illuminate, the BYPASS mode will enable, the internal speaker will enable, and the drives will be checked (if installed). Once fully booted, the DTS-ECP fader display should show a number and the NONSYNC format should be enabled (this will occur unless the DTS CP Setup Software, automation, or remote front panel is enabling a different format).

The booth monitor "wake-up" state is set by a dip switches on the D744 board. See Page 2-7. If the internal speaker does not enable or none/some of the AMP buttons enable, check the dip switch settings. After the boot-up sequence, the internal speaker will remain enabled. The booth monitor's LEFT, CENTER, RIGHT, SW, INT SPK buttons should be illuminated (enabled). The fader display should contain a number, as shown below. **If the fader display does contain a number, the DTS-ECP is not fully booted.**
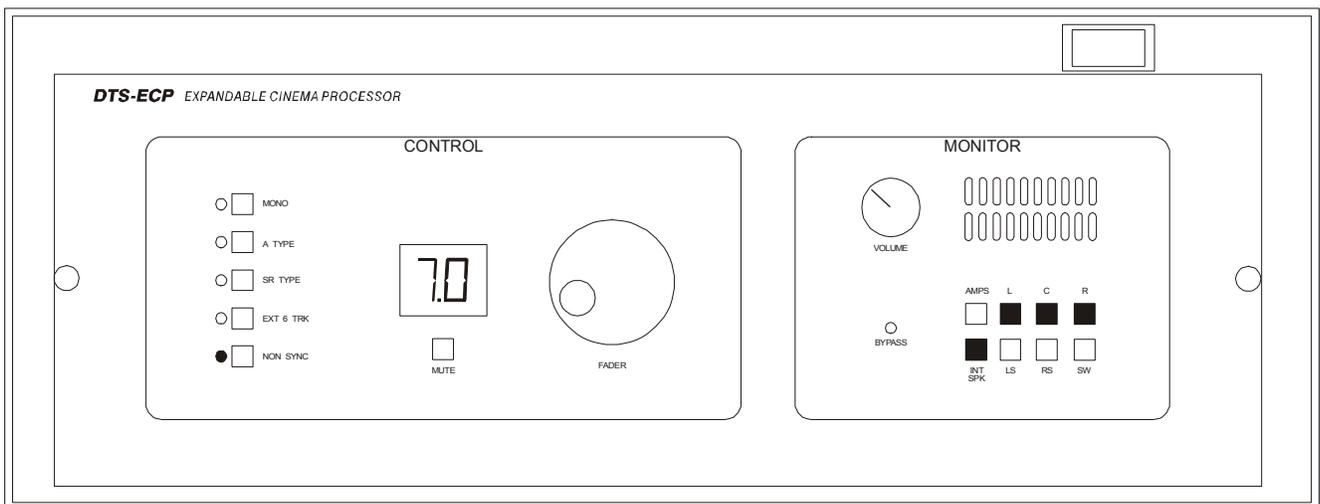
○ OR ☐ = OFF
● OR ■ = ON

SECTION 3   DTS-ECP FRONT PANEL
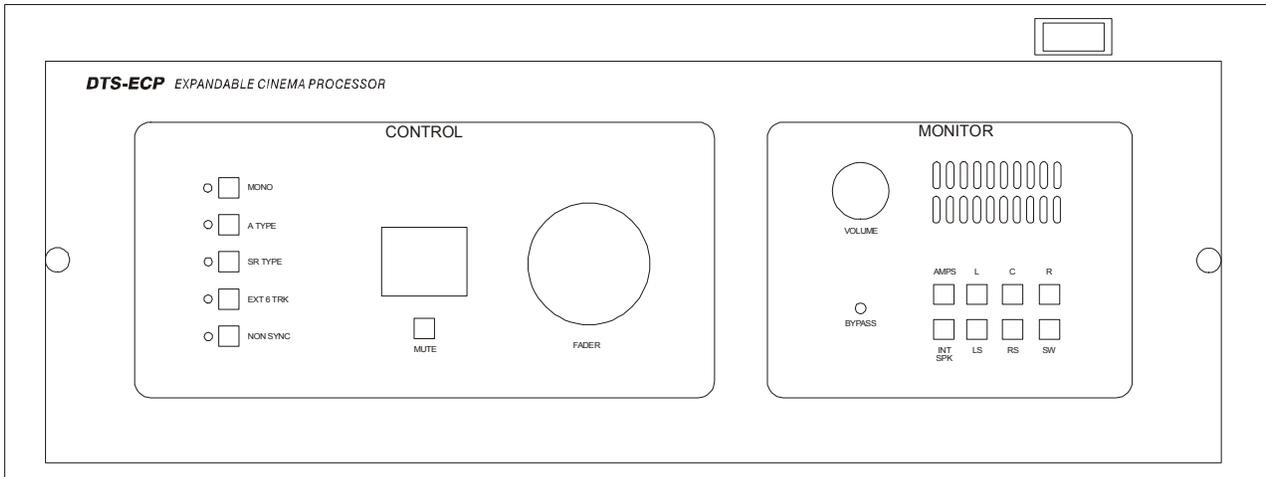
3.1.   DTS-ECP FRONT PANEL

On the front panel of the DTS-ECP, there is a **CONTROL panel** that contains grouping of format select switches (keys), the master fader, master volume level display, the MUTE button. There is also the **MONITOR panel** that contains the internal monitor speaker, monitor speaker volume control, BYPASS indicator light, and monitor select switches (keys).

3.2.   (Control) FORMAT KEYS

MONO   ➢ for mono analog playback
A-TYPE   ➢ for stereo analog playback using A-Type noise reduction
SR-TYPE   ➢ for stereo analog playback using SR-Type noise reduction
EXT 6 TRK   ➢ for external 6-track inputs
NONSYNC   ➢ stereo input, usually used for intermission music or program

3.3.   MONITOR KEYS

AMPS   ➢ when **enabled**, selects listening from the amplifiers. When **disabled**, selects listening from the output of the DTS-ECP.
L   ➢ selects listening to the left channel
C   ➢ selects listening to the center channel
R   ➢ selects listening to the right channel
INT SPK   ➢ when enabled, selects listening through the internal speaker.
LS   ➢ selects listening to the left surround channel
RS   ➢ selects listening to the right surround channel
SW   ➢ selects listening to the subwoofer channel

NOTES

SECTION 4   DTS-ECP INITIAL SETTINGS

All tests contained in this section must be completed before proceeding to B-chain adjustment.

4.1.   SETUP CHECK LIST

Use this checklist to ensure important settings are completed before showing film to an audience.

COMPLETED

- ☐   Verify wiring and cable routing (Section 9)
- ☐   Set D744 board jumpers (Section 2)
- ☐   Surround delay calculated and programmed (Section 4)
- ☐   Speaker Time Alignment Delay calculated and programmed (Section 4)
- ☐   Theater equipment check (Section 4)
- ☐   Speaker Phase checked (Section 4)
- ☐   B-chain alignment completed (Section 5)
- ☐   A-chain alignment completed (Section 6)
- ☐   Program NONSYNC output mode (Section 7)
- ☐   Program power-on format (Section 7)
- ☐   Program output trims, if needed (Section 7)
- ☐   Performance test (Section 8)
- ☐   (Booth) monitor performance and default verified (Section 8)
- ☐   BYPASS operation verified and BYPASS sound level set (Section 8)
- ☐   Automation verified with DTS-ECP (Section 8)
- ☐   All EQ settings are saved on my PC using the Upload/Download software

4.2. SURROUND DELAY

This is used to ensure the sound from the back of the theater arrives at the listener's ears approximately 20 milliseconds after the arrival of the front speaker sound. The following procedure describes how to arrive at the correct surround delay setting.

- Measure the distance between a **rear seat** and the nearest **surround speaker** in feet. If *calculating in metric, convert feet to meters by multiplying by 3.

- Measure the distance from the **same rear seat** to the nearest **screen speaker**. If calculating in metric, convert feet to meters by multiplying by 3.

- Subtract the distances measured from each other, and add 20. The result is **the surround delay in milliseconds.**

EXAMPLE: Rear seat is 12 feet from nearest surround speaker

                    Rear seat is 82 feet from nearest screen speaker

                    The surround delay is set for $(12 - 82) + 20 = 90$ milliseconds

- Program result into DTS-ECP by going into the OP*T*IONS menu. The screen below should appear**:**
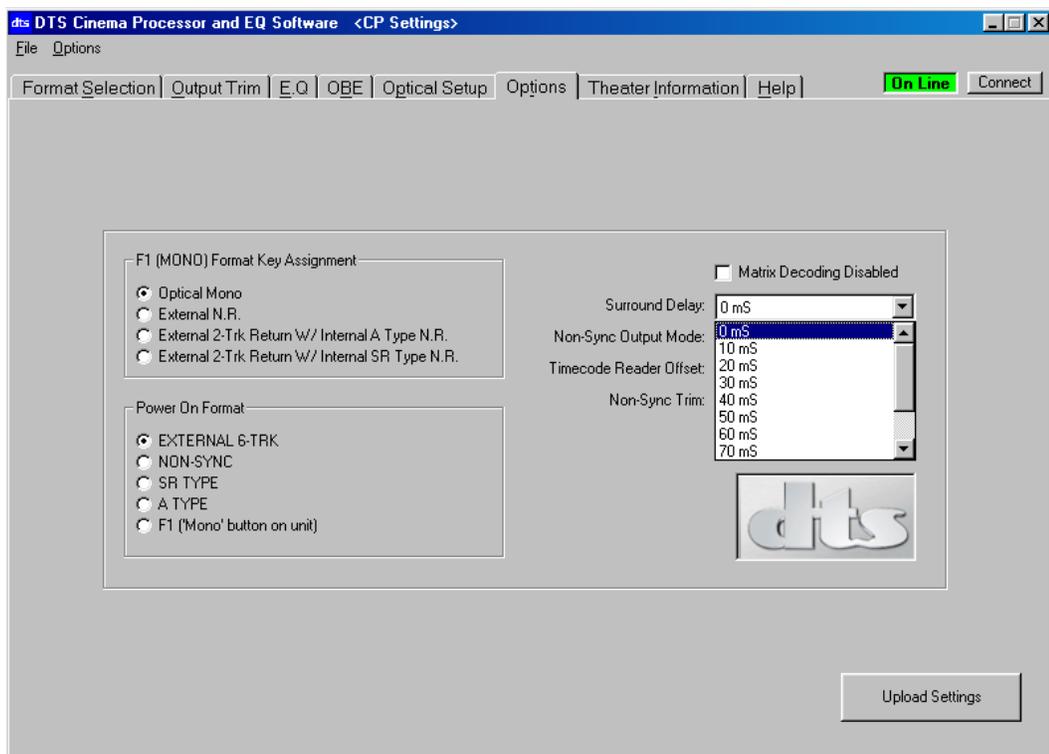
- Set value by selecting value desired. Delay setting selections are in increments of 10. The maximum setting is 100ms. Click cursor on **UPLOAD SETTINGS** to send calibration information from the laptop to the DTS-ECP

- Verify surround delay setting by listening to a familiar soundtrack or the DTS BUZZ AND BILL SHOW Test Film. The action on-screen should match sound in the auditorium. Most soundtrack mixers use the surrounds sparingly or to evoke spaciousness. Generally, no screen dialogue should be heard in the surrounds, and if there is, the delay setting is probably too high.

4.3.   (SPEAKER) TIME ALIGNMENT DELAY

This is used to delay the low frequency sound in screen speakers. It's done to compensate for time discrepancies between low and high frequencies that are caused by the low frequency drivers being in front of high frequency drivers in common screen speakers. Sound from low frequency drivers must be delayed so the low frequency energy and high frequency energy reaches the listener at the same time. Check with speaker manufacturer for delay specifications.

Jumpers on the D744 board are used to set the delay. The jumpers program time delay in increments of 0.3, 0.4, 0.5, and 0.6 milliseconds. The range is from 0.3 to 1.1 ms. A jumper can be used alone or several added together, depending on the delay required. Page 2-7 shows the location of delay jumpers for each screen channel.
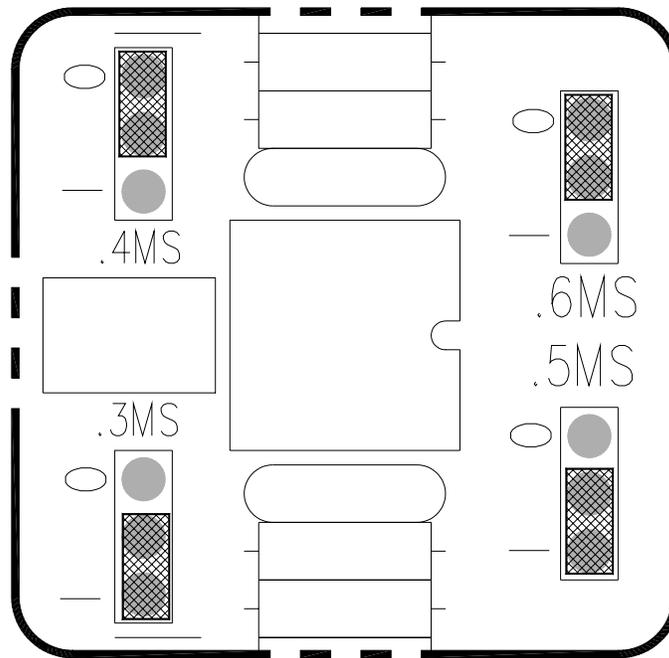
1 = In
0 = Out

EXAMPLE: A speaker manufacturer specifies a delay of **0.8 ms.** On the D744, set (2-position) jumpers "0.3ms" and "0.5ms" to the "1" & center position. This sets the delay**:** 0.3ms + 0.5ms = 0.8ms.

If **no delay** is needed, set each screen delay jumper to "0" & center position.

4.4.   THEATER EQUIPMENT CHECK

Prior to adjusting the EQ, all of the components in the audio system should be checked for proper installation and operation.

SPEAKERS

• Check that all speakers are properly mounted and secured. Ensure there are no loose parts or mounting hardware left around the speakers that could be a source of noise or rattles.

• Check the aiming of all speakers. Verify there are no obstructions in front of the speakers. For stage channels, ensure that the masking, screen frame, and sound wall do not block the speakers.

• Speaker cables should be correctly secured to the speakers and are of a suitable gauge.

• Verify each speaker has no missing or open drivers.

• Check that all speakers are connected to the correct channel.

• Verify the high and low frequency drivers for each channel are in phase. Also check each channel is in phase with the others.

AMPLIFIERS

• The gain settings of all of the screen channel amplifiers and surround amplifiers should be the same. If a particular amplifier requires a vastly different gain setting or operates differently than the others, then it should be checked and repaired.

• Check all of the amplifiers for distortion or noise.

• Verify that the cooling fans are operating correctly and that the air vents are clean and free from obstructions.

AUDITORIUM

The auditorium should have all of the acoustic treatments installed prior to setting the EQ. Any excessive noise from air conditioners, hallways or other sources should be minimized. All chairs must be installed. Remove any plastic coverings from chairs or speakers prior to any EQ (B-chain) alignment.

4.5.   SET PRELIMINARY OUTPUT LEVELS

The DTS-ECP output levels are factory preset at 300mV rms. This nominal level ensures that speakers will not be overdriven during the setup procedure. **All SPL readings must be taken in the theater, just off-center in rear third section.**

Most installers **set the speaker amplifier gain(s) to maximum**. In some situations, this may cause excess noise from the amplifier. If this is the case, reduce the amplifier gain to an acceptable level. Clearly mark the setting so it can be reset, if necessary.

• Set master fader to 7**.**0.

• Place SPL meter in theater (rear third section, just off center). Set SPL meter to C weighted, slow. Enable the internal pink noise generator by entering the OUTPUT TRIM screen and clicking cursor to change "Pink noise" Left "off" to "ON". Start with the left channel.
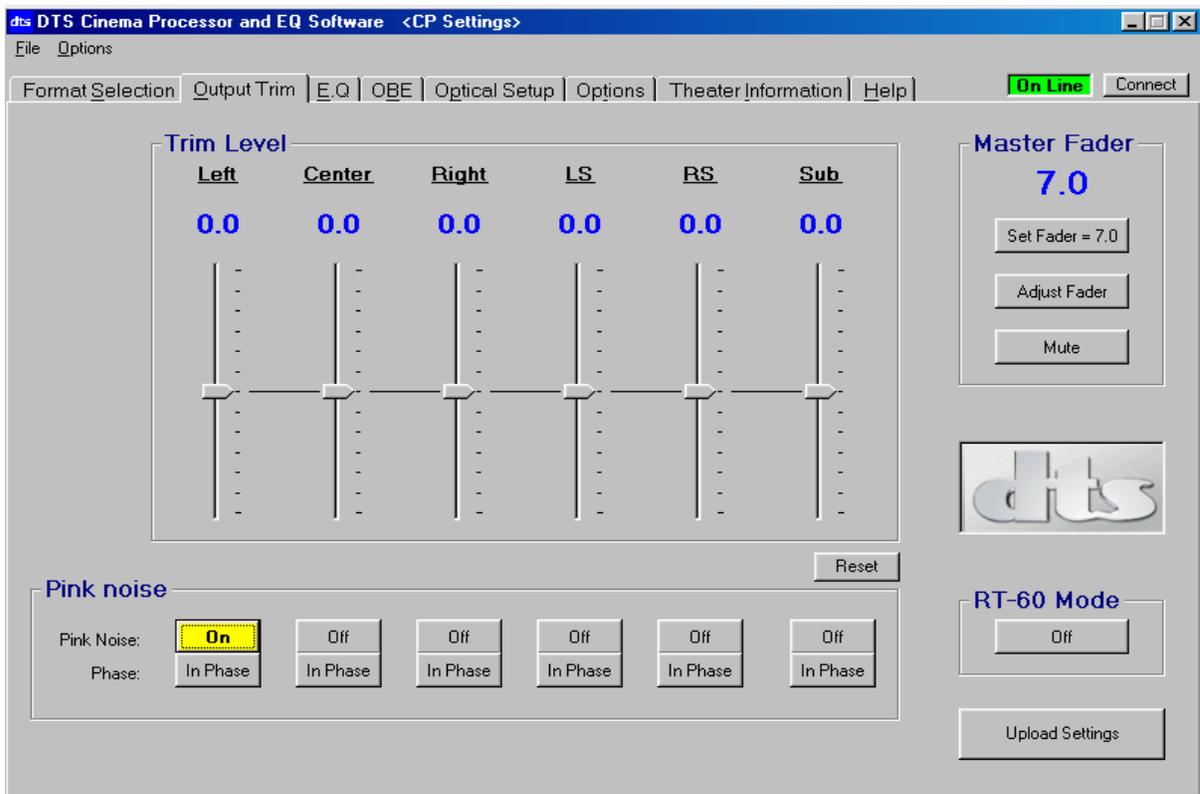
Measure SPL. Adjust **L** (left) channel ("Main Outputs") gain trimpot (do not adjust level on-screen), on the D744 analog board, to obtain **80 dBC**.   *NOTE: After EQ is finished, final SPL will be set as in Section 5.*
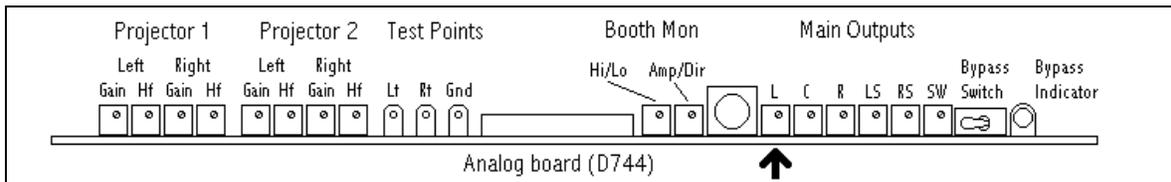
• Once set, proceed to **C** (center) channel and adjust it to 80 dBC. Repeat for remaining channels.

4.6.   (SPEAKER) PHASE

Tools required: SPL meter & phase checker device (if surround channels use an array of speakers).

Speaker Phase must be tested to verify adjacent speakers are in-phase. If speakers are not in-phase, signals will cancel and playback will never sound correct. Speaker phase is tested by first playing pink noise on one channel and measuring SPL output. Then, pink noise is also played on the adjacent channel. SPL should increase. If SPL decreases, speakers are not in-phase.

The Phase Screen allows the user to play pink noise on several channels at once and, if desired, to invert the phase for each individual channel. This screen is used for testing only, if phase is inverted while testing, it will not effect soundtrack playback.

To test, place SPL meter in auditorium as shown on page 5-1. Enter OUTPUT TRIM menu. The screen below should appear**:**
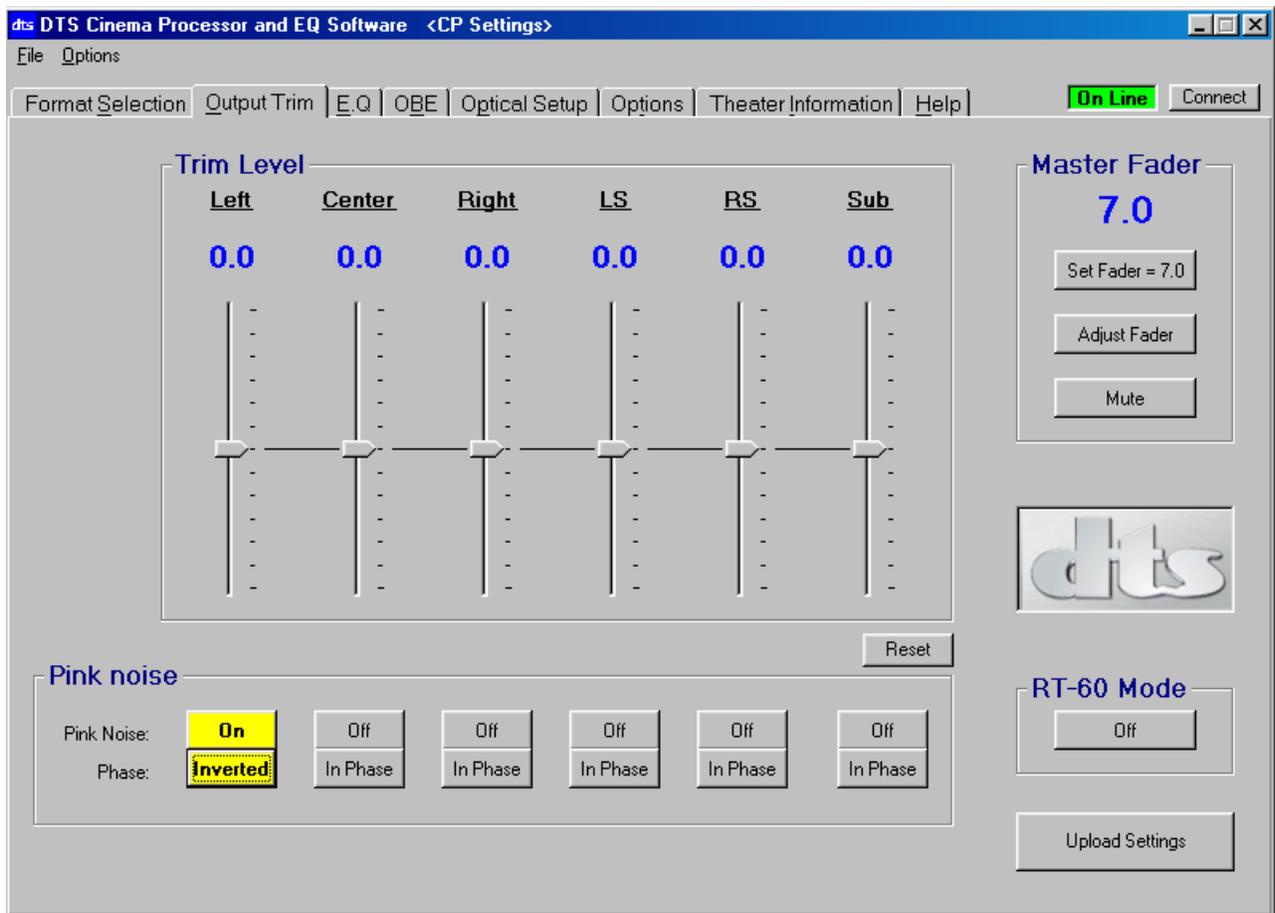
(continued)

4.6.   (SPEAKER) PHASE (continued)

• First, test **Screen Speakers**. Move cursor to LEFT "Pink Noise" box. Enable pink noise by clicking cursor on "off" and it should change to "ON" and glow yellow. Pink noise from the left channel should be heard in the auditorium and booth monitor. Note SPL reading. With LEFT still enabled, move cursor to CENTER channel and enable it's pink noise. Both the left and center boxes should highlight and the SPL should increase. If the level goes down, the speakers are out-of-phase.

To verify speakers suspected of being out-of-phase:

   • Highlight (turns yellow) Left and Center pink noise boxes. Continue monitoring SPL.

   • Look at pink noise phase selection for each channel, all should be "In Phase".

   • Move cursor to Center and click on "In Phase" box so it changes to "Inverted" and glows yellow.

   • The phase for center channel pink noise has now been inverted.

   • If SPL increases, this verifies that the center speaker is **NOT** in phase with the left speaker.

If speakers are out-of-phase, check speaker wiring. If external wiring incorrect, fix and retest phasing. It is possible, although rare, that speakers are internally cross-wired. In this case, swap wires on the output of the speaker and check phase again. If that fixes it, leave external wires crossed and post a note or label to alert the service technician.

• Repeat test for CENTER and RIGHT screen speakers.

• Now, test **surround speakers**. If only one speaker is used for each surround channel, perform the Screen Speakers Test, above. If an array of speakers is used for each surround channel, use a phase checker device that allows testing of each individual surround speaker. The DTS CP Setup Software cannot do this type of testing.

NOTES

Thank you for choosing DTS !

SECTION 5   B-CHAIN ALIGNMENT

This procedure was written with the assumption that the installer is familiar with the fundamentals of installing and equalizing cinema processors, and the use of microphone multiplexers. **The DTS-ECP surround delay, speaker time alignment delay, and speaker phasing must be completed before proceeding.**

     The following equipment is required**:**
- DTS CP Setup software and laptop PC
- SPL meter
- Real Time Analyzer
- Calibrated Microphone or Mic Multiplexer
- DTS Technician's kit

Place Multiplexer in auditorium as directed by manufacturer. Or, see diagram below**:**

SUGGESTED MICROPHONE PLACEMENT
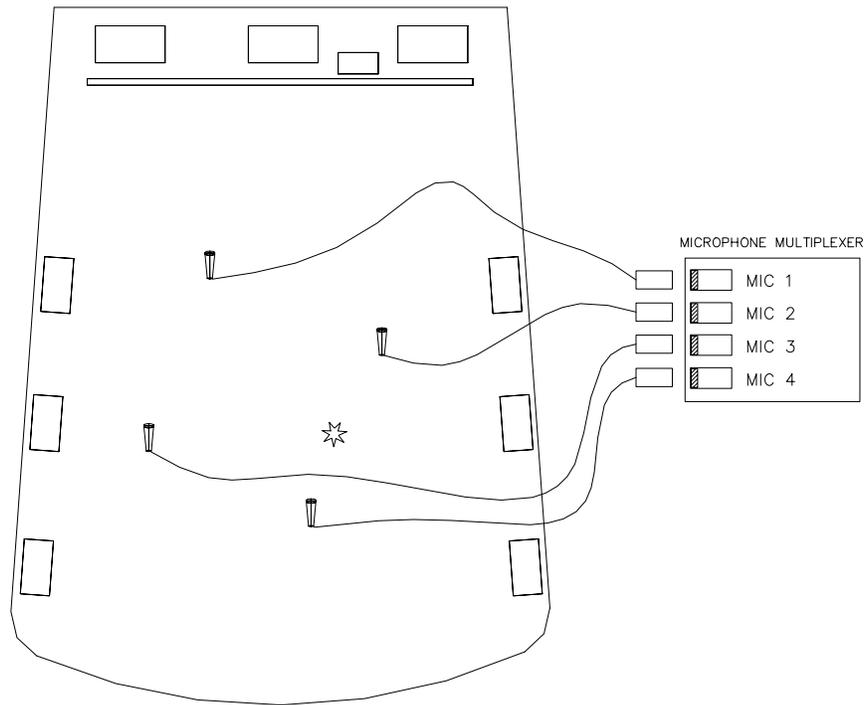
☼ MAKE ALL SPL READINGS AT THIS LOCATION.
    IF USING A SINGLE CALIBRATED MICROPHONE FOR
    ADJUSTING EQ, LOCATE THE MIC AT THIS LOCATION.

THEATER.DWG

5.1.   SETTING OUTPUT LEVELS

5.1.1.   CONNECTING A MICROPHONE   OR   MIC MULTIPLEXER:

At this time, the DTS-ECP built-in RTA and AUTO-EQ features are not implemented. So, an external multiplexer system is required. The "A" and "B" chain settings and EQ are adjusted by means of a laptop PC and the DTS CP Setup Software. Place microphones in theater as directed by the multiplexer manufacturer, or, as per suggested microphone placement drawing (page 5-1).

5.1.2.   CHECK DTS-ECP PROGRAMMED OUTPUT LEVELS

Using the DTS CP Setup Software, enter OUTPUT TRIM menu and verify all "Trim Level" settings are at "0.0" (center line, as shown below).
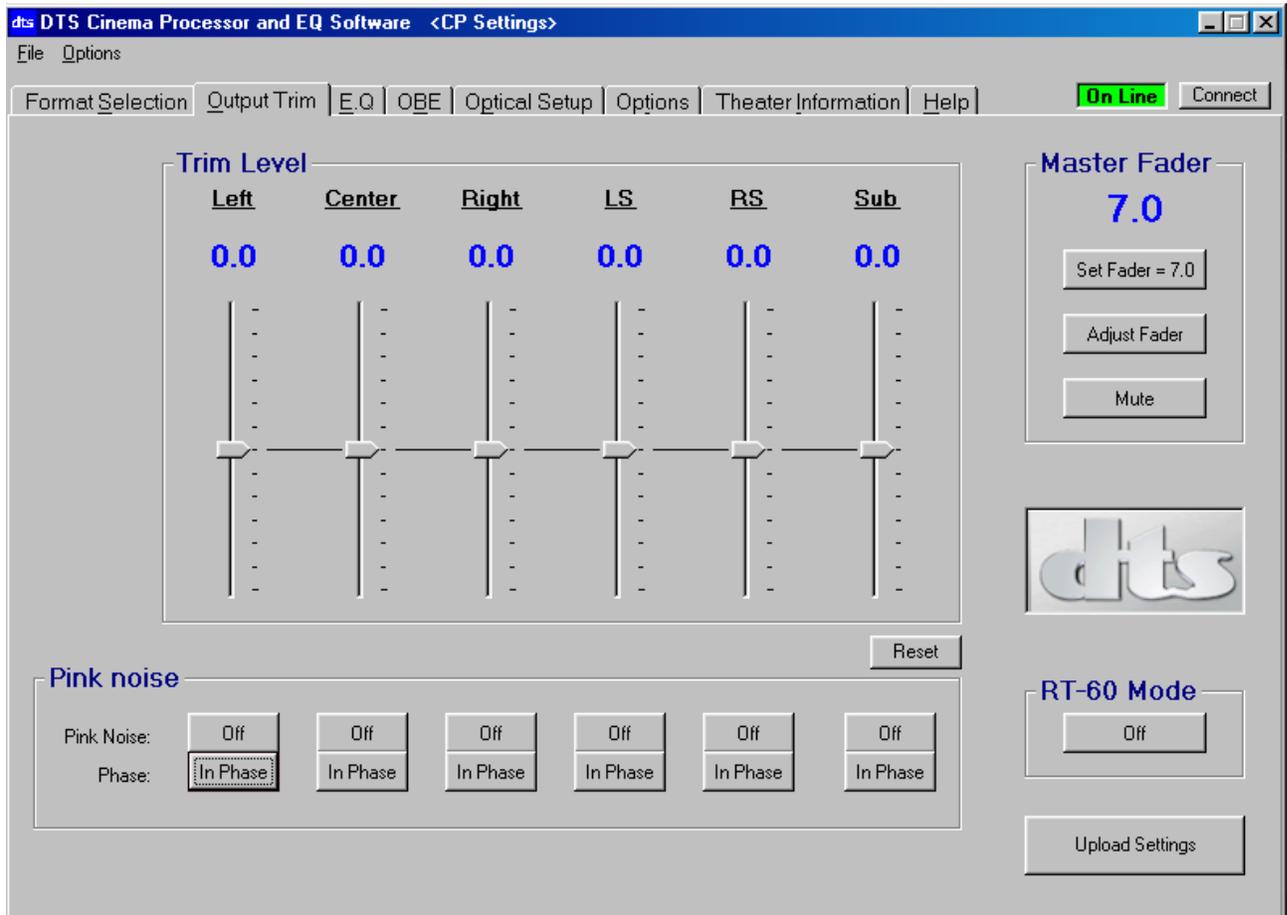
Click cursor on UPLOAD SETTINGS to send calibration information from the laptop to the DTS-ECP   -OR-   go to Options and select "Upload Options" and "Automatically Upload".

5.1.3.   MEASURE PRELIMINARY OUTPUT LEVELS

The DTS-ECP output levels are factory preset at 300mV rms. This nominal level ensures that speakers will not be overdriven during the setup procedure. **All SPL readings must be taken in the auditorium, just off-center in rear third section.**

• Place SPL meter in theater (rear third section, just off center

• Set master fader to 7.0. Use DTS CP Setup Software, select EQ menu, "Master Fader"

• Click cursor on "Set Fader = 7"

• The program will ask "are you sure you want to Set Fader to 7.0 ?" , click cursor on "Yes"

•.Use cursor to enable the internal **pink noise generator** and **Left** channel, shown below:
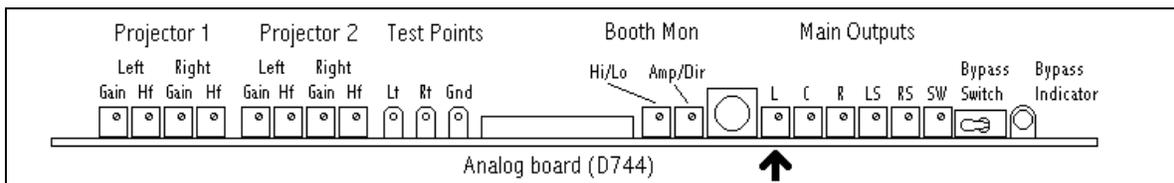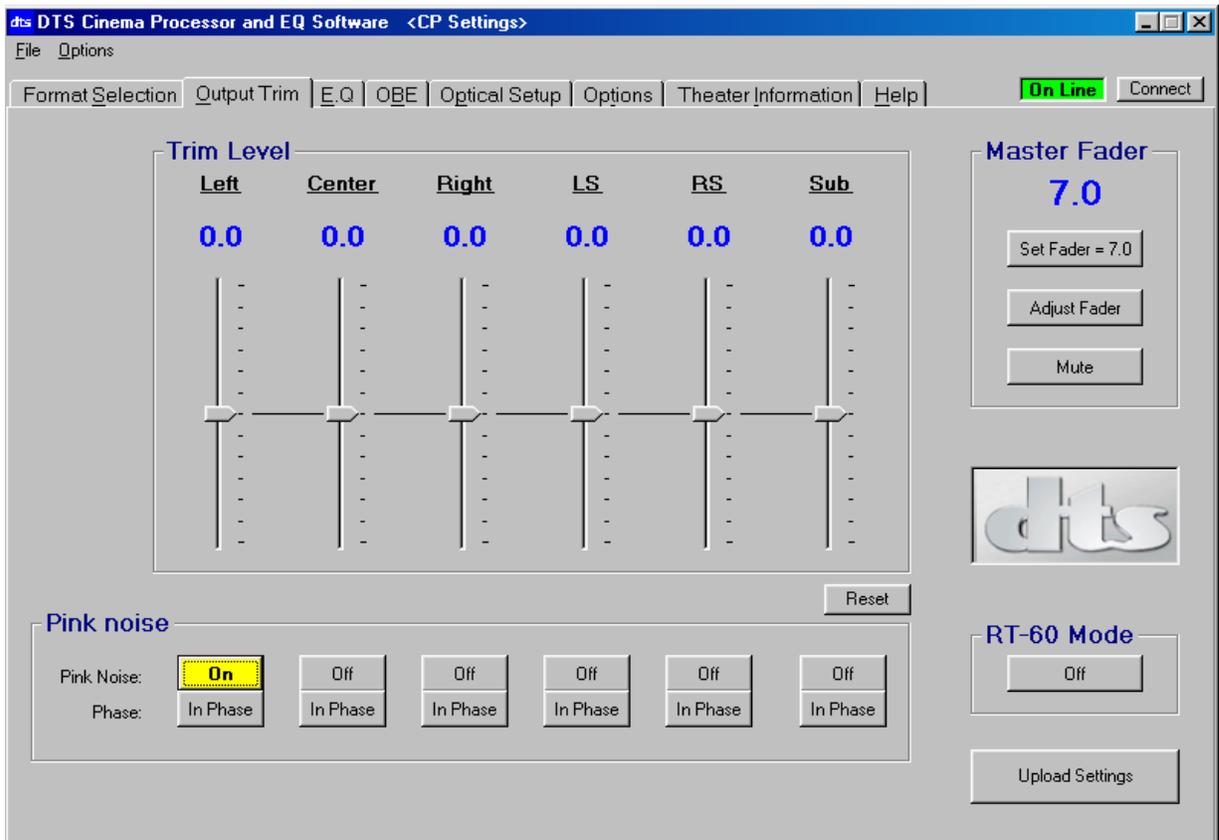
• Measure SPL in auditorium. Adjust **L** (left) channel gain trimpot ("Main Outputs" on D422 analog board) to obtain **82 dBC***.

   *NOTE: <u>82 dBC setting for EQ only</u>. After EQ process is finished, final SPL will be set.

• Once set, proceed to **C** (center) channel and adjust it to 82 dBC. Repeat for remaining channels.

5.2. ROOM EQUALIZATION

A microphone multiplexer (or single mic) and RTA are required to perform room EQ. Place microphones as per RTA manual, or see Suggested Microphone Placement drawing, page 5-1.

While observing the display on the RTA, cycle through the pink noise for each channel. The left, center, and right channels should be similar to each other. The display for the surrounds will be different than the screen channels, although both left and right surround channels should look similar to each other. If there are large differences between the channels with all the EQ adjustments set to flat, then there may be a problem with the speakers, speaker phasing, or amplifiers. Make any necessary adjustments or repairs before proceeding.

5.2.1. EQ PROGRAMMING PROCEDURE

- Start by using DTS CP Setup Software and laptop PC, enter EQ menu
- Set the master fader 7.0. **All adjustments should be done with master fader set to 7.0.**
- .Use cursor to enable the internal **pink noise generator** and **Left** channel, shown below:
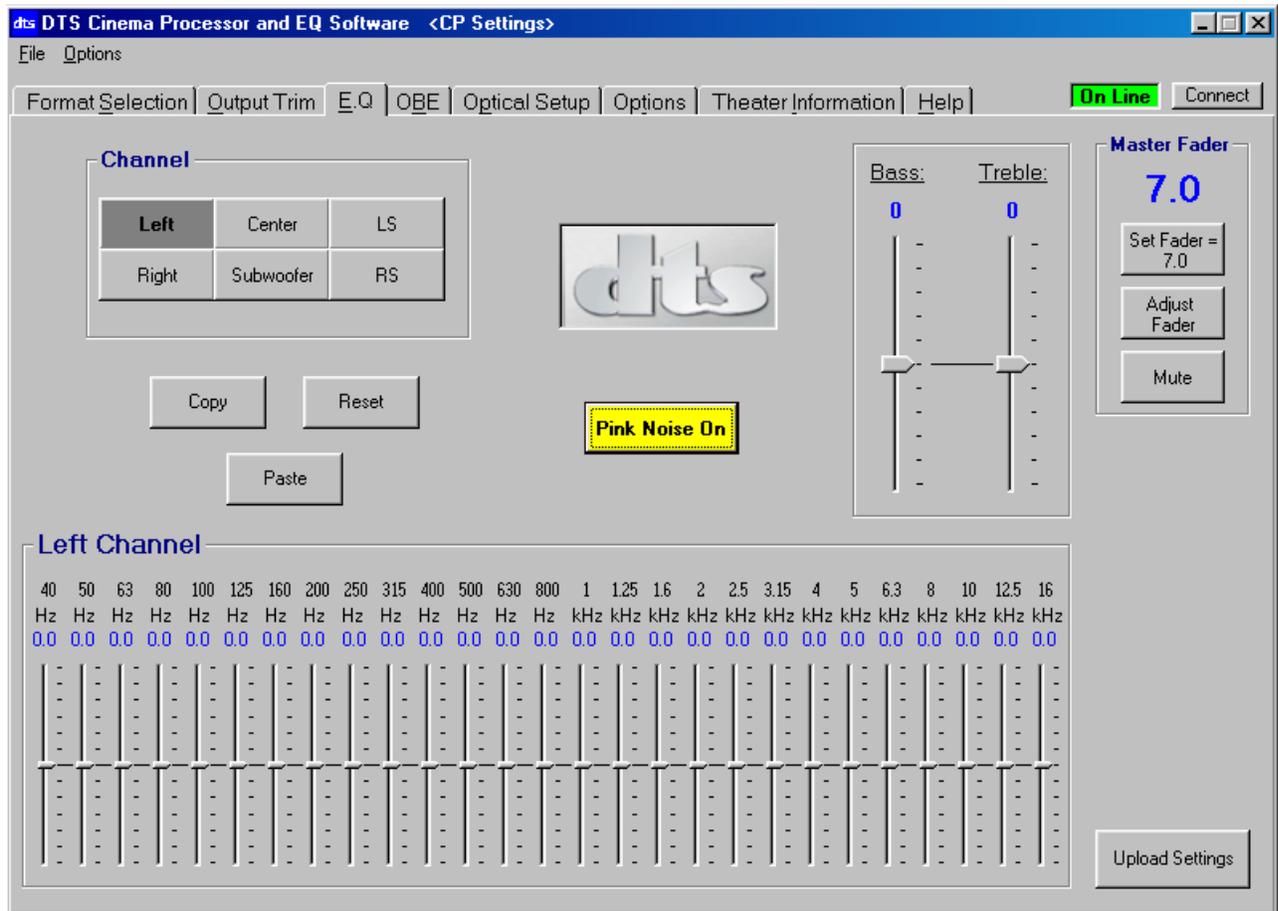
(continued)

5.2.1. EQ PROGRAMMING PROCEDURE (continued)

• Do a coarse adjustment to the **LEFT BASS**. Use the cursor to move the adjustment bar up or down as needed. Adjust BASS frequency response as flat as possible on RTA, see "Standard X-Curve" drawing on this page. **Click cursor on UPLOAD SETTINGS to send calibration information from the laptop to the DTS-ECP**
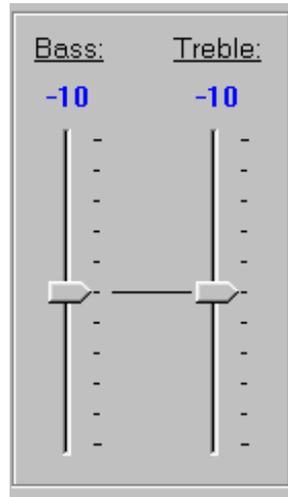
• Do a coarse adjustment to the **LEFT TREBLE**.   Use the cursor to move the adjustment bar up or down, as needed. Adjust TREBLE to achieve a flat response to 2 kHz with the level dropping off 3 dB per octave above 2 kHz on RTA, see below "Standard X-Curve". **Click cursor on UPLOAD SETTINGS to send calibration information from the laptop to the DTS-ECP.**
  NOTE: The DTS-ECP responses slowly to EQ gain adjustments, so give it a few seconds to finish the measurement.
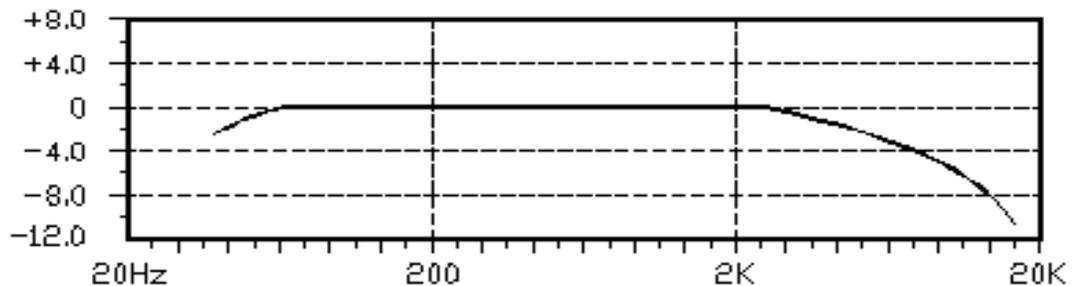
Standard X-Curve

(continued)

DTS P/N 9301DECP0002/10

5.2.1. EQ PROGRAMMING PROCEDURE (continued)

• Do a **Left** channel fine-tune adjustment. Use the cursor to move the frequency level bars as needed to achieve the Standard X-Curve on the RTA. Each of the 27 frequency bars on the equalizer can be adjusted from –6dB to +6dB in ½ dB increments. **Click cursor on UPLOAD SETTINGS to send EQ calibration information from the laptop to the DTS-ECP**.
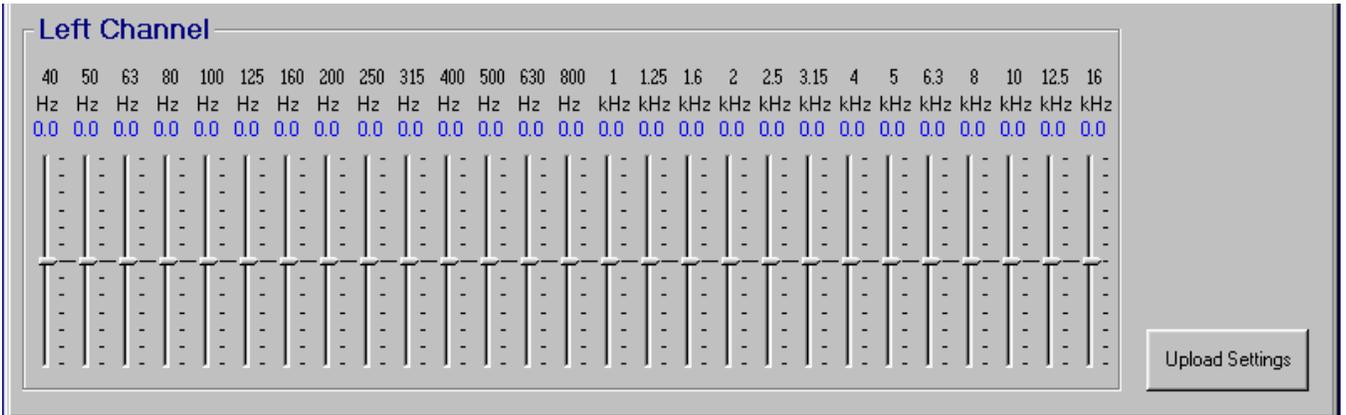
The goal is to achieve the Standard X-Curve, a flat response to 2 kHz and a roll-off of 3 dB per octave above 2 kHz, as described in ISO Standard 2969, using as little EQ as possible. Diametrically opposed settings on adjacent frequencies bands should be avoided. Adjustments on one frequency band will affect the adjacent bands so adjustments should be made in small increments. When one band is set, often, a slight correction on an adjacent band will be required to maintain the correct response.

Standard X-curve
RTA
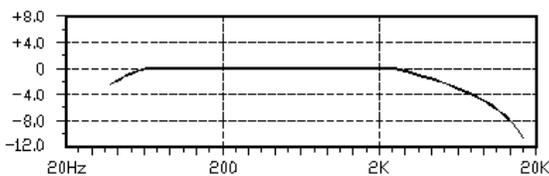
Make adjustments on
 ECP "EQ" screen ➢
 to achieve X-curve on
 ◁ RTA.

1/3 Octave Adjustment Screen
DTS CP Setup software
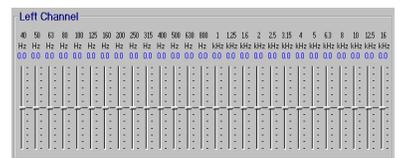
• When the Left channel is complete, click cursor on **UPLOAD SETTINGS**.

• Once Left channel is completed, use cursor to enable the **Center** channel. Repeat EQ procedure. Repeat for all remaining channels. See 5.2.4. for Sub bass channel EQ.

Remember to click cursor on "Upload Settings" to send EQ calibration information from the laptop PC to the DTS-ECP.   NOTE: The DTS-ECP responses slowly to EQ gain adjustments, so give it a few seconds to finish the measurement.

5.2.2. COPYING EQ SETTINGS

Copying EQ settings from one channel to another speeds the EQ process**. Screen channels may be copied to screen channels, and surround channel to surround channel.** However, screen channels cannot be copied to surrounds. No channel can be copied to the subwoofer.

• To copy settings, select channel to copy, enable "copy", then select channel to receive setting and select paste. Example: Copying Left channel to Center channel.

  ① Use cursor to select Left channel

  ② Use cursor to select "Copy"

  ③ Use cursor to select Center channel

  ④ Use cursor to select "Paste". The EQ settings from the Left channel should appear on the Center channel.

  ⑤ Click cursor on **UPLOAD SETTINGS** to send EQ calibration information from the laptop to the DTS-ECP

• Fine-tune the new channel's EQ as needed. Repeat as needed for remaining channels.

5.2.3. SURROUND CHANNELS' EQ

The **surround channels'** equalizers differ from the screen channels in that they have single octave bands instead of 1/3 octave bands.

• While still in the DTS CP Setup Software EQ Menu, use the cursor to select **LS** (left surround channel).

• Use the cursor to move the LS frequency level bars as needed to achieve the Standard X-Curve on the RTA. **Click cursor on UPLOAD SETTINGS to send calibration information from the laptop to the DTS-ECP**
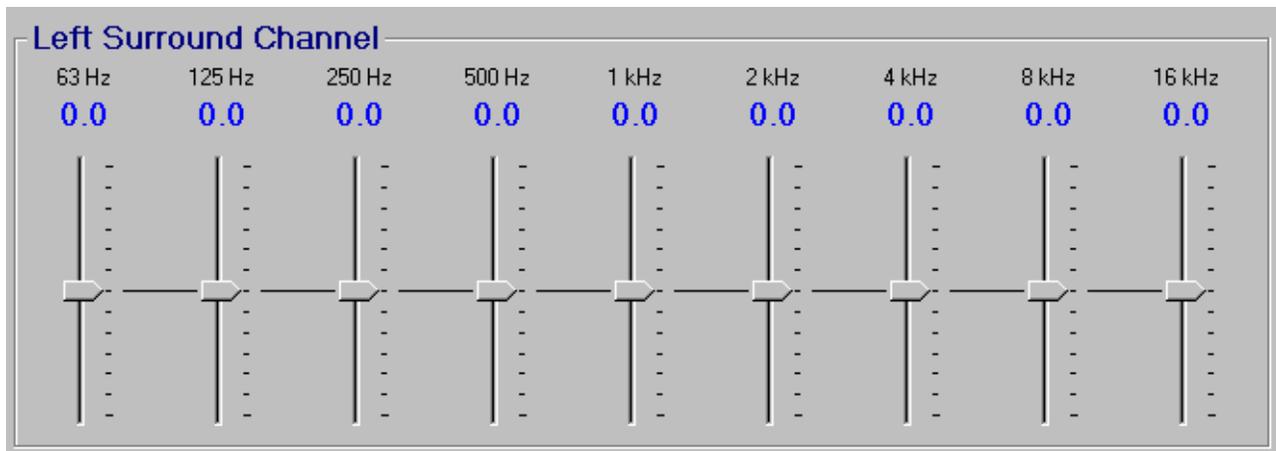
• Repeat procedure for the **RS** (right surround channel). You may choose to copy the LS to the RS channel and then fine-tune. **Click cursor on UPLOAD SETTINGS to send calibration information from the laptop to the DTS-ECP.**   NOTE: The DTS-ECP responses slowly to EQ gain adjustments, so give it a few seconds to finish the measurement.

5.2.4. SUB BASS PARAMETRIC EQ

• While still in the DTS CP Setup software EQ Menu, use the cursor to select Subwoofer channel.
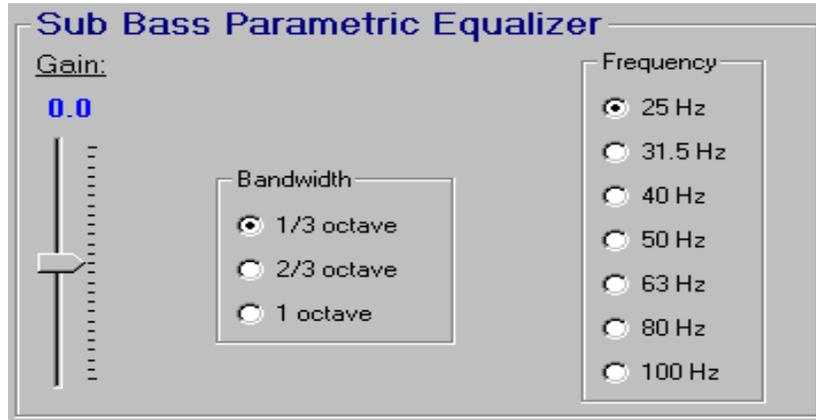
    ⊠ **Gain** adjustment is in ½ dB steps from +6.0dB to −6.0dB
    ⊠ Available bandwidth range is selectable: 1 octave, 1/3 octave, 2/3 octave
    ⊠ Available **frequencies** are: 100Hz, 80Hz, 63Hz, 50Hz, 40Hz, 31**.**5Hz, 25Hz.

• The frequency range of the sub bass pink is from 20Hz to 250Hz. Using the SUB BASS PARAMETRIC EQUALIZER section of the screen, adjust the sub bass EQ so that the pattern on the RTA has a flat response, as shown below. **Click cursor on UPLOAD SETTINGS to send calibration information from the laptop to the DTS-ECP.** NOTE: The DTS-ECP responses slowly to EQ gain adjustments, so give it a few seconds to finish the measurement.
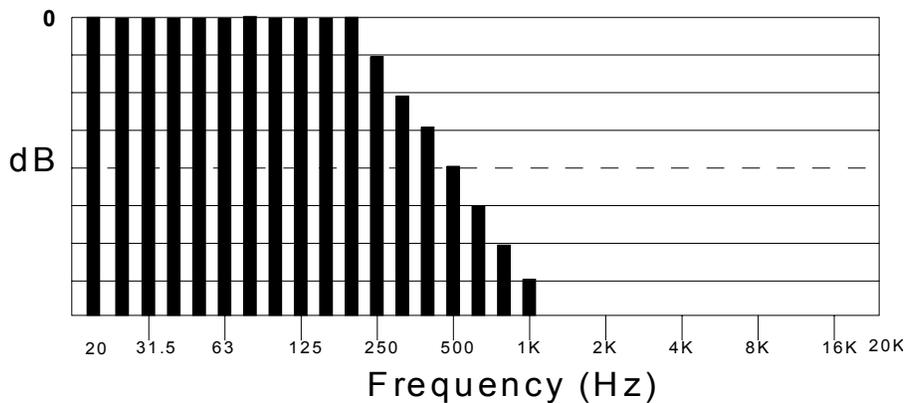
(continued)

5.2.4. SUB BASS PARAMETRIC EQ (continued)

EXAMPLE: The graph below shows that an area around 63Hz needs adjustment. Start by first choosing the frequency and then the octave range so adjustments can be made. In this instance, use the cursor to set **FREQUENCY**   to **63Hz**.
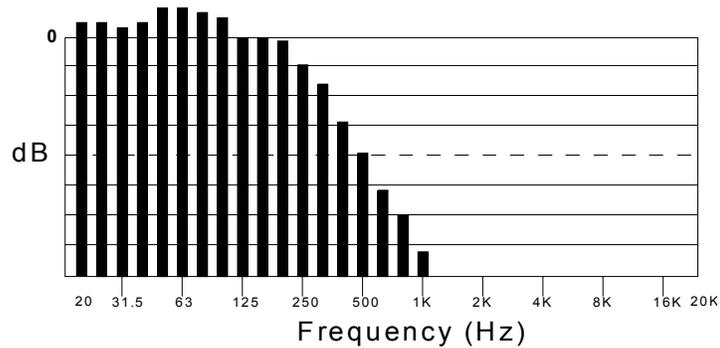
* The **BANDWIDTH** is determined by looking at the width of the area in need of adjustment. In the above example, notice the area needing adjustment is between 63dB and 125Hz. This is one octave, so in this case, select 1 OCTAVE.   If the range needing adjustment was smaller, then choose 2/3 OCTAVE. If only a spike appeared, then try 1/3 OCTAVE.

Remember to click cursor on UPLOAD SETTINGS to send calibration information from the laptop to the DTS-ECP.   **NOTE:**   The DTS-ECP responses slowly to EQ gain adjustments, so give it a few seconds to finish the measurement.
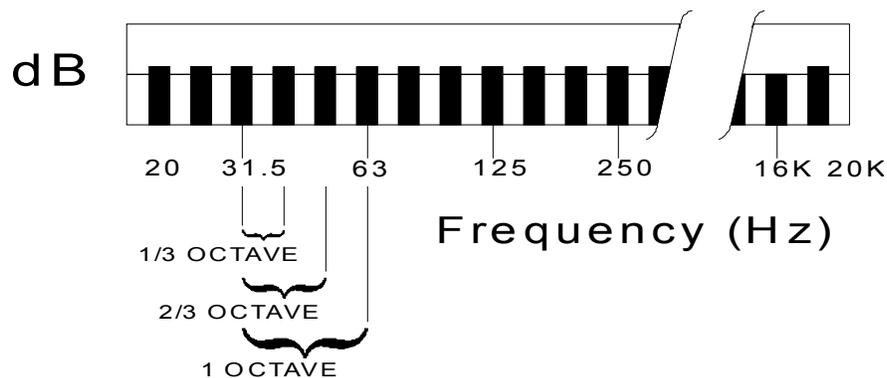
(continued)

5.2.4. SUB BASS PARAMETRIC EQ (continued)

• Now make bandwidth adjustments by clicking cursor on the **sub bass "Bandwidth".** Adjust until the pattern on the RTA is as flat as possible. **Click cursor on UPLOAD SETTINGS to send calibration information from the laptop to the DTS-ECP**
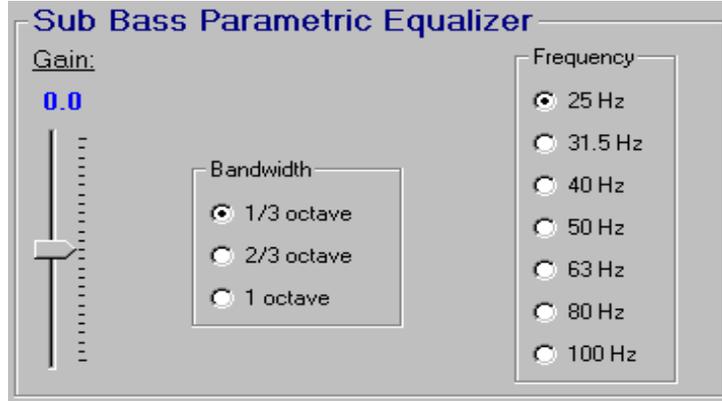
NOTE: The DTS-ECP responses slowly to EQ gain adjustments, so give it a few seconds to finish the measurement.

5.2.5.   OPTICAL SUB-BASS EXTENSION (OBE) ADJUSTMENT

• Click the cursor on the **OBE Menu**.

(continued)

DTS P/N 9301DECP0002/10
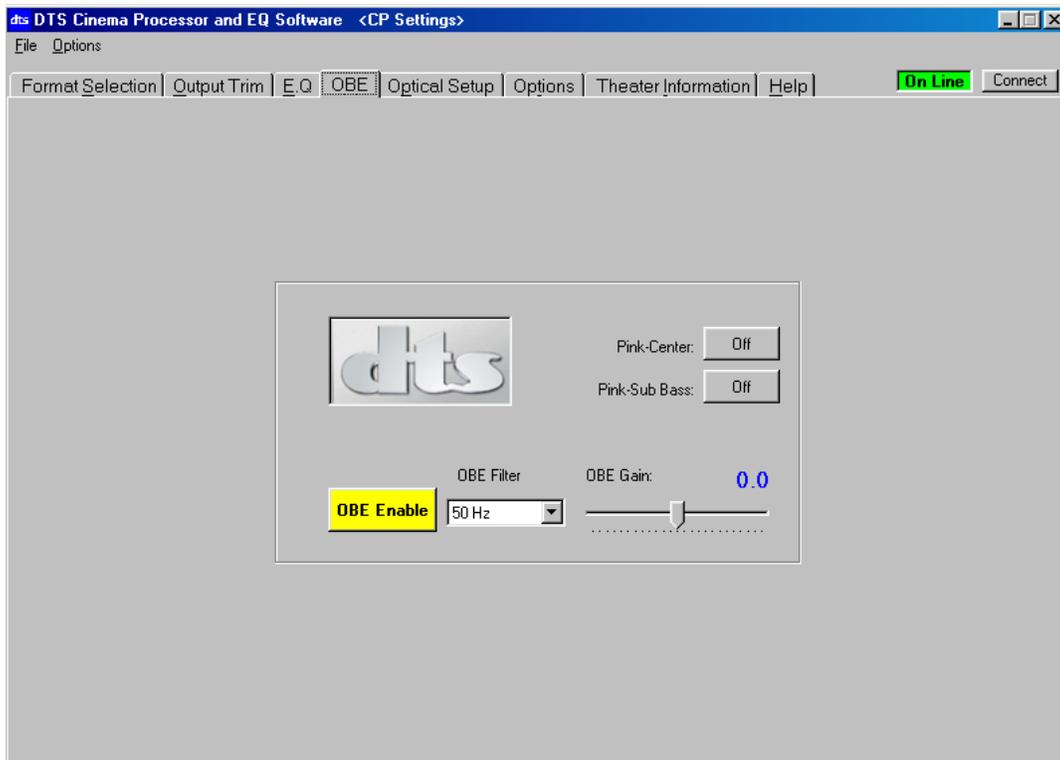
5.2.5.　OPTICAL SUB-BASS EXTENSION (OBE) ADJUSTMENT　(continued)

- If not already enabled, activate OBE ENABLE and adjust the **OBE (low pass) filter.** The adjustment range is from 50Hz to 120Hz, in 10dB steps.

The intent is to get rid of any low-end frequency cross-points when the sub bass channel and center channel are combined.
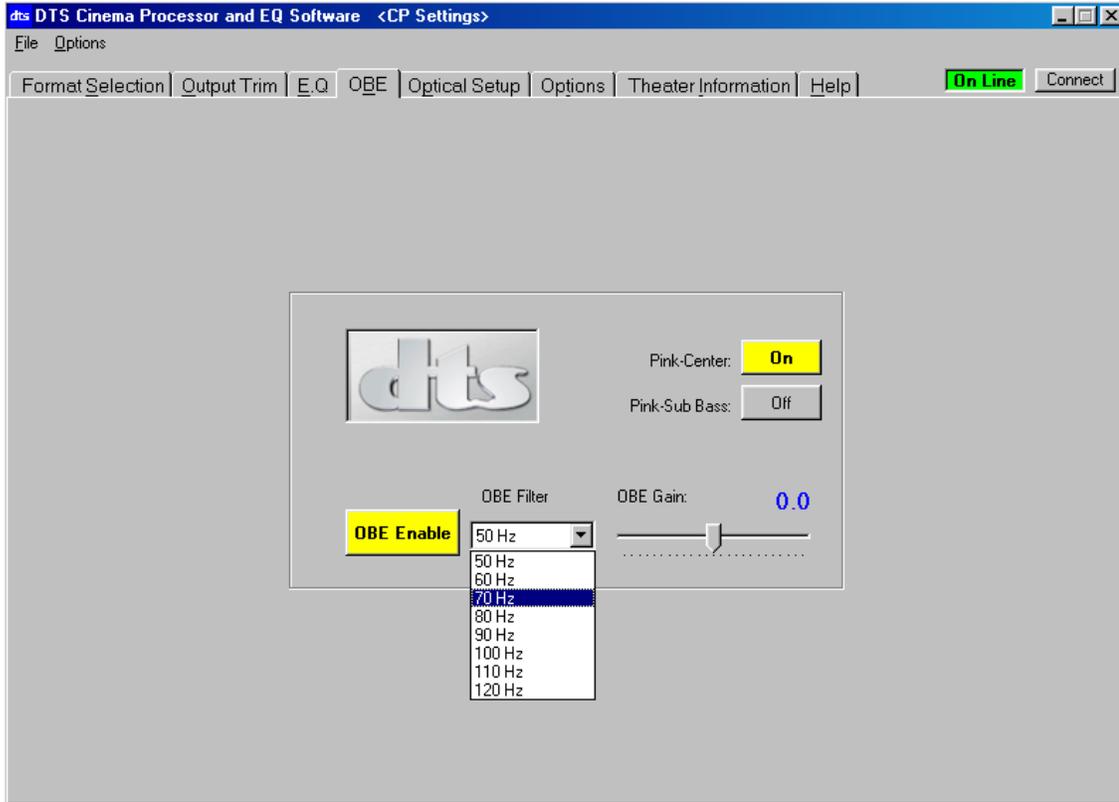
- To determine the crossover, click cursor on "**Pink-Center**" so that the box indicates "on" and is colored yellow. Pink noise should be heard in auditorium coming from the center channel. The pattern on the RTA should look very similar to the graph below. If it does not, go back and check the EQ of the center channel.
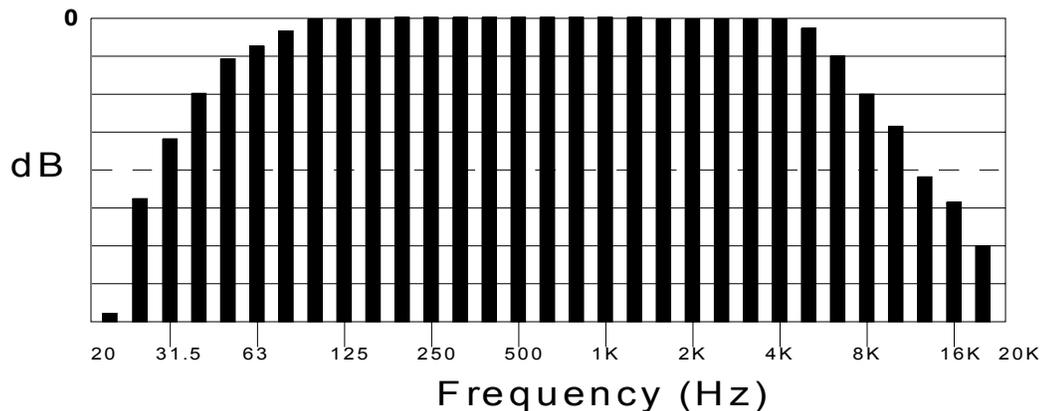
(continued)

5.2.5.   OPTICAL SUB-BASS EXTENSION (OBE) ADJUSTMENT   (continued)

• Disable the Pink-Center and enable "**Pink-Sub-Bass".**   The pattern on the RTA should look very similar to the graph below**:**
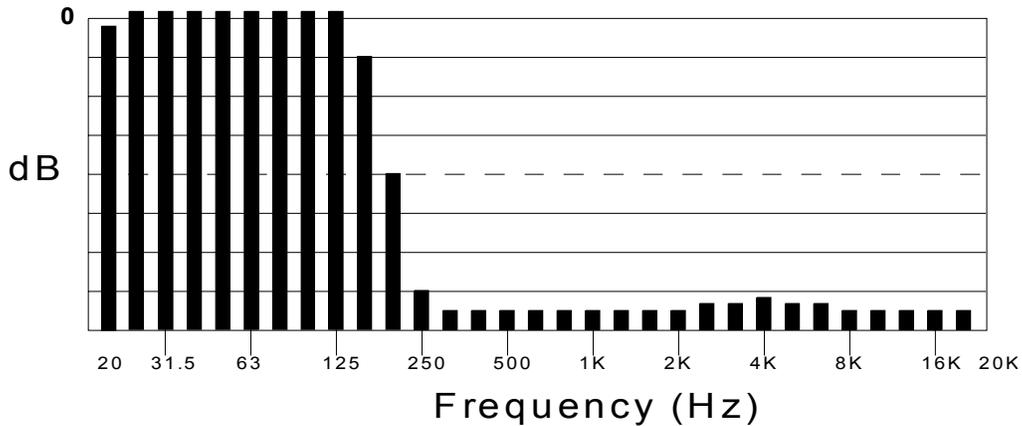
• Now enable both the **"Pink-Center"** and **"Pink Sub-Bass".** If a peak or valley appears in the pattern between 50Hz and 120Hz when both are on, then use the **"OBE Filter"** to even it out. Choose the frequency to filter by clicking the cursor on the OBE Filter choice bar and make gain adjustments using the **"OBE Gain"** bar. **Click cursor on UPLOAD SETTINGS to send calibration information from the laptop to the DTS-ECP.**   NOTE: The DTS-ECP responses slowly to EQ gain adjustments, so give it a few seconds to finish the measurement.

In the **example** below, filtering is needed around 80Hz. In this case, you'd choose 80Hz.
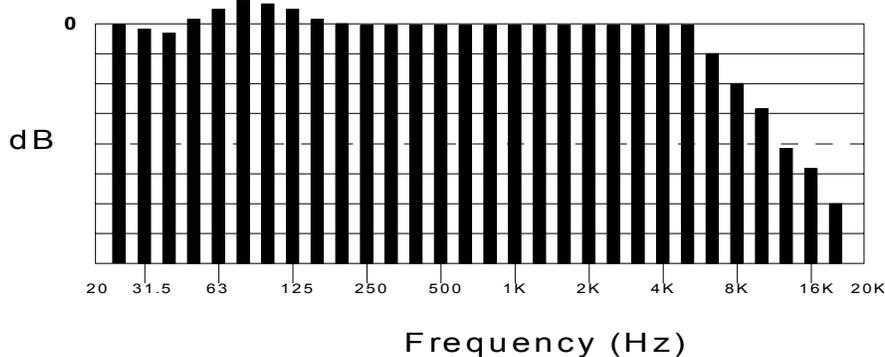
• When the filter has been correctly set, the pattern on the RTA should look the graph below**:**
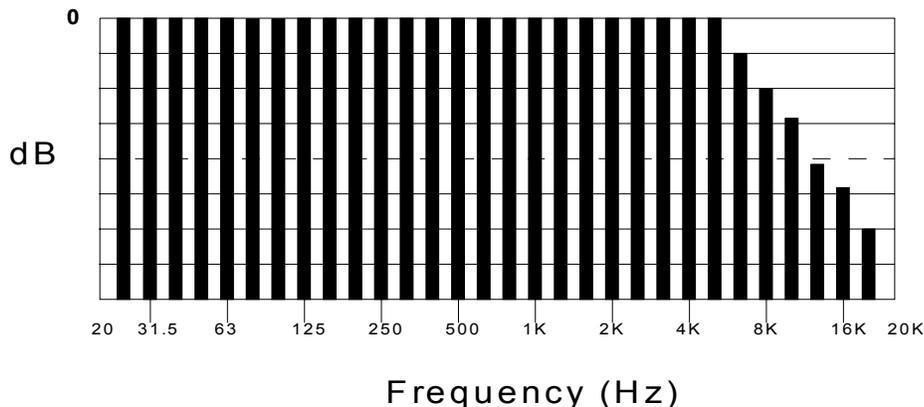
(continued)

5.2.5. OPTICAL SUB-BASS EXTENSION (OBE) ADJUSTMENT (continued)

• Now, adjust the **OBE Gain**. Use the cursor to select "Pink-Center". The SPL meter should read **85dBC**. Disable the "Pink-Center".

• Use the cursor to select "Pink-Sub-Bass". The SPL meter should read **85dBC.** If the sub bass gain needs adjustment, click cursor on gain bar and drag it or hit the up/down arrows on your keyboard. The range is in ½ dB steps, from −6.0 dB to +6.0 dB.

• **Click cursor on UPLOAD SETTINGS to send calibration information from the laptop to the DTS-ECP.**

• Once the center and sub bass channels are set, enable pink noise for **both channels** ("Pink-Center" and "Pink-Sub-Bass"). The SPL meter should reflect a **+3dB gain**. This confirms the sub bass channel is working correctly.

• Disable pink noise for both channels. OBE should remain enabled. OBE may be disabled, if desired.

5.2.6. SAVING EQ SETTINGS

Save all EQ settings by using the DTS Upload/Download Program and storing settings on your PC or an floppy disc. You must first quit out of the DTS CP Setup Software and enter into the Upload/Download Program. Details on the operation of this program are given in Appendix F.

5.2.7. CLEARING EQ SETTINGS

To clear EQ settings from a channel, enter the EQ Menu screen. Select channel to reset and click cursor on "Reset". The program will ask ""Are you sure you want to reset (chosen) channel?" If you do, click cursor on "Yes". **Click cursor on UPLOAD SETTINGS to send calibration information from the laptop to the DTS-ECP.**
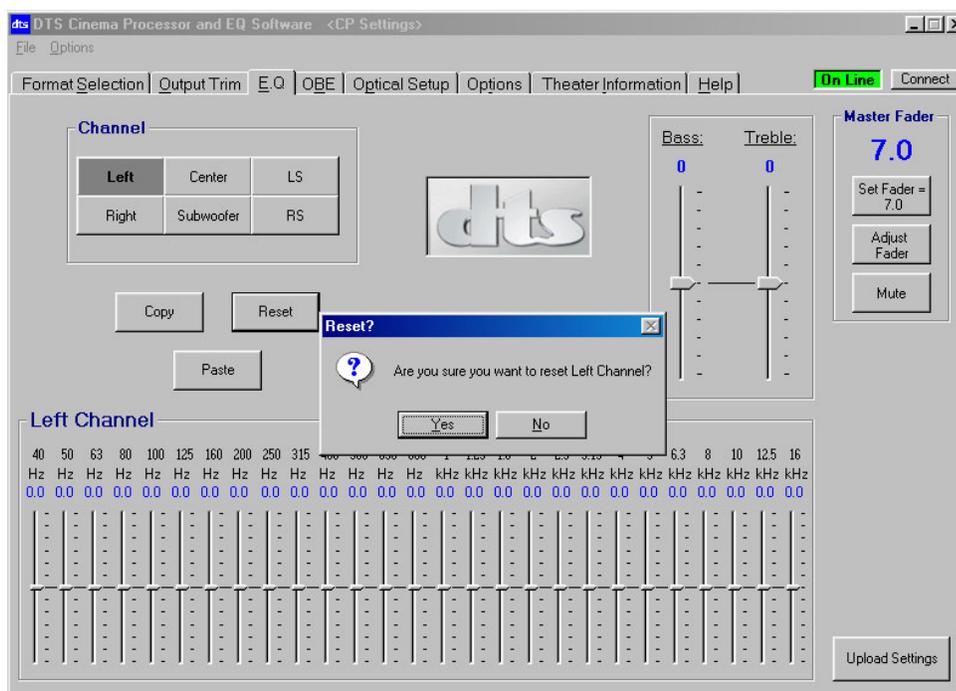
5.3.   FINAL SOUND LEVEL ADJUSTMENTS

5.3.1. FINAL SPL ADJUSTMENT

• Go to the **EQ Menu** and check each channel's level adjustment. Start with the Left Channel.
Click the cursor on **"Left" channel** and click on "Pink-Noise" box until it turns yellow and
indicates **"Pink Noise On".**
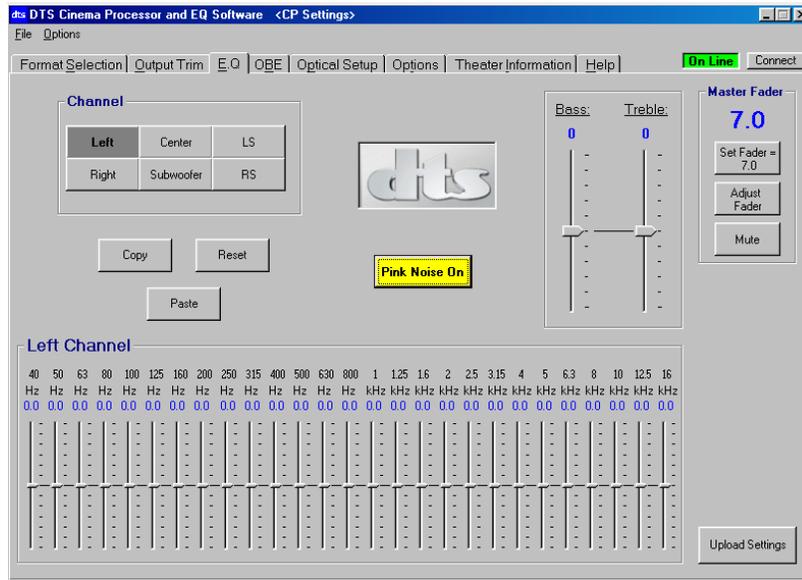
• Verify the master fader is set to 7.0. **All levels should be set with master fader set to 7.0.**

• **SPL meter set to "slow" and "C" weighted**. Adjust D744 "**L**" (left) channel ("Main Outputs")
trimpot until SPL reads **85 dBC** in the theater.
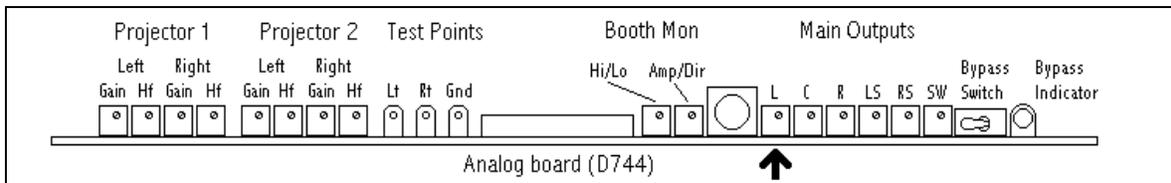
• Once set, to proceed to the **Center Channel**. Set D744 ("Main Outputs") "**C**" trimpot to achieve
85dBC in the theater. Repeat procedure for **all remaining channels**, set to the following SPL**:**

Left, Center, Right	85 dBC
Left & Right Surrounds	82 dBC
Subwoofer	85 dBC

5.3.2   LISTEN TO THEATER SPEAKERS

• After adjusting EQ and SPL, play the BUZZ AND BILL SHOW film in SR format.
• Walk through the auditorium and listen to the speaker's sound quality at different locations.
Be sure to listen in both optical and external sound formats.
• Verify there is a uniform, good sound quality throughout the auditorium. If there are large
differences from one area to another, the EQ and SPL process should be repeated.

SECTION 6   A – CHAIN ALIGNMENT

6.1.   ALIGNING PROJECTOR'S ANALOG OPTICS

This procedure assumes that the sound head alignment is complete and therefore will not fully cover solar cell, exciter lamp, slit lens, or lateral guide adjustments. If the projector's sound head is not aligned, refer to the projector's installation manual or contact projector manufacturer.

Equipment Required: Oscilloscope with test leads, DTS CP Setup software, the DTS BUZZ AND BILL SHOW test film, RTA, and various calibration film (not provided by DTS)**:**
- **50% Modulation Tone**
- **Pink Noise**
- SMPTE BUZZ Track
- 1 kHz Cross-talk Cell Alignment
- P35-SL 1000Hz Signal, "Photographic Sound Track", Level SMPTE MONO Test Film (optional).

The 50% Modulation Tone and Pink Noise films are used to setup the DTS-ECP and are mandatory. Use the SMPTE BUZZ Track and 1 kHz Cross-talk Films to check projector adjustments. The SMPTE MONO Test Film is not essential for setting up the DTS-ECP.

CONNECT TEST EQUIPMENT

Connect the oscilloscope and RTA to the to the DTS-ECP via test inputs on the D744 board. Use test leads that have dual-ended plugs at 0.080 inches long and are 2mm in diameter, such as a Pomona 3901 or 3221.
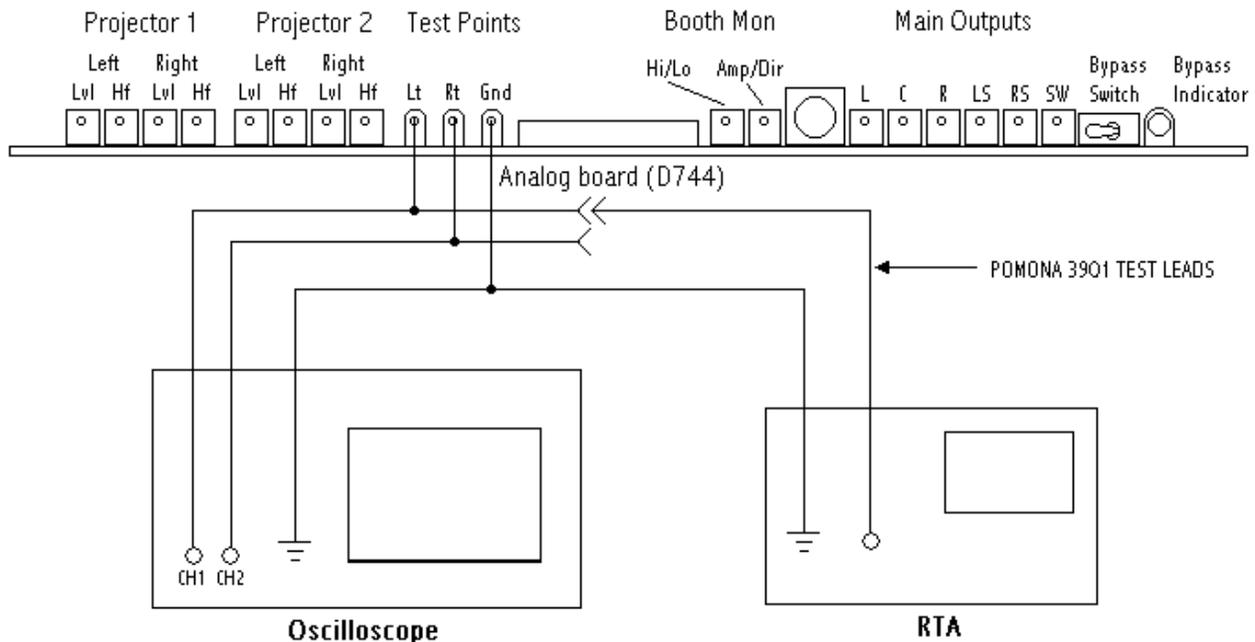
6.2.   OPTICAL GAIN

• Verify the projector's optics have been cleaned and aligned.

• Start by using DTS CP Setup Software and laptop PC, enter OPTICAL SETUP menu. **Click the cursor on "Start".**
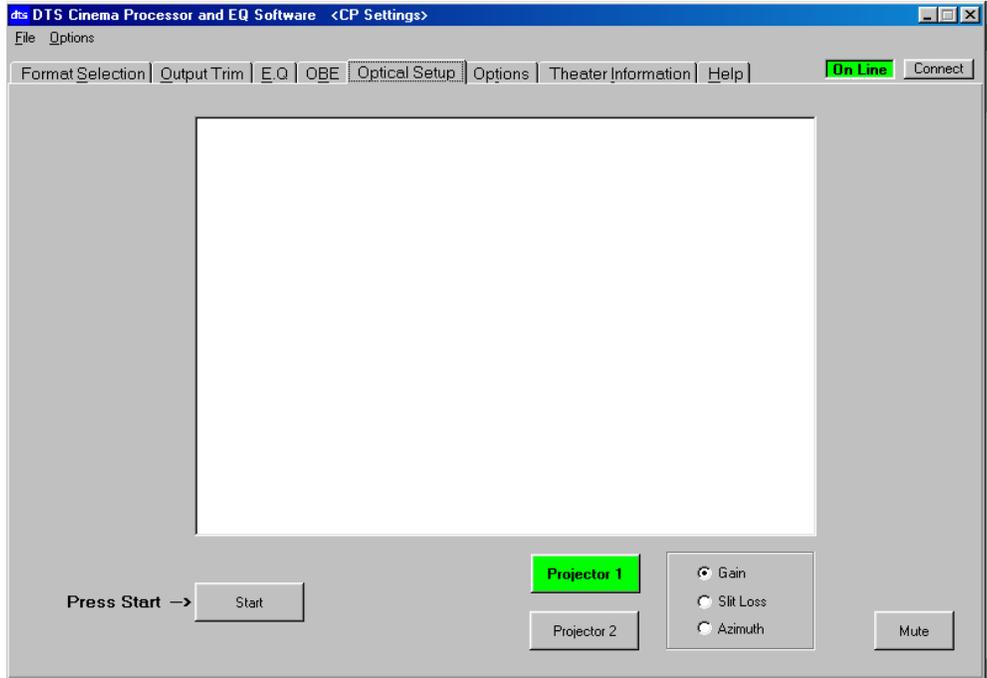
• Click cursor on "Gain", and "Projector 1".   MUTE should enable. The screen below should appear when the **50% Modulation Tone** film is played.
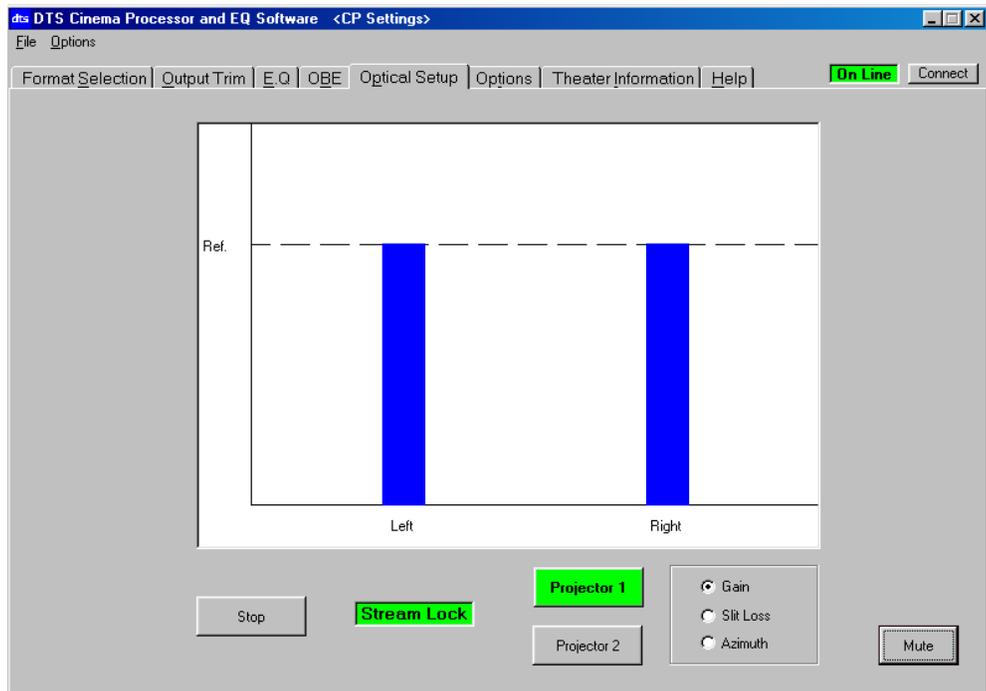
(continued)

6.2.   OPTICAL GAIN   (continued)

• While tone plays, adjust D422 **PROJECTOR 1 LEFT GAIN** trimpot on for Projector 1 left cell.
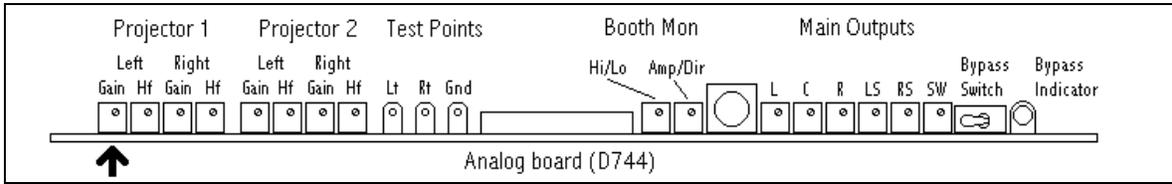
• Adjust trimpot until Projector 1 Left Optical Gain is at reference level, indicated by **"Ref."** broken line (PC screen).

• Adjust the **PROJECTOR 1 RIGHT Gain** trimpot for the right cell in the same manner.
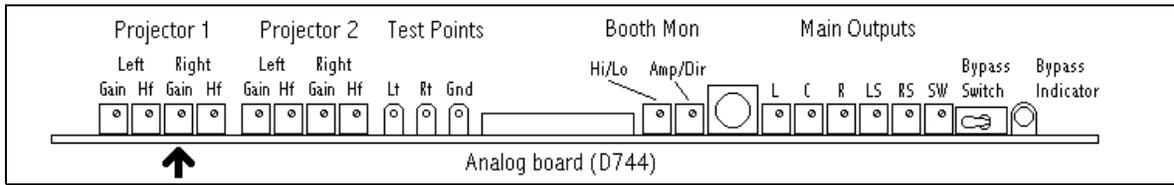
• Continue on to CELL ALIGNMENT CHECK.

6.3.   CELL ALGINMENT CHECK

6.3.1. CELL ALIGNMENT

• Run a loop of **SMPTE Buzz Track** film. Check for proper lateral alignment of the solar cell. The (cell) slit must be properly aligned so that the light illuminates only the optical soundtracks.

• While the film is running, look at the oscilloscope. Verify the positioning of the slit relative to the optical track. When no signal output (or a null) is seen on the scope, the lateral adjustment is correct. See diagram below. If adjustment is necessary, refer to projector manufacturer for proper alignment procedure.

    • Some projectors use a film guide that adjusts laterally for a null if the lens and exciter lamp are fixed.

    • Some projectors have a lens/exciter lamp assembly that is adjusted laterally for a null if the film is not adjustable side-to-side.

    • Some projectors use a lens that allows the width of the slit to be adjusted. The adjustment is correct when the left and right signals both disappear equally.

(continued)

6.3.1.   CELL ALIGNMENT   (continued)

OK   OK

← Correct Cell Alignment
Display on Oscilloscope

CELL ALIGNMENT ON OSCILLOSCOPE
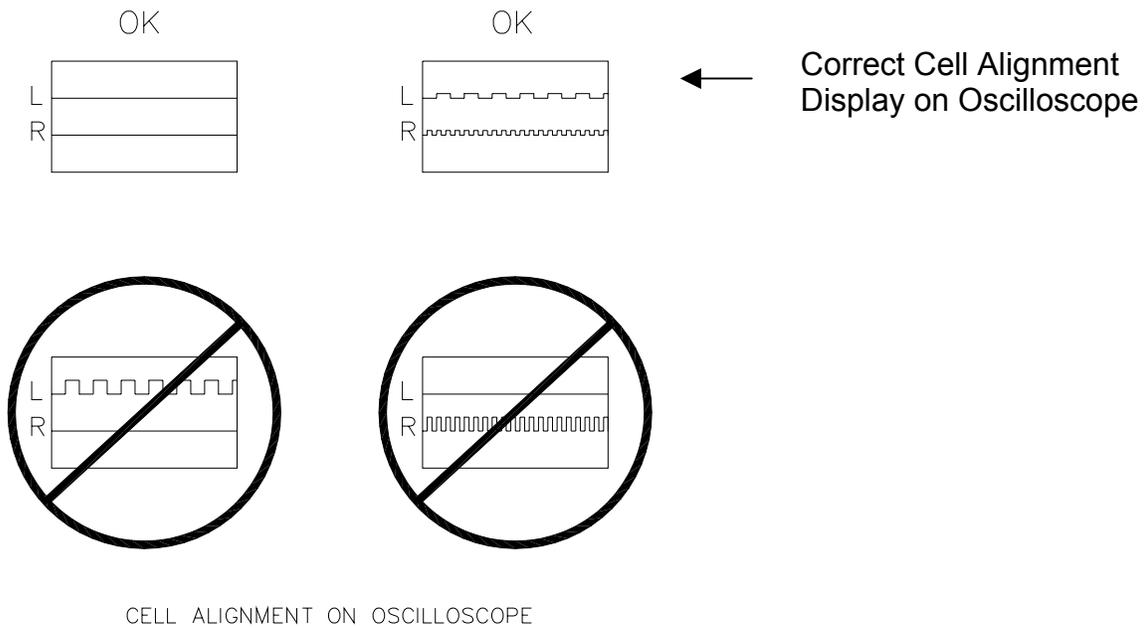
• Continue on to CROSS-TALK STEREO ALIGNMENT.

6.3.2.   CROSS-TALK STEREO ALIGNMENT

• Run a loop of **1 kHz Cross-talk Cell Alignment** film. Verify no cross-talk between stereo tracks.

• While film is running, look at the oscilloscope (scope should be connected as shown in Section 6.1). Cross-talk should be at a minimum, as per the diagram below. If adjustment is necessary, refer to projector manufacturer for proper alignment procedure.

Minimum Crosstalk on
Oscilloscope
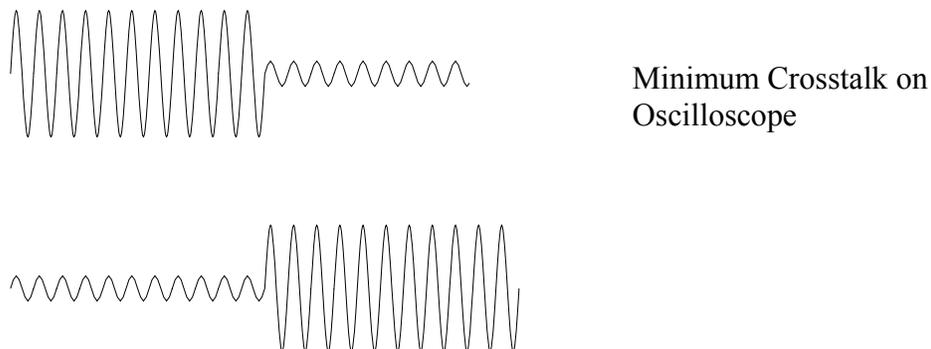
• Continue on to SLIT LOSS COMPENSATION.

6.4.   SLIT LOSS COMPENSATION

- Start by turning D744 **PROJECTOR 1 LEFT & RIGHT HF** trim-pots (20-turn) fully clockwise.

- Run a loop of **Pink Noise** film and click cursor on "Slit Loss".
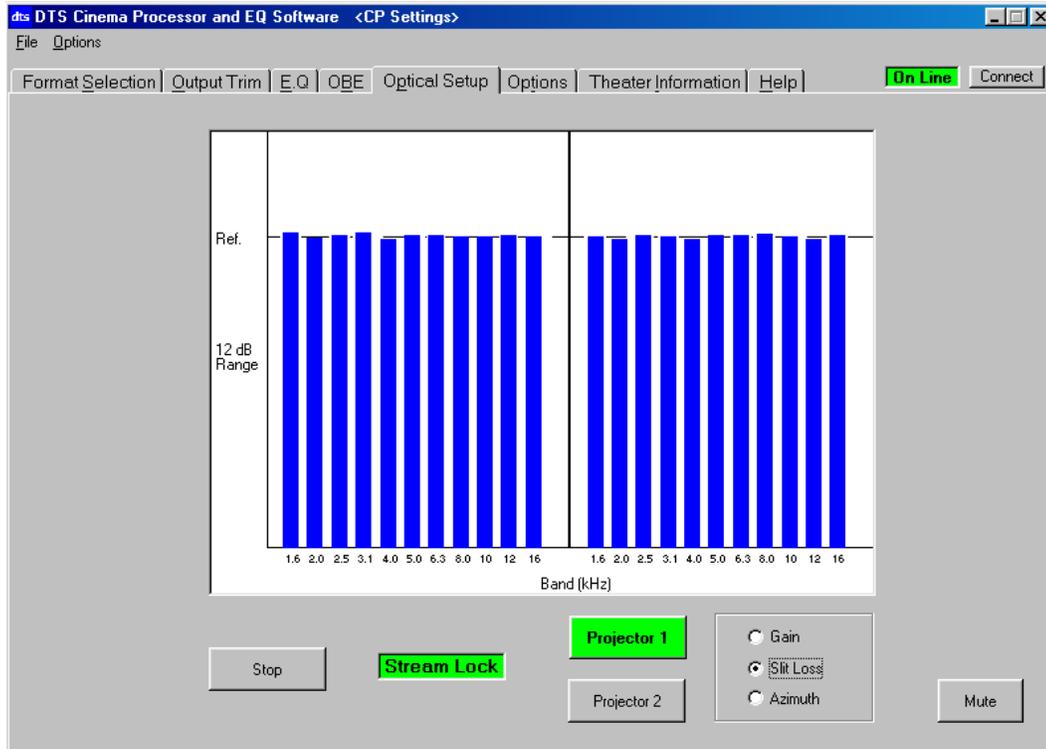
- Now, adjust **PROJECTOR 1 LEFT   HF** trimpot to achieve flat response from 1 kHz to 12**.**5 kHz for the left cell.
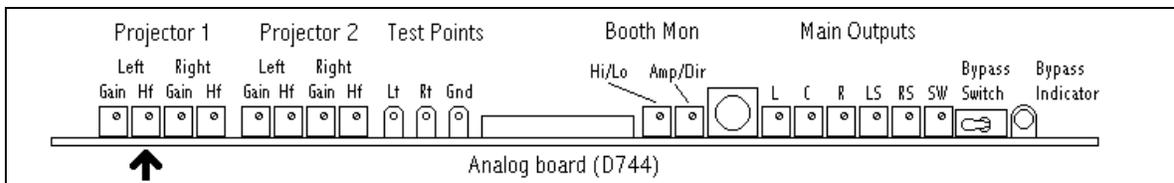
- Note that as adjustments are made, the RTA display uses a slow response curve. Make each adjustment a little at a time to ensure that over-adjustment is avoided.

- Repeat for **PROJECTOR 1 RIGHT   HF,** adjust its trimpot to achieve a flat response from 1 kHz to 12**.**5 kHz for the right cell.
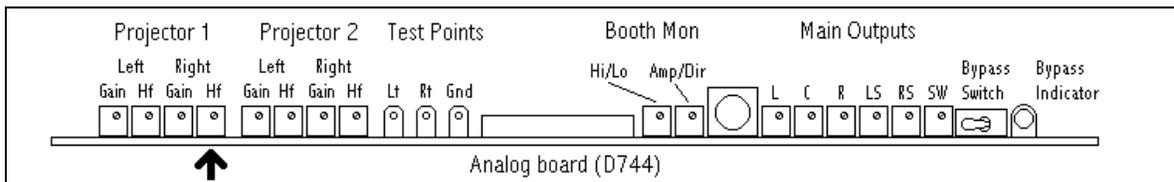
- Once completed, continue on to AZIMUTH.

6.5.   AZIMUTH

- To adjust azimuth, run a loop of **Pink Noise** film and click cursor on "Azimuth".

- This shows the phase difference between the left and right optical channels. The display should look like a relatively straight diagonal line from the lower left corner to the upper right corner.

GOOD AZIMUTH   BAD AZIMUTH
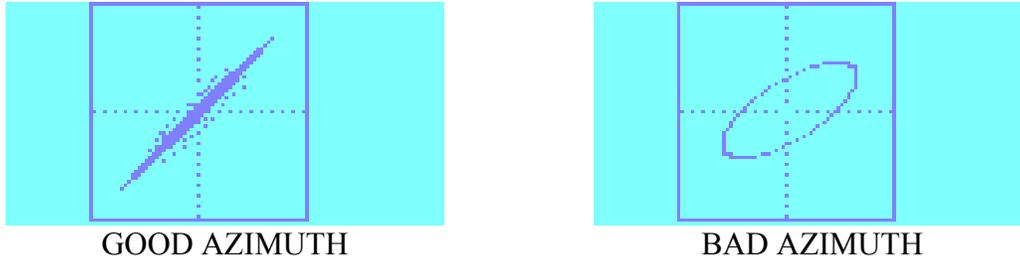
- If the display is not correct, the alignment of the optical head should be checked and mechanically adjusted. Once any changes are made to the solar cell alignment, the optical gain and slit loss adjustment must be repeated.

6.6.   MONO

- Use either the **Pink Noise** film -or- the P35-SL 1000Hz Signal, "Photographic Sound Track" (MONO), Level SMPTE Test Film. Go to "Format Selection" menu.

- Run the test film and click cursor on "Mono". Pink noise should be heard in the auditorium and booth monitor coming from the center channel.

6.7.   BYPASS MODE ADJUSTMENT

The DTS-ECP will automatically switch into BYPASS mode if the internal power supplies fail or if a failure occurs in the DSP (D741) or CPU (D740) boards. If required, you may switch the DTS-ECP the into BYPASS mode by setting the D744 "BYPASS" switch to the right.
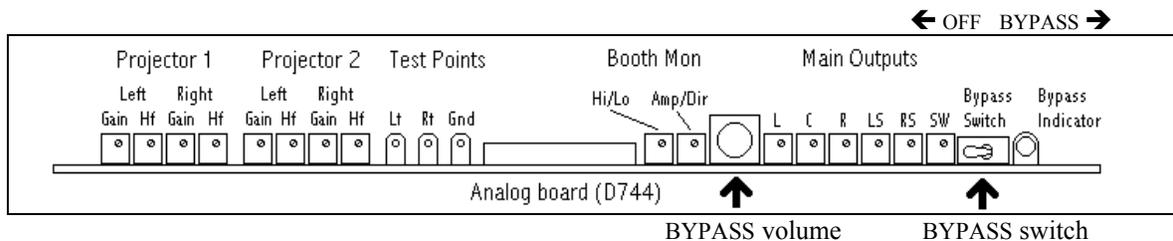
When in the BYPASS mode:
- Two red LEDs - one on the D744 board and one on the front panel - will illuminate.
- The signal from the solar cell will be routed to the screen speakers (left, center, right).
- A "BYPASS" pot on the D744 board is used to adjust volume.

BYPASS Level Adjustment
- Switch DTS-ECP to BYPASS mode – set "BYPASS" switch on D744 to the right.
- Run **50% Modulation Tone** film and adjust "BYPASS" pot on D744 to until 85dBC (SPL) is achieved in the theater. Leave pot in this position.
- Switch "BYPASS" off. DTS-ECP should return to an optical format.

6.8.   FINAL LEVEL CHECK

- Enter OPTICAL SETUP menu. Click the cursor on "Start", "Gain", and "Projector 1". The screen below should appear**:**
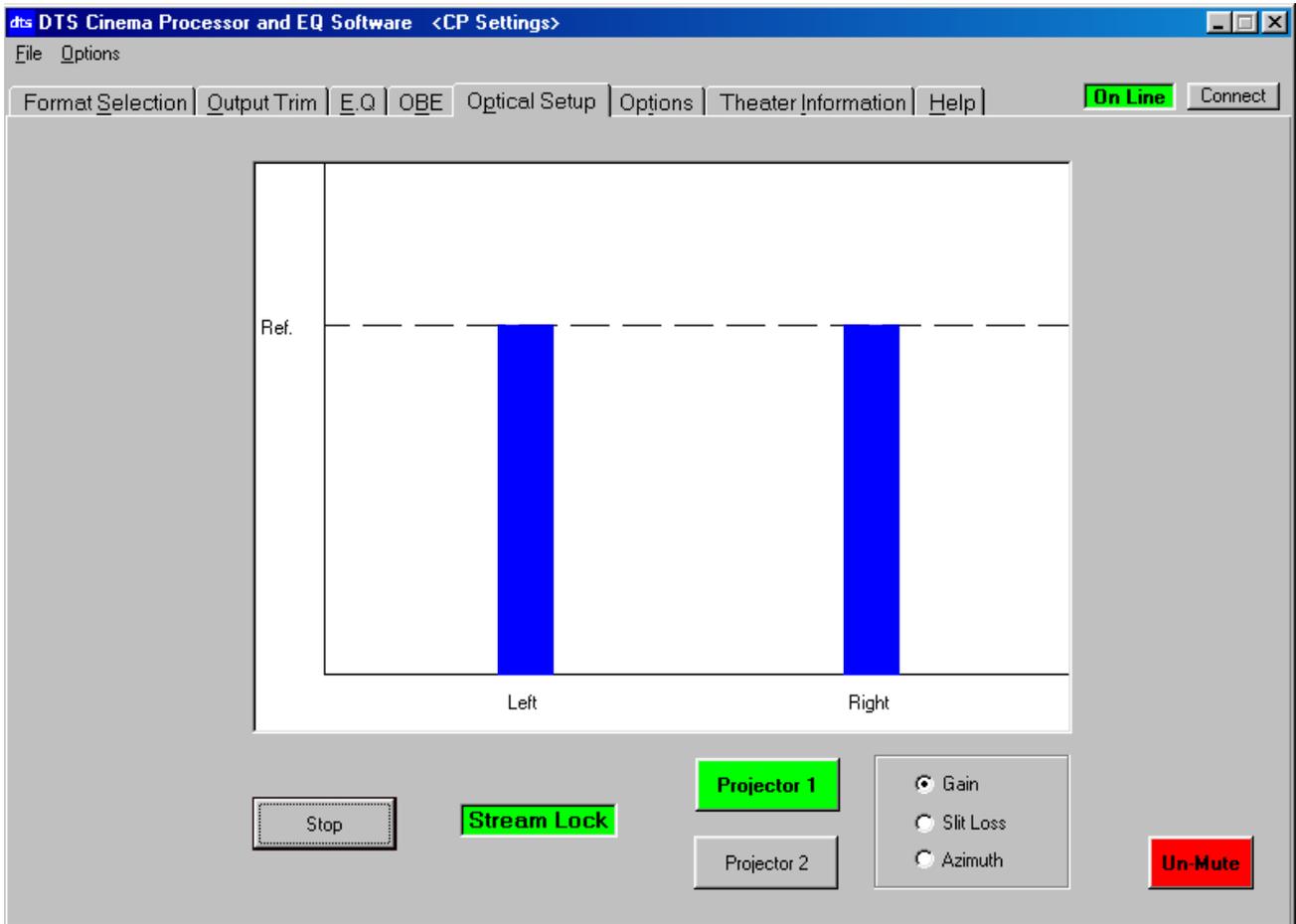
- Run the **50% Modulation Tone** film.

- **Un-mute** the DTS-ECP and verify the level is still at reference (ref.), adjust left and right gain pots on D422, if necessary.

- If a second projector exists, repeat procedure for **Projector 2**.

NOTES

Thank you for choosing DTS !

SECTION 7   MENUS AND FINAL PROGRAMMING

7.1.   CP Setup Software Menus

All DTS-ECP programming is done by using the DTS CP Setup software and a laptop PC. The first Setup screen shows the version of the CP Setup software and installed DTS-ECP software versions.

<u>F</u>ile
     New   Not used
     Open   Use to open a saved file
     Save   Use to save a file
     Save As   Use to rename and save a file
     Exit   Use to exit program
<u>O</u>ptions
     COM Port Selection   User select port PC uses for communication with CP: COM 1 is standard, options are COM 2, COM 3, and COM 4
     Baud Rate   9600 is standard, 19200 is optional
     Upload Options   Unless reset by user, options are normally disabled
       Automatically Upload   Enable this to automatically upload settings to CP
       Confirm Message Box   Enable this to always confirm changes from PC to CP
       Enable Shortcuts   Enable this if you want to use keyboard shortcuts (see Section 7.4)
     Set Theater Information   Click cursor here to enter "Theater Information"

     On-line/Off-Line   Notifies you of communication status between PC and CP
     Connect   If status "off-line", click here to connect PC to CP

Tabs

     FORMAT <u>S</u>ELECTION   *O<u>P</u>TICAL SETUP*
     OU<u>T</u>PUT   TRIM   *OP<u>T</u>IONS*
     <u>E</u>Q   *THEATER INFORMATION*
     O<u>B</u>E   *<u>H</u>ELP*

FORMAT SELECTION

Clock	Set by PC internal clock
(software version)	Displays CP Setup Software version and software installed in CP
(Format) Mode	
Optical MONO	Format "01", mono sound tracks
A-TYPE	Format "04", A-Type noise reduction stereo optical sound tracks
SR-TYPE	Format "05", SR-Type noise reduction stereo optical sound tracks
EXTERNAL 6-TRK	Used to select external "6-track Analog Input" (P8), 300mV nominal
DTS DIGITAL	Not used unless DTS Digital (Model DPP) package is added
NONSYNC	Nonsync format
Fader	Displays fader setting and allows user to change volume by click and holding cursor on bar and moving mouse (or pressing up/down arrows)
Mute	Allows you to Mute/Unmute CP sound level from your PC
Upload Settings	Click cursor here to upload all setting changes on PC to CP
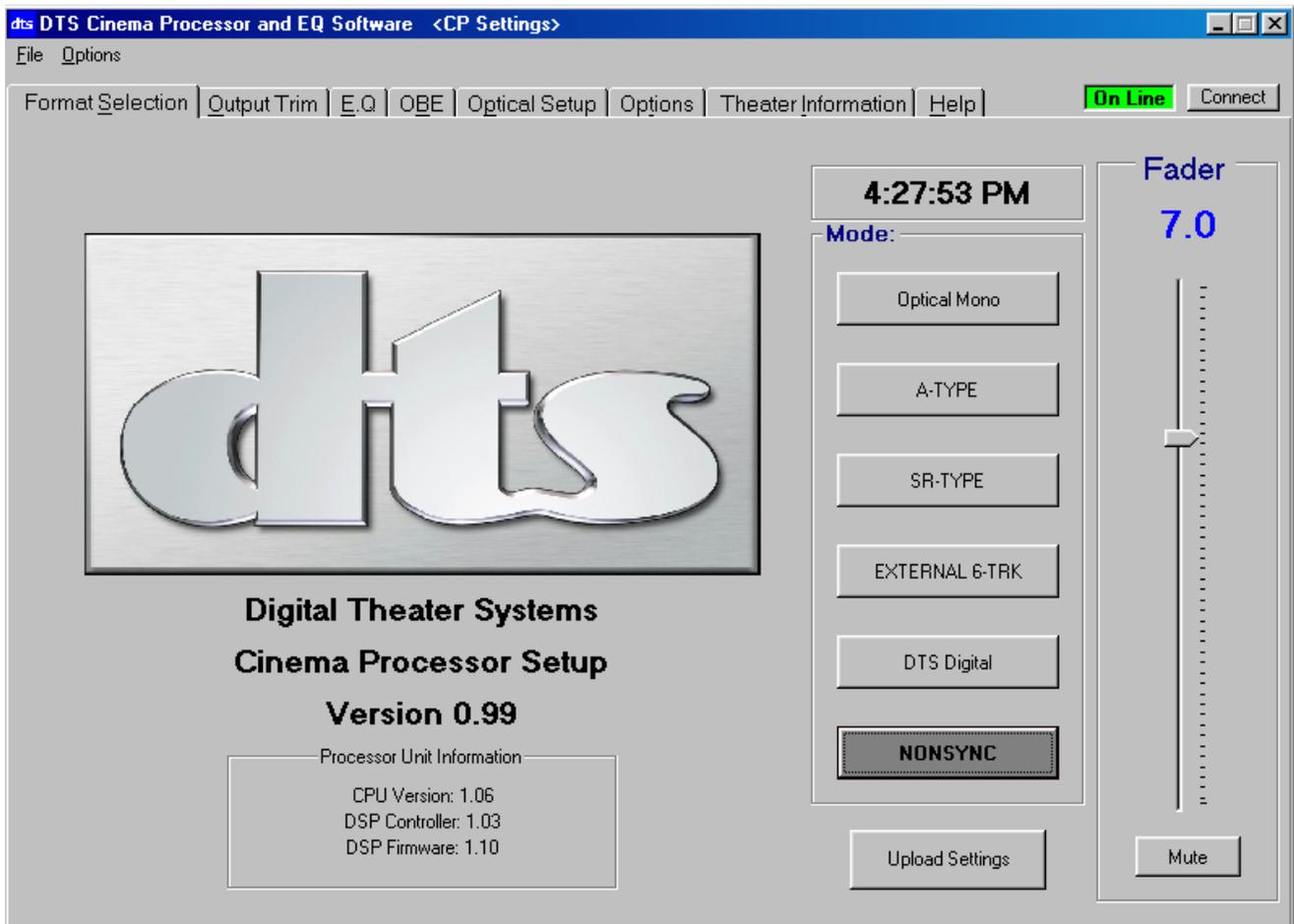
<u>OUTPUT   TRIM</u>

<u>Trim Level</u>

Left	Adjusts level for the Left channel
Center	Adjusts level for the Center channel
Right	Adjusts level for the Right channel
LS	Adjusts level for the Left Surround channel
RS	Adjusts level for the Right Surround channel
Sub	Adjusts level for the Subwoofer channel

<u>Pink Noise</u>

Off/On	Used to enable pink noise for the channel listed directly above
In-Phase/Inverted	Used to test speakers, output, and for RT-60 test

<u>Master Fader</u>

Set Fader = 7.0	Click cursor here to set fader to '7'
Adjust fader	Click cursor here to open fader window and change volume level
Mute	Allows you to Mute/Unmute CP sound level from your PC
RT-60 Mode On/Off	Click cursor here to enable RT-60 testing
Upload Settings	Click cursor here to upload all setting changes on PC to CP
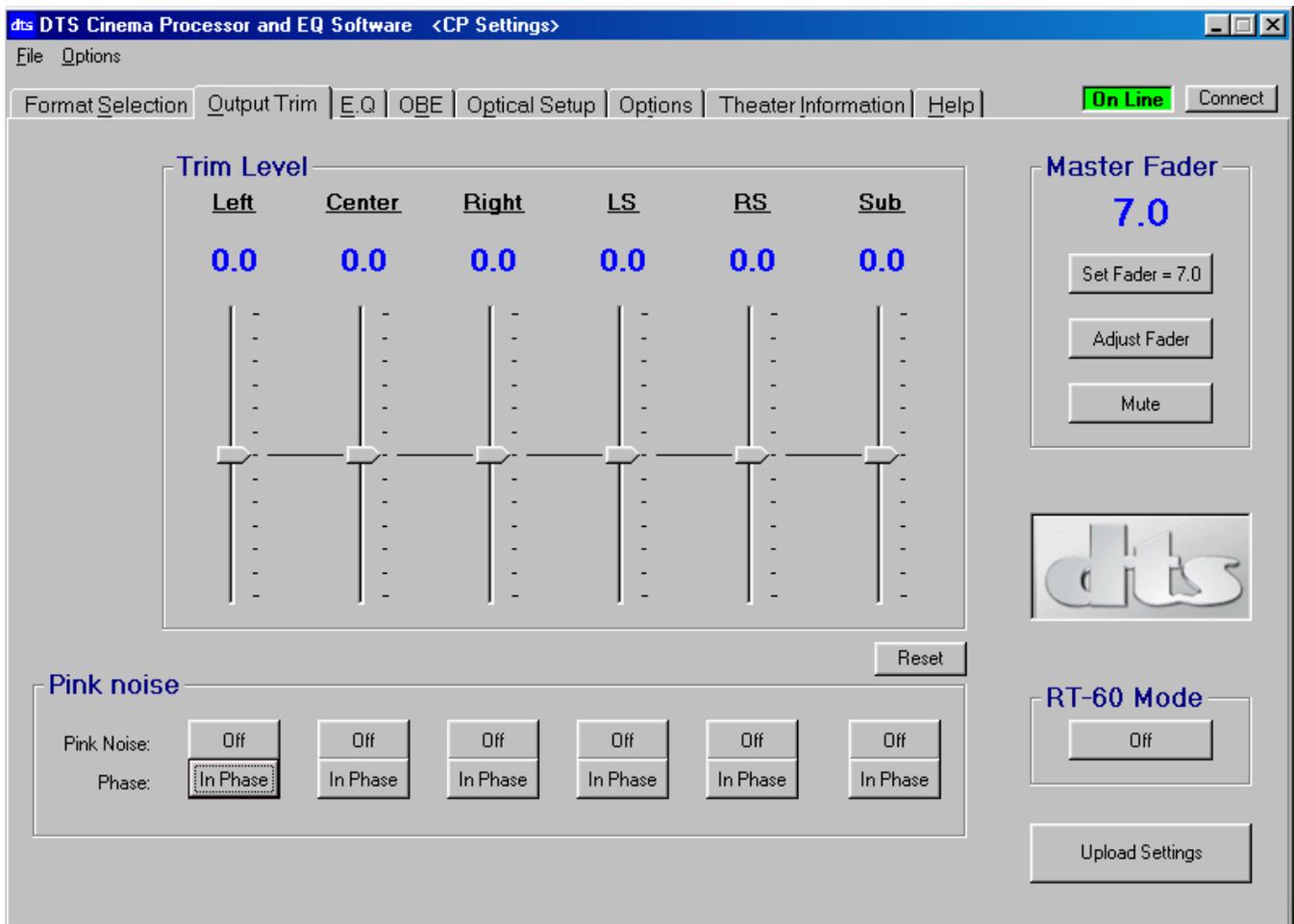
EQ

Channel
   Left   Click cursor here to adjusts EQ for the Left channel
   Right   Click cursor here to adjusts EQ for the Right channel
   Center   Click cursor here to adjusts EQ for the Center channel
   <u>Subwoofer</u>   Click cursor here to adjusts EQ for the Subwoofer channel
(sub bass parametric equalizer)

     Gain   Allows user to increase or decrease subwoofer gain (in frequency/bandwidth selected)

      Bandwidth   Allows user to select bandwidth of subwoofer EQ = 1/3, 2/3, 1-octave
      Frequency   Allows user to select frequency of subwoofer adjustment = 25Hz, 31.5Hz 40Hz, 50Hz, 63Hz, 80Hz, 100Hz
   LS   Click cursor here to adjusts EQ for the Left Surround channel
   RS   Click cursor here to adjusts EQ for the Right Surround channel
   (EQ adjustments)   Click cursor on adjustment bar (and use mouse or up/down keys) to change frequency level of enabled channel
Copy   Click cursor here to copy enabled channel EQ settings
Reset   Click cursor here to reset (to flat) enabled channel EQ settings
Paste   Click cursor here to paste copied EQ settings to enabled channel
Pink Noise On/Off   Click cursor here to turn pink noise on or off
Bass (level)   Coarse level adjustment to low frequencies of the enabled channel
Treble (level)   Coarse level adjustment to high frequencies of the enabled channel
<u>Master Fader</u>

   Set Fader = 7.0   Click cursor here to set fader to '7'
   Adjust fader   Click cursor here to open fader window and change volume level
   Mute   Allows you to Mute/Unmute CP sound level from your PC
Upload Settings   Click cursor here to upload all setting changes on PC to CP

DTS P/N 9301DECP0002/10
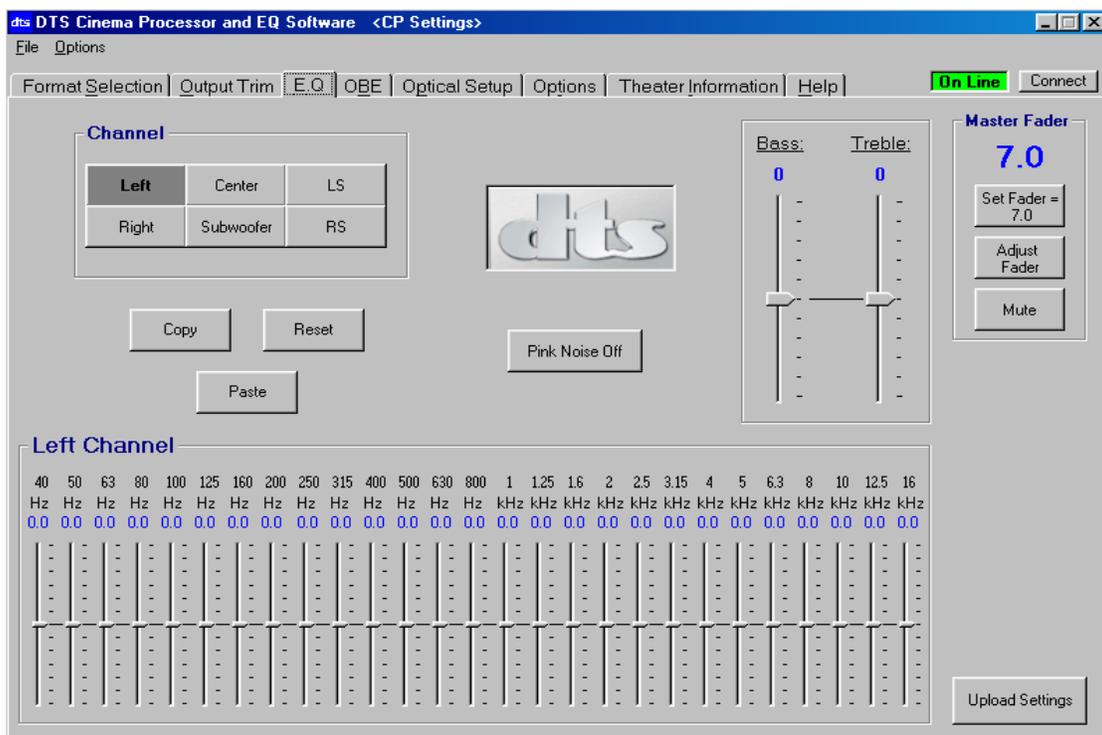
O<u>BE</u>   Optical Bass Extension Menu

Pink Center On/Off   Allows user to turn Center channel pink noise on or off
Pink Sub-Bass On/Off   Allows user to turn Sub-Bass channel pink noise on or off
<u>OBE Disable/Enable</u>   Allows user to enable or disable OBE
  OBE Filter (setting)   When OBE enabled, allows user to select filter setting = from 50Hz to
                                                120Hz in steps of 10Hz

    OBE Gain fader   When OBE enabled, allows user to adjust gain of selected filer frequency
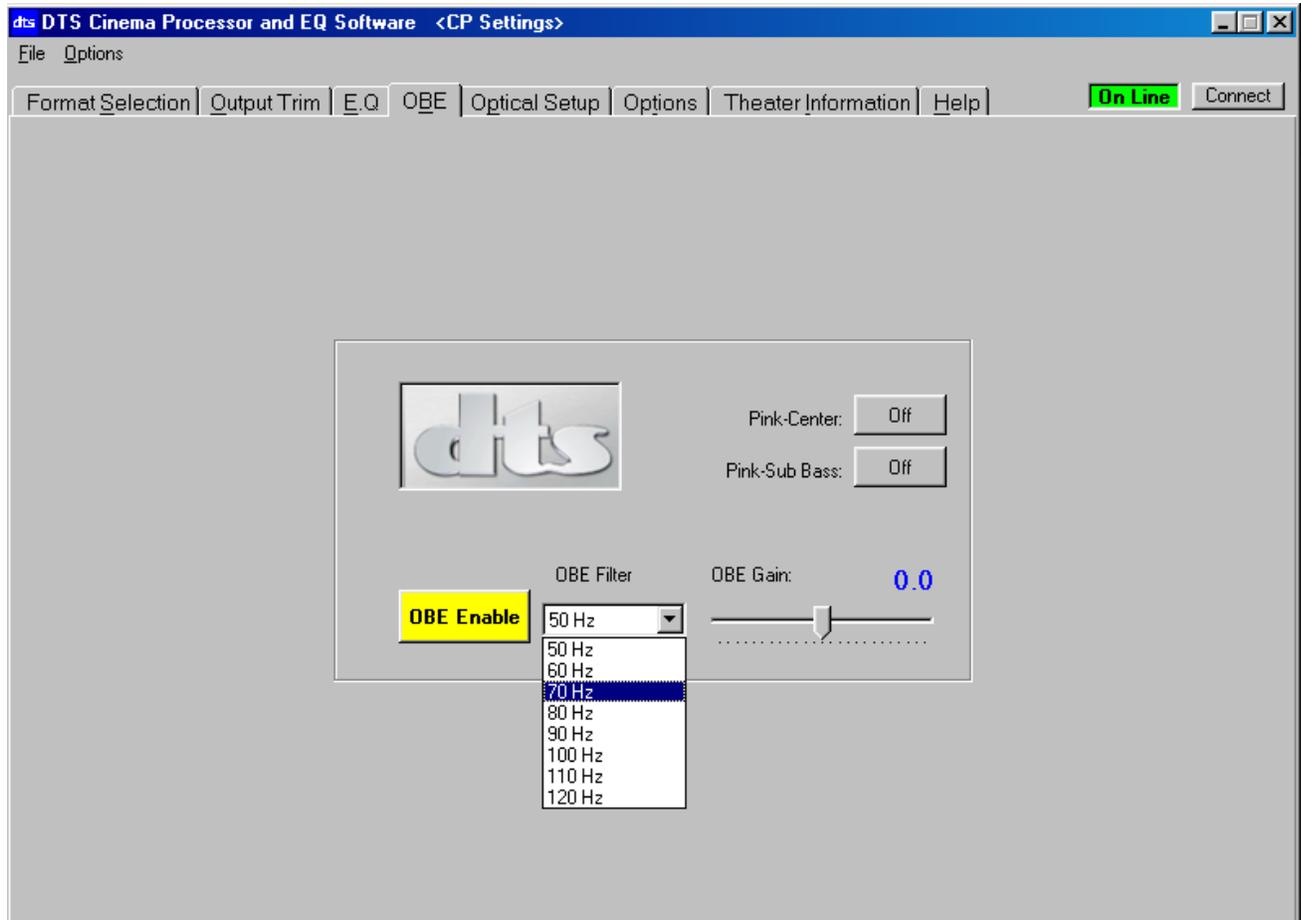
OPTICAL SETUP   **Click cursor on "START" button to start program**

Start/Stop	Allows user to start or stop program
(stream lock)	Alerts user to communication status between CP and PC
<u>Projector 1 / 2</u>	Allows user to select display of projector 1 (P5) or projector 2 (P4)
Gain	To set the gain of the selected projector
Slit Loss	To set the slit loss of the selected projector
Azimuth	To set the azimuth of the selected projector
Mute	Allows you to Mute/Unmute CP sound level from your PC
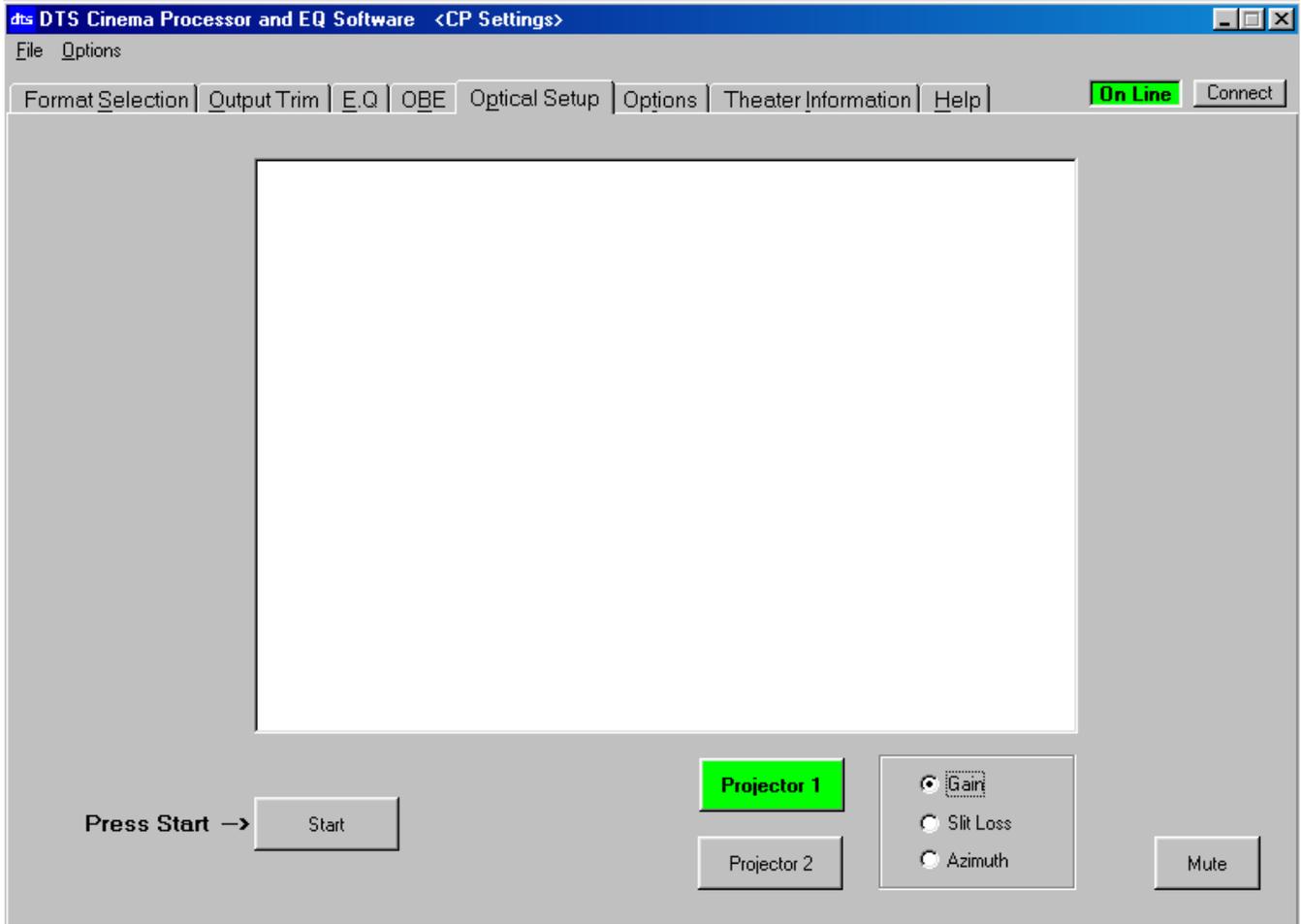
OP*T*IONS

<u>F1 Key Format Assignment</u>	Allows user to select sound format for F1 key (CP "MONO" button)
Optical Mono	Selecting this assigns F1 key to MONO sound format
External N.R.	Selecting this assigns F1 key to enable P6 (EXTERNAL NOISE REDUCTION) input and tells the ECP to **not** apply any internal noise reduction
External 2-Trk return w/Internal A-Type N.R.	Selecting this assigns F1 key to enable P6 (EXTERNAL NOISE REDUCTION) input and tells the ECP to apply A-Type internal noise reduction
External 2-Trk return w/Internal SR-Type N.R.	Selecting this assigns F1 key to enable P6 (EXTERNAL NOISE REDUCTION) input and tells the ECP to apply SR-Type internal noise reduction
<u>Power On Format</u>	Allows user to select format CP will enable after power-up or Reset
External 6-Trk	ECP to enable P8 (6-TRACK ANALOG IN) connector
Nonsync	ECP to enable NONSYNC format
SR-Type	ECP to enable SR-TYPE (05) format
A-Type	ECP to enable A-TYPE (04) format
F1	ECP to enable F1 key (determined by "F1 Key Format Assignment", above)
Matrix Decoding Disabled	Allows user to disable matrix for pure stereo playback
Surround Delay (setting)	To set surround delay, from 0 to 100mS in steps of 10mS
Nonsync Output Mode (setting)	To set NONSYNC mode = screen (L, C, R) only, surrounds only, screen & surrounds, or matrix (Lt/Rt)
Timecode Reader Offset (setting)	To set reader offset (-IF- DTS Digital option installed), otherwise not sued
Nonsync Trim (setting)	Used to set surround delay, from 0 to –20dB in steps of 1dB
Upload Settings	Click cursor here to upload all setting changes on PC to CP
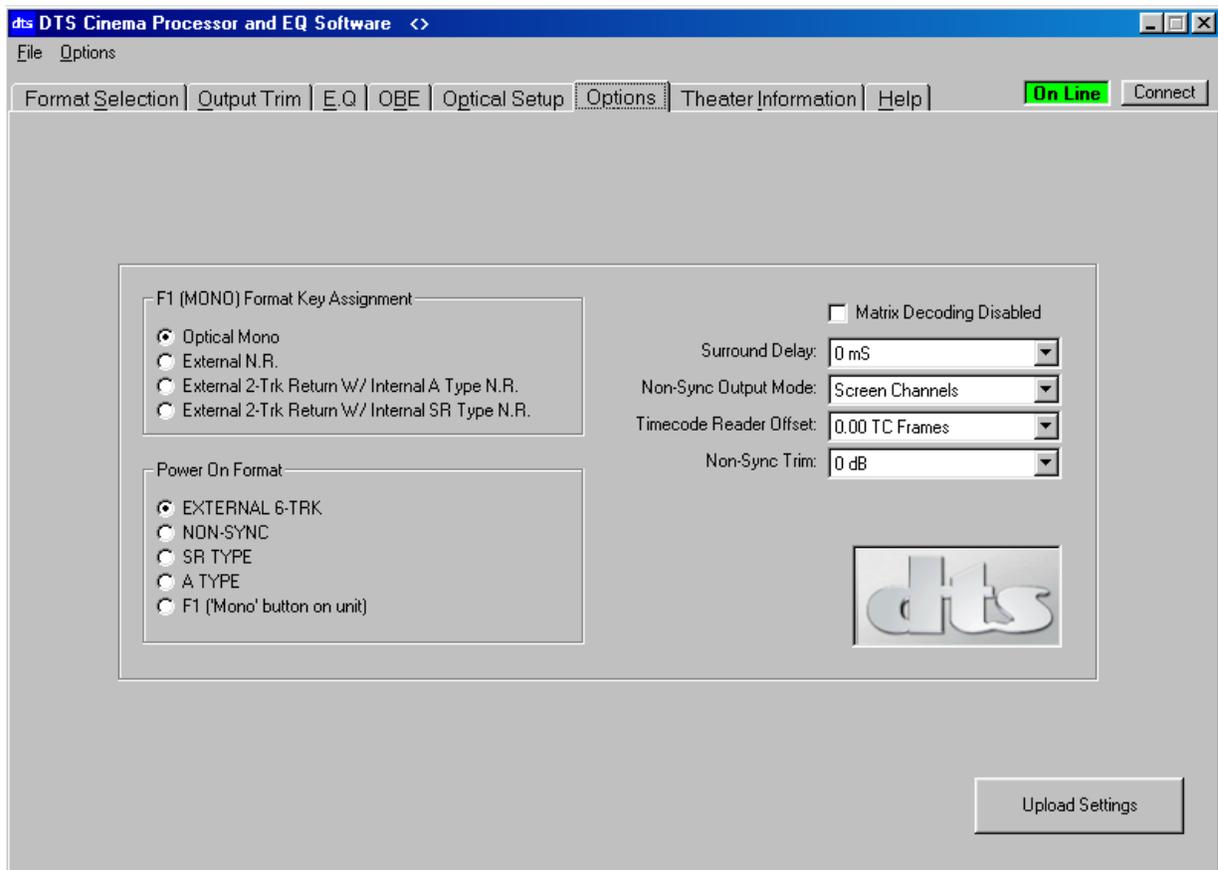
THEATER INFORMATION   Allows you to view theater information. To enter information, click cursor on **EDIT**. Be sure to enter information <u>before</u> using DTS Upload/Download program.
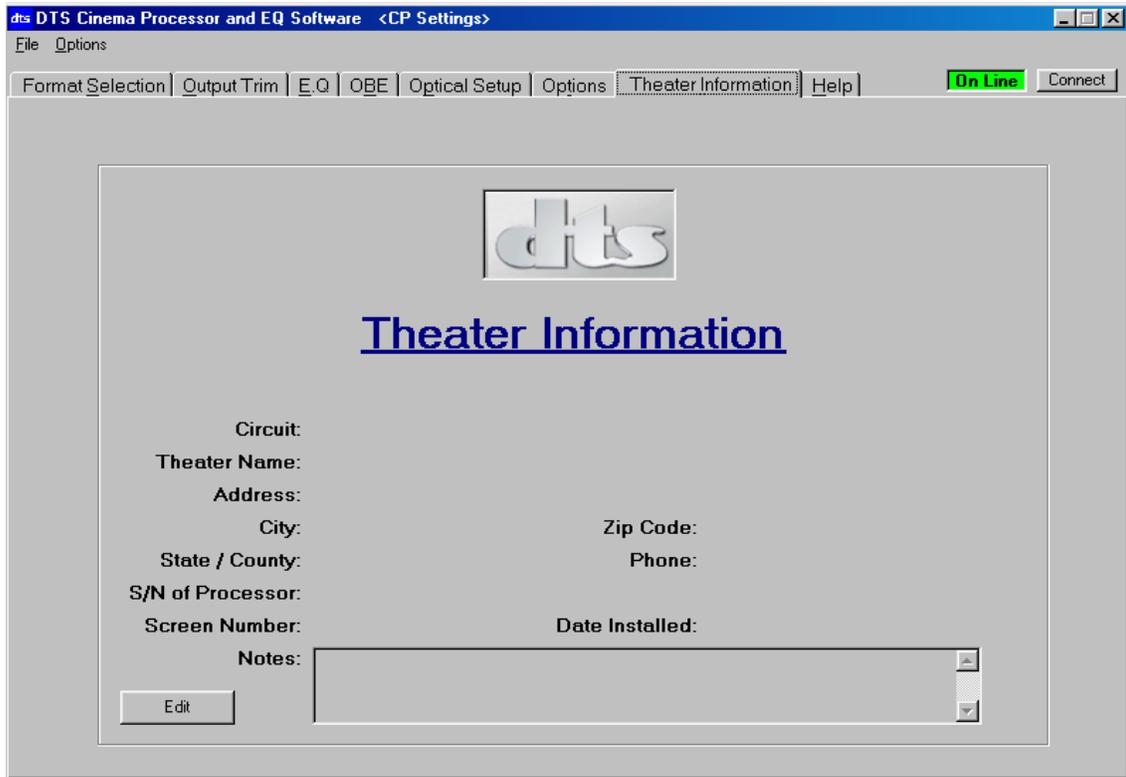
HELP   Lists DTS offices, contact information, keyboard shortcuts, and brief explanation of software menus.. Also has automatic Internet links for those laptop PC units with **Netscape V4.01** -or- **Internet Explorer**.
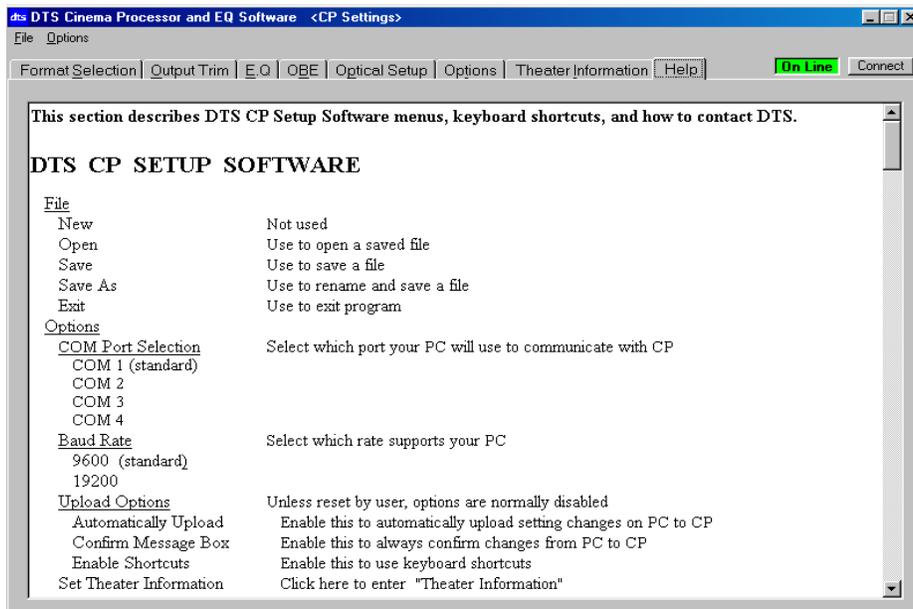
7.2.   FINAL PROGRAMMING AND SETUP

(Options Menu) ASSIGN F1 KEY (a sound format)

This is used to assign a sound format to the DTS-ECP front panel F1 key. Choices are:

Optical Mono	Selecting this assigns F1 key to MONO sound format **(factory setting)**
External N.R.	Selecting this assigns F1 key to enable P6 (EXTERNAL NOISE REDUCTION) input and tells the ECP to **not** apply any internal noise reduction
External 2-Trk return w/Internal A-Type N.R.	Selecting this assigns F1 key to enable P6 (EXTERNAL NOISE REDUCTION) input and tells the ECP to apply A-Type internal noise reduction
External 2-Trk return w/Internal SR-Type N.R.	Selecting this assigns F1 key to enable P6 (EXTERNAL NOISE REDUCTION) input and tells the ECP to apply SR-Type internal noise reduction

(Options Menu) NONSYNC OUTPUT MODE

This is used to assign NONSYNC audio output. **If curtains remain closed during intermission, its best to set NONSYNC output to the surrounds only.** The choices are:

Screen	Stereo signal going to Left, Center, Right channels only
Surrounds	Stereo signal going to Left Surround and Right Surround only
Screen & Surrounds	Stereo signal going to Left, Center, Right, Left Surround, & Right Surround
Matrix	Lt/Rt mix going to Left, Center, Right, and Surrounds

(Options Menu) POWER-ON FORMAT

This is used to program the default sound format that is enabled after the film finishes playing or after the DTS-ECP boots-up to the normal operating screen. The **factory setting is NONSYNC**.

External 6-Trk	ECP to enable 6-TRACK ANALOG IN (P8) connector
NONSYNC	ECP to enable NONSYNC format
SR-Type	ECP to enable SR-TYPE (05) format
A-Type	ECP to enable A-TYPE (04) format
F1	ECP to enable F1 key (determined by "F1 Key Format Assignment", above)

(Options Menu) DISABLE MATRIX

This is used to disable the internal matrix decoder when pure stereo playback is desired.

REMOTE FADER OPTION

Two remote fader configurations are possible -- using a voltage source (EAMPLE: Kinoton fader) **or** using a resistor/divider (potentiometer) to control remote fader volume. Wire the remote fader to P28 "Remote Fader" (wiring details in Section 9, "REMOTE FADER"). After the remote fader is connected, both the remote and front panel faders are active.

(continued)

7.3.   FINAL PROGRAMMING AND SETUP   (continued)

DTS E342 REMOTE FRONT PANEL OPTION

Connect to E342 "DTS Remote Front Panel" to P11A or P11B ("AUTOMATION") connectors. Once plugged in, both the Remote and ECP front panels are active.

ENTER THEATER INFORMATION

Go into "Theater Information" screen and enter installation details for future reference. Be sure to put any special information of the setup/theater in "Notes" – which is also a good place to maintain history of the DTS-ECP unit. Once completed, use DTS Upload/Download Program to store this on your laptop or on a floppy disc.

7.4.   KEYBOARD SHORTCUTS

To use keyboard shortcuts, first enter "Options". Click cursor on "Upload Options" and then "Enable Shortcuts". Once enabled, the keyboard shortcuts, given below, can be used.

Global Shortcuts**:**

Alt + S = Format Selection Tab
Alt + O = Output Trim Tab
Alt + E = EQ Tab
Alt + B = OBE Tab
Alt + P = Optical Setup Tab
Alt + T = Options Tab
Alt + I = Theater Information Tab
Alt + H = Help Tab

Ctrl + N = New Settings
Ctrl + O = Open Settings
Ctrl + S = Save Settings
Ctrl + A = Save Settings As
Ctrl + X = Exit

These shortcuts are enabled in the
upload options menu bar:

   F1 = Connect
   F2 = Upload Settings

Shortcuts on the EQ Tab**:**

Ctrl + M = Toggle Mute
Ctrl + 7 = Set Fader = 7
Ctrl + G = Activate Pink Noise
Ctrl + L = Select Left Channel
Ctrl + C = Select Center Channel
Ctrl + R = Select Right Channel
Ctrl + P = Select Left Surround Channel
Ctrl + Q = Select Right Surround Channel
Ctrl + E = Select Subwoofer Channel

SECTION 8   DTS-ECP SYSTEM TEST AND OPERATION

8.1.   DTS-ECP SYSTEM PERFORMANCE TEST

Before attempting to complete this performance test, verify all setups are done as per the "Setup Check List" (page 4-1). All but the last three items on the list should be completed.

Tools Required: DTS CP Setup Software, laptop PC, 50% Modulation Tone film, and the DTS "BUZZ AND BILL SHOW" test film (or another film clip containing an optical soundtrack that you are familiar with).

8.1.1. DTS-ECP TEST

• Power the DTS-ECP and thread the 50% Modulation Tone film through the projector.

• Power on your PC and enter the "Optical Setup" menu. Click cursor on "Start" to start program.

• Start the projector and verify both right and left level's are at "0".

• Stop projector and unthread the 50% Modulation Tone film.

• On your PC, enter the "Optical Trim" menu. One by one, enable each channel's pink noise.

Channel Verification

• Open the port window.

• Verify that when the LEFT channel pink noise is playing, sound is heard coming <u>only</u> from the left **screen speaker**.

• Verify that pink noise is heard in **booth monitor's** left channel <u>only</u>. This is checked by enabling the "INT SPK", "AMPS" and "L" buttons on the monitor panel. All other buttons should **not** be illuminated. Turn up the monitor volume. Repeat for remaining channels.

Verify Sound Performance

• Thread the BUZZ AND BILL SHOW film (or whatever film clip your are familiar with) through the projector..

• Start the projector. Verify the DTS-ECP switches to SR-Type (BUZZ AND BILL SHOW optical track is in the SR format – if using a different clip, select it's sound format on the DTS-ECP). Verify sound is heard in the monitor speaker. Verify DTS-ECP fader is set for '7.0'.
NOTE: The DTS-ECP cannot provide 20dB of headroom when the master fader is set to a value greater than 7.0.

• Go into the theater. Verify sound is well balanced and has overall good digital sound quality. If the level is not correct, verify levels using the DTS CP Setup Software and 50% Modulation Tone film.

• If a two projector theater, repeat "Verify Sound Performance**"** for Projector 2.

Verify BYPASS Operation

• Play the BUZZ AND BILL SHOW film. Remove the DTS-ECP front panel and hang it on the hooks provided.

• While the film is playing, switch the DTS-ECP into the BYPASS mode by setting the BYPASS switch on the D744 board to the right.

• While in the **BYPASS mode,** verify the two red BYPASS indicator lights illuminate**:** One light is on the D744 board and the other light is on the DTS-ECP front panel.

• While in the BYPASS mode, verify the sound level is good in the theater and sound is heard in the booth monitor. **Volume is adjusted by the BYPASS volume pot on D744.**

• Set the D744 BYPASS switch to "OFF". The DTS-ECP should return to the selected optical format.

Set Booth Monitor Adjustments

• Connect RTA line out to the P3 MONITOR OUT on the DTS-ECP rear panel. Play pink noise (Optical Trim menu) on the center channel. Press **MONTIOR center** channel and turn up monitor volume. Verify the signal on the RTA is flat. If low frequency is greater than high frequency, adjust **R17** (D744 board) **until a frequency balance** (high frequency vs. low) is seen on the RTA.

• Once frequency is balanced, press AMPS button in and out to verify monitor playback is equal in volume. If not, adjust **R16 until the volume balance** (D744 board) between AMPS (amplifier out) and direct out (from DTS-ECP) is equal (through the booth monitor).

• Press the "AMPS" button and verify sound is heard in the monitor speaker whether the button is on or off.

• If using an **external monitor speaker**, press the "INT SPK" button off on the DTS-ECP. This will disable the internal speaker. Verify the performance of the external speaker while playing film soundtrack.

8.1.2. Verify External Equipment Performance With DTS-ECP

** The DTS-ECP master fader should be set to 7.0 for all tests **

Automation

After automation is programmed, verify it controls the sound format selections on the DTS-ECP when engaged (with cues on the film, dowser open/close, curtain open/close, etc.).

External 6-Track Analog Sources

Dolby™ Model DA-20
Use Dolby Digital Test Film to check its operation with the DTS-ECP. Thread the film, play it, and verify the DTS-ECP plays properly in the EXT 6-TRK sound format. Verify the sound level and overall sound quality. See Dolby manual for details on the DA-20.

6-Track Magnetic Master
Run the master and verify the DTS-ECP plays properly in the EXT 6-TRK sound format. Verify the sound level and overall sound quality.

External Microphone

Verify which DTS-ECP connector is being used for external microphone input (at 300mV). Press the sound format key that controls that connector and speak into the microphone. The master fader on the DTS-ECP should be at 7.0. Verify the sound level and overall sound quality.

Remote Fader (optional)

Connect the remote fader and verify it adjusts the master fader setting on the DTS-ECP. Both the remote fader <u>and</u> the DTS-ECP front panel fader should control the DTS-ECP volume level.

DTS E342 Remote Front Panel (optional)

Connect the remote panel and verify it controls the sound formats, MUTE, and DTS-ECP volume level. Both the DTS-ECP front panel <u>and</u> the remote front panel should control functions on the DTS-ECP.

NONSYNC

Connect NONSYNC source (at 300mV) and play it. If needed, push NONSYNC button on the DTS-ECP front panel. Verify the sound level and overall sound quality.

8.2.   OPERATION

8.2.1. BEFORE THE SHOW

- Power on the sound rack and wait for the DTS-ECP to boot-up. Once booted, the front panel lights should illuminate as shown below. A numerical volume level must be displayed.
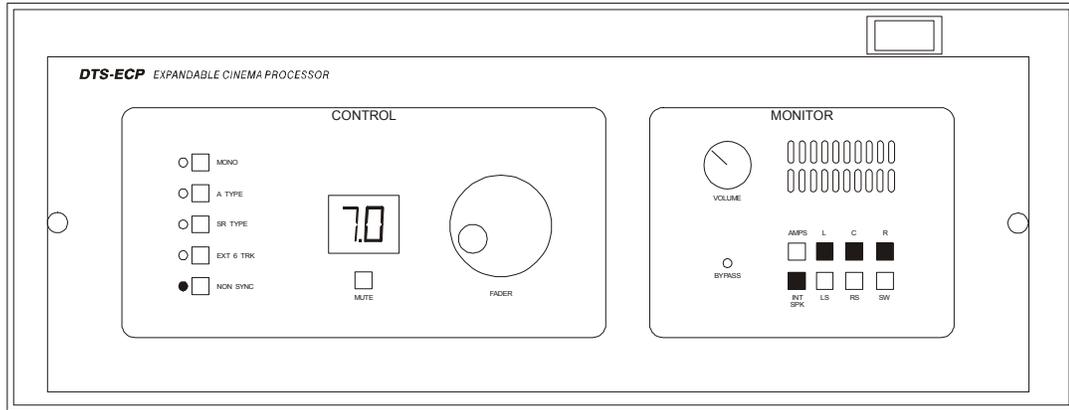
○ OR □ = OFF
● OR ■ = ON

- **Thread film** through projector(s). Verify the **fader setting** at 7.0 and sound format is selected to NONSYNC (if that is the intermission sound format of choice). Verify sound level in auditorium. Adjust volume level, if necessary.

- If using an **external microphone**, select the format controlling the external microphone (hopefully, the installer left a label). The format depends on which input is used for the microphone. Test it by selecting format and speaking into the microphone. Verify sound level in auditorium. Adjust volume level, if necessary.

8.2.2. DURING THE SHOW

- The correct **sound format** needed for the show should be automatically keyed in by automation. You may switch it in manually by pressing the desired sound format button on the DTS-ECP front panel.

- **Go into the theater and listen**. Verify good balanced sound quality. In most cases, the fader should be at 7.0. This may be adjusted, if necessary. It's best to decide on one volume level for the entire show: Trailers, feature, and NONSYNC (intermission)

- Adjust **monitor** volume for comfortable listening level in the booth. Select channels to monitor by pressing appropriate buttons. Select INT SPK if using internal speaker.
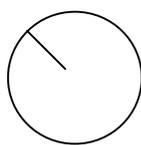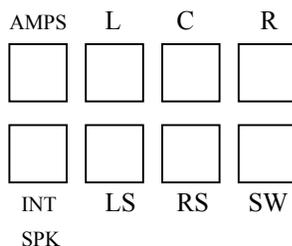
⇦ Press channels to monitor in booth

8.2.2. DURING THE SHOW

• BYPASS Mode Operation

The DTS-ECP will automatically switch into BYPASS if an internal failure occurs. If required, you may switch the DTS-ECP into BYPASS by setting the D744 "BYPASS" switch to the right.
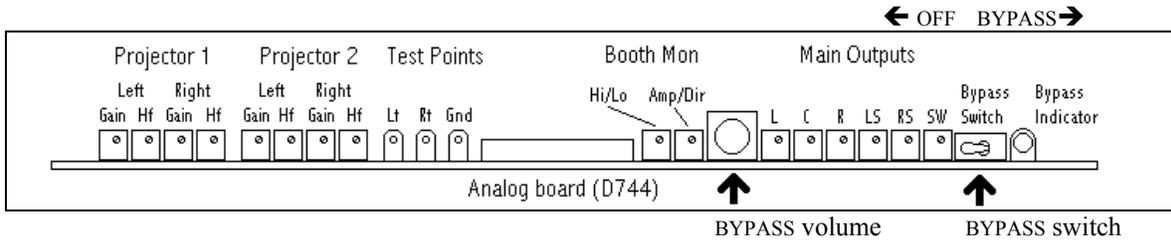
While in the BYPASS mode:
- Two red LEDs - one on the D744 board and another on the front panel - will illuminate.
- The signal from the solar cell will be routed to the screen outputs.
- The "BYPASS volume" pot on D744 is used to adjust volume in the auditorium.

• Remote Fader Operation

When connected, the remote fader may be used at any time to adjust volume level.   Both the remote and unit front panel faders remain active.

• DTS E342 Remote Panel Operation

When connected, the remote panel may be used at any time to control the DTS-ECP.   Both the remote and unit front panels remain active.

• Dual Projector Operation

For theaters using two projectors, the DTS-ECP needs to see analog signal from each projector. Switching between projectors for analog sound is done manually or through an automation system.

8.2.3. AFTER THE SHOW

- In most cases, the automation should be programmed to pulse the DTS-ECP to NONSYNC at show end.
- Clean projector gates and optics.
- Rethread film through projector for next show.

• Maintenance

- To prevent over-heating, keep the DTS-ECP **side vents clear**.

NOTES

Thank you for choosing DTS !

SECTION 9   WIRING DIAGRAMS

This chapter contains the following diagrams:

NOTES

Blank on purpose

Blank on puropse

Blank on purpose

Blank on purpose

Blank on purpose

MUTE TOGGLE

5.1 VDC MAX (CONTROL)

REMOTE TOGGLE

470 R

REMOTE LED

0 VDC

470 R

MUTE LED

1K

5.0 VDC

9 PIN MALE "D"

1
2
3
4
5
6
7
8
9

FADER SETTING	CONTROL VOLTAGE
0.0	5.0 VDC
1.0	4.50
2.0	4.00
3.0	3.50
4.0	3.00
5.0	2.50
6.0	2.00
7.0	1.50
8.0	1.00
9.0	0.50
9.0	0.00

NOTES:

1. EITHER A POTENTIOMETER OR VOLTAGE SOURCE MAY BE USED TO CONTROL THE REMOTE VOLUME.

2. OPTION 1 = POTENTIOMETER, 1K OHMS.

3. OPTION 2 = VOLTAGE SOURCE, TO PIN 2 = 0 VDC TO +5.00 VDC.

4. REQUIRES SOFTWARE V1.04 OR HIGHER.

Title: DTS-6AD REMOTE FADER OPTION

Document Number: SDE238

Rev A

Size A

Date: Monday, February 28, 2000

Sheet 1 of 1

USED WHEN DTS DIGITAL OPTION IS ADDED.

MALE 9 PIN SUB D
TO TIME CODE READER–PROJECTOR

J2

MALE 9 PIN SUB D
TO DTS PROCESSOR

J1

BLUE	1	TIME CODE SIGNAL– PROJECTOR #1
WHITE	6	GROUND
BROWN	2	TIME CODE SIGNAL– PROJECTOR #2
VIOLET	7	GROUND
BLACK	3	SERIAL DATA FROM REMOTE TERMINAL TO DTS PROCESSOR
ORANGE	8	GROUND
GREEN	4	SERIAL DATA FROM DTS PROCESSOR TO REMOTE TERMINAL
YELLOW	9	LED DRIVE SIGNAL TO READER HEAD
RED	5	+5VDC @ 2AMPS TO READER HEAD

J2

J1

STANDARD LENGTH CABLE = 30'

CABLE SUFFIX NUMBER	CABLE LENGTH
–01	30'
–02	40'

TITLE: TIME CODE READER CABLE
DATE: 1/24/00   DRAWN: M.SKRZAT   APPROVED
SCALE: NONE   REV.
DIGITAL THEATER SYSTEMS
5171 CLARETON DR
AGOURA HILLS, CA 91301
COMPUTER FILE NAME
TID435.DWG   DWG.NO. TI–D435

NOTES
1. THIS CONDUCTOR IS NOT NEEDED FOR TIME CODE READER TO OPERATE.
2. VERIFY WIRE COLORS–SOME CABLES MAY VARY.
3. IF PROBLEMS READING TIME CODE ARE EXPERIENCED, CONNECT SHIELD WIRE TO A GROUND ON THE PROJECTOR.

SECTION 10   TROUBLESHOOTING

10.1.   INSIDE THE DTS-ECP

- **D744   ANALOG BOARD**

This board contains all the analog circuitry, BYPASS & monitor circuitry, analog signal test points, individual level control trim-pots for all 6 channels, and stereo signal adjustment trim-pots.

- **D741   DSP BOARD**

This board contains digital signal processing (logic) circuitry and IC1 firmware chip.

- **D740-01   CPU BOARD**

This board contains the RESET button, memory & software files, and U8 & U9 firmware chips. When the DTS Digital (Model DPP) package is added, the board changes to a D740-00.

- **CONTROL PANEL (D273 board)**

This panel's lights display the current sound format selected on the unit. During normal operation, the volume value will display just to the left of the fader level control knob. Normal playback volume level is '7.0'.

- **MONITOR PANEL (D272 board)**

This panel's buttons display if the DTS-ECP is in Bypass Mode and (booth) monitor functions such as**:** Monitor volume, which channels are playing out of the monitor speaker, if the monitor is playing from the DTS-ECP outputs or the amplifier outputs, and the selection of internal or external speaker.

(continued)

UNIVERSAL AC INPUT MODULE

D742 MOTHERBOARD

SRW 115-3001
POWER SUPPLY
5V, +/- 12VDC

FANS (2)

CD-ROM DRIVE PORT

SRW45-2005
POWER SUPPLY
+/- 15VDC

D744 ANALOG BOARD

D741 DSP BOARD

D740-01 CPU BOARD
(FOR DTS-ECP)

NOTES: UNLESS OTHERWISE SPECIFIED

REVISIONS

ZONE | REV | DESCRIPTION | DATE | APPROVED

UNLESS OTHERWISE SPECIFIED

DIGITAL **T**HEATER **S**YSTEMS

MODEL DTS-ECP
CINEMA PROCESSOR
INSIDE VIEW

APPROVALS | DATE
DRAWN R. T.CRUZ | 2/14/01
CHECKED
ISSUED

SIZE D | FSCM NO. | DWG. NO. | REV
SCALE - | ECP inside view.dwg | SHEET 1 OF 1

CONTRACT NO.

NEXT ASSY | USED ON
APPLICATION

10.1.   INSIDE THE DTS-ECP   (continued)

• **D742   MOTHER BOARD**

Holds most rear panel connectors and all boards plug into this board. **Rev. N** and above contain status LEDs that monitor the power supply busses.

• **POWER SUPPLIES (2)**

There are two supplies in the DTS-ECP. Both connect to the **universal AC input module** that is rated for 85 VAC to 264 VAC, between 47 Hz and 64 Hz.

• SRW45-2005 has an output of +15 VDC, -15 VDC and powers the D744 analog board.

• SRW115-3001 has an output of +5 VDC, +12 VCD, -12 VDC and powers the D740-01 CPU & D741 DSP boards, and CD-ROM drives (if added).

External fuse is 2A slow blow, 3AG. Will accept 5 x 20mm.

P7A AUX (rear panel) connector is available for **external power supply** input. This supply will be used if the internal supplies fail. The external supply should be rated at 2 amps and for an output of ± 12 VDC to ± 15 VDC. <u>The external power supply module is not provided by DTS</u>.

• **COOLING FANS (2)**

Helps to prevent overheating of the DTS-ECP. The are two different fans in DTS-ECP. One on the back panel is the more powerful of the two. It helps maintain good air circulation in the unit. Fan description**:** EBM 8412, 12VDC, 0**.**8watts, 3.15” square at 1” deep, 33CFM, 35dBA.

The other fan, next to the card cage, is there to cool parts on the D741 DSP board. Fan description**:** EBM 8412L, 12VDC, 0**.**8watts, 3.15” square at 1” deep, 21CFM, 21dBA.

If fan replacement is necessary, the CFM (cubic feet per minute) rating must be maintained. Also, to ensure good air flow, the DTS-ECP <u>side air vents must be clear</u>.

• **E307 DTS-ECP COM-PORT ADAPTER BRACKET**

The COM-PORT adapter is used allow access of the RS322 connector to either the rear panel or the front panel (when bracket switch set to “FRONT”, otherwise the switch is set to “REAR”). The RS232 is mainly used to upload/download programmed settings, such as EQ, trims, anything programmed in using the DTS CP Setup Software**.   Factory setting is “REAR”.**

The bracket is also used as a port to combine wiring for the DTS-ECP front control panel and the DTS E342 Remote Front Panel (if used).
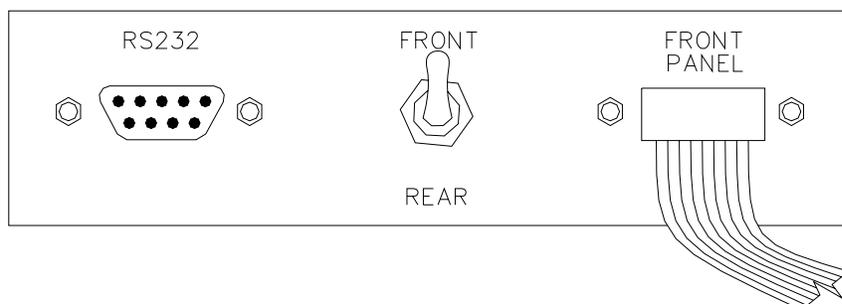
10.2.   USER TROUBLESHOOTING TIPS

It's best go into the theater and listen to the first few minutes of the show, especially new shows. Listen to the level and general quality of the sound. The sound track should be in sync with the picture and played at a comfortable level.

- **No Sound**

  - Verify amplifiers are powered on and their volume settings are set to maximum (unless noted otherwise).

  - Look at DTS-ECP front panel and verify the MUTE button is not engaged (it should not be illuminated).

  - Look at DTS-ECP front panel and verify the master fader is turned up. The level is normally set to '7.0'. The front CONTROL panel display should indicate a numerical volume level.

  - Verify the correct sound format is selected on the DTS-ECP.   Most films play at sound format (05) "SR-Type". The sound format is usually written on the film and film can.

  - If turning the DTS-ECP fader has no effect, see if the unit is set to BYPASS. In BYPASS, the front panel "BYPASS" red light will be illuminated and the D744 "BYPASS VOLUME" pot controls sound in the auditorium.
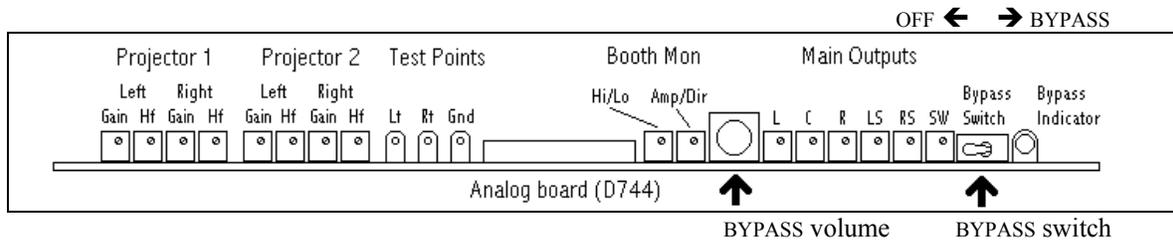
  - Manually switch the DTS-ECP into BYPASS. Verify the BYPASS VOLUME pot is turned up.

  - Verify projector exciter lamp is on and that the lamp power supply is operating. Solar cell connections may be loose or damaged.

  - Try switching in auxiliary power supply (if available).

- **Volume Too Loud/Soft**

  - Adjust DTS-ECP master fader as needed. The goal is to set the master fader once (usually at 7.0) and then not touch it again.

  - If the front panel "BYPASS" red light is illuminated, the unit is in BYPASS. Remove front panel and turn up BYPASS volume control on the D744 board (pictured above).

- **DTS-ECP Won't Automatically Switch To The Correct Sound Format**

  - Verify automation cues are correctly added to the film.

  - Verify automation is correctly programmed to go to the sound format desired.

  - Verify automation is securely connected to the DTS-ECP.

  - Verify automation is powered.

  - Manually press the desired sound format button until there is time to troubleshoot.

** diagram showing signal path **
   Back side

10.3.   TECHNICIAN TROUBLESHOOTING GUIDE

DISPLAY ANOMALIES

◈ No volume control

- Verify DTS-ECP not in MUTE.
- Verify boards are pushed all the way into their connectors (check with power turned off).
- Verify the front control display cable is plugged into the COMPORT bracket "FRONT PANEL" connector. Try swapping out the control display board.
- Try swapping the D741 (DSP) board.

POWER ANOMALIES

◈ DTS-ECP Seems Dead

- Using a multimeter to verify output of power supplies. Replace any bad power supply. SRW45-2005 is ±15 VDC,   SRW115-3001 is +5 VDC   and   ± 12 VDC. Check status LEDs on D742 motherboard (next page).
- If no output seen, verify AC input. If AC is ok, replace bad supply. If no AC seen, is power switch on? If power switch on and no AC at switch, verify AC input to DTS-ECP. If AC ok, replace universal AC input module.

◈ Intermittent Power

- Verify the two cooling fans are rotating. Are fans plugged into motherboard? Are fans getting power? If getting power yet no rotation, replace any fan not working.
- Verify side vents are not obstructed. **Blocked vents will cause the unit to overheat**.
- Verify AC input is good and power switch is working properly.
- Use a multimeter to verify power supply output while connected and disconnected to the DTS-ECP: SRW45-2005 is ±15 VDC,   SRW115-3001 is +5 VDC   and ± 12 VDC. Check status LEDs on D742 motherboard (next page).
- If voltage does not return after supply is disconnected, replace the bad supply.
- If voltage returns after supply is disconnected, something is loading down the supply. Swap out boards until the one causing the problem is found.

◈ DTS Timecode Readers Do Not Appear To Be Powered (when DTS Digital added)

- If the reader(s) <u>red LED (inside the lens) is not on</u>, verify +5 VDC at pin 5 on the DTS timecode cable. The +5 VDC is supplied by the DTS-6AD and it's output is protected by a "resettable" fuse that opens when overheated and then closes after the fault is corrected. The "resettable" fuses (one for each timecode reader) are located on the D742 motherboard**:** F2 for TC1 and F4 for TC2.

- If the reader(s) <u>green LED is not on</u>**:**
  - ⊠ Verify film is threaded through the reader and that there is timecode on the print.
  - ⊠ Verify the red LED inside the lens is glowing.
  - ⊠ Verify the projector chassis is earth grounded.
  - ⊠ Verify timecode cable is correctly wired and that no wires are broken (see page 9-14).

- If the reader(s) <u>green LED is blinking</u>, see Section 11.4 for troubleshooting details.

• Power Supply Status LEDs on D742, Rev. N

On the D742 motherboard, there are five status LEDs for the power supply busses.

ID	COLOR	SUPPLY	FUNCTION
D17	Red	+5 VDC	Digital supply and timecode reader
D18	Amber	+12 VDC	Digital supply
D19	Green	-12 VDC	Digital supply
D20	Amber	+15 VDC	Analog supply
D21	Green	-15 VDC	Analog supply

To see these LEDs, remove the DTS-6AD front control panel and look under the D740 CPU board and to the back. You should be able to see the LEDs glowing. If one or more LEDs are dark, then use a voltmeter to test the output of that power supply.
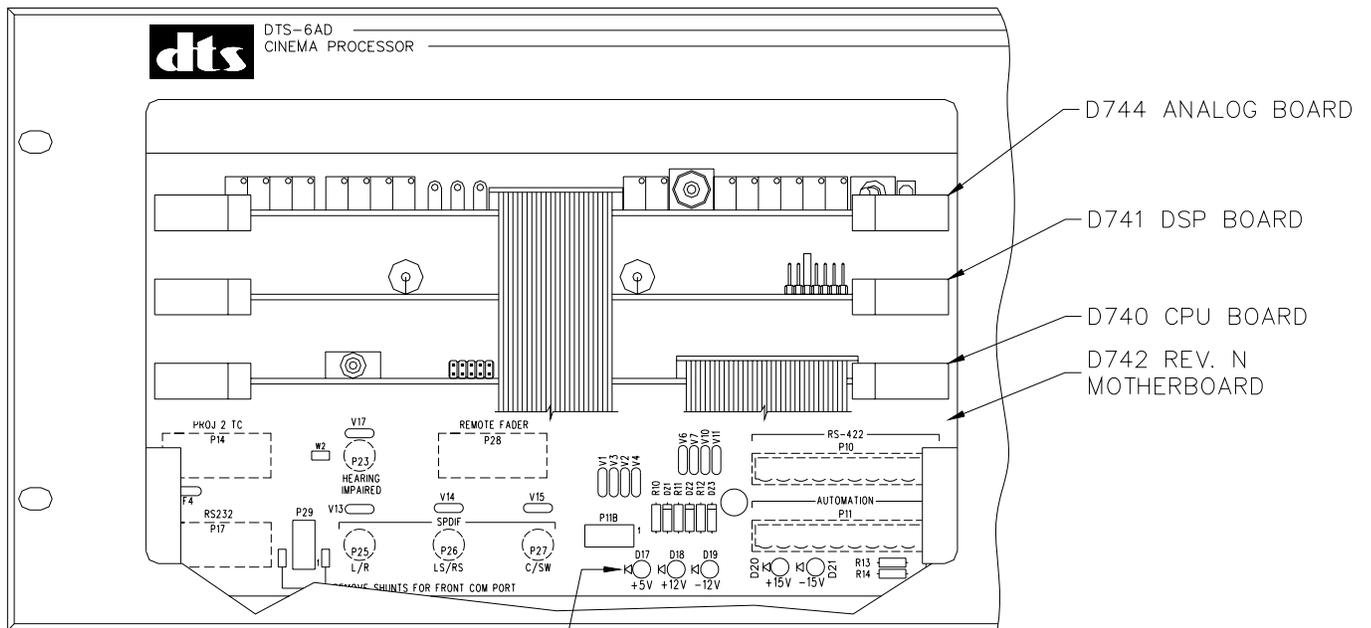
POWER SUPPLY LED'S.
VIEWED FROM FRONT PANEL, LOOKING
UNDER D740 BOARD AND TO THE BACK.

LOGIC ANOMALIES

◈ Unit goes to wrong sound format at <u>show end</u>

- If at show end and after RESET, check Power-On Format selection (Section 7.2).
- If ok after RESET but not at show end, check automation programming and film cues.
- Disconnect STATUS/CONTROL connector, to verify automation not interfering. Check wiring.
- Add isolation transformers to NONSYNC inputs (DTS supplies them free of change).
- If unit continues to switch formats incorrectly, try swapping out the D741 DSP board.

◈ Unit goes to wrong sound format at <u>show start</u>

- Check automation programming and film cues.
- Check wiring of STATUS/CONTROL connector to automation.
- Add isolation transformers to NONSYNC inputs (DTS supplies them free of change).
- If unit continues to switch formats incorrectly, try swapping out the D741 DSP board.

BYPASS ANOMALIES

◈ No volume while in <u>BYPASS</u>

- The BYPASS trimpot (on the D744 board) now adjusts volume. The front panel fader is disabled while unit is in BYPASS.
- Verify projector exciter lamp is on and that the lamp power supply is operating. Solar cell connections may be loose or damaged.   Using test film, verify signal coming from stereo solar cells.
- Verify power amps are on.

◈ Stuck in BYPASS

- Verify BYPASS toggle switch on D744 is set to the left (off).

OFF ← → BYPASS

BYPASS volume   BYPASS switch
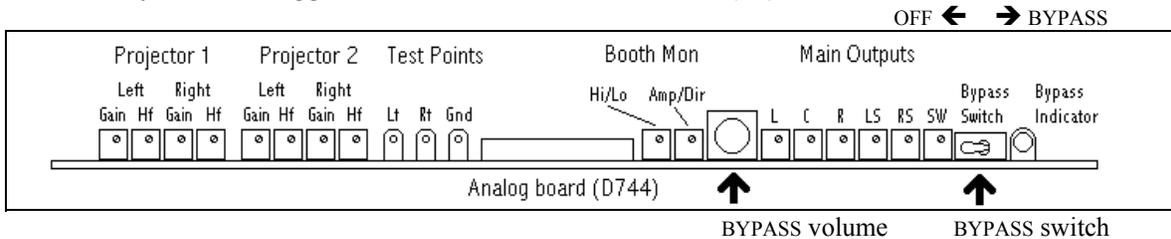
- Bypass Mode will automatically enable if a failure occurs in the D740 CPU or D741 DSP boards. Try changing out these boards with known good ones.

MONITOR ANOMALIES

- Monitor volume is adjusted by the monitor volume control. Select channels to monitor by pressing appropriate buttons. Select INT SPK if using **internal speaker**. If an external speaker is used, it is normal for it to always be active – whether INT SPK is on or off.

(Monitor) Volume

⇦ Press channels to monitor in booth
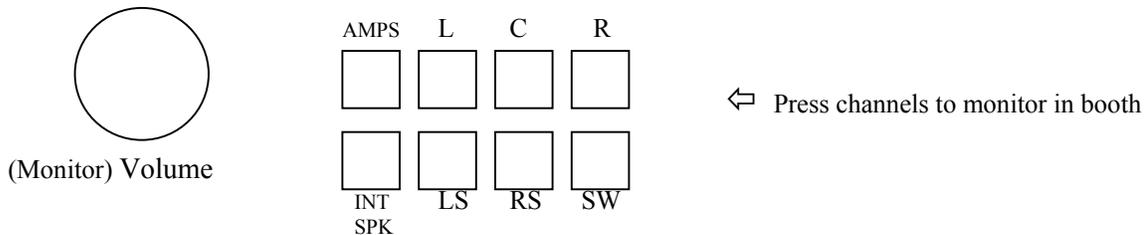
- Try changing the monitor board.
- Try changing the D741 DSP board.

NOISE, DISTORTION, AND OTHER SOUND ANOMOLIES

- Try changing formats to see if problem can be isolated.
- Use monitor to listen when AMPS button is off and on. See if noise coming from DTS-ECP or amps.
- If only when AMPS button is on, check amplifiers/speakers. During break, turn off all amps. Turn on again one by one to localize problem. Replace any speaker that hums, is noisy, sounds distorted.
- Check wiring, take special notice of grounding. Keep signal cable runs as short as possible. Use only shielded cable and route away from power sources, florescent lights, and projector motor.
- Be sure to use isolation transformers on NONSYNC input lines (transformers free from DTS).
- Check solar cell wiring and connection to the DTS-ECP.
- Try changing the D744 analog board.

✦ Dialogue Echo
Generally, no screen dialogue should be heard in the surrounds. If there is, the surround delay is set too high. See Section 4.3 and verify surround delay setting.

✦ Hum
- If subwoofer a **Kintek KT-90**, try lifting the signal ground to the DTS-ECP. Because this speaker is self-powered, grounding is critical. Be sure power cord has a ground prong that is connected to the AC ground. Never remove the ground prong.
- Keep signal cable runs as short as possible. Use only shielded cable and route away from power sources, florescent lights, and projector motor.
- Verify wiring. Be especially careful when checking grounds. Be sure chassis are earth grounded.

✦ RF interference
- Verify wiring of grounds. Verify projector chassis and sound rack are earth grounded.
- Verify output cables are shielded and that one end of the shield is **earth** grounded. Never route audio cables next to power lines, automation lines, florescent light, or projector motors**.**
- Add isolation transformers to NONSYNC inputs (DTS supplies them free of change).

✦ DTS-ECP resets after a change-over or lamp strike
Projector motor probably effecting DTS control lines. Verify output cables are shielded and that one end of the shield is **earth** grounded. Never route DTS audio cables next to or with power lines or projector motors. Do not run them together through the same conduit, separate conduit is preferred.

✦ Thumping noise heard in auditorium while playing in analog
Sound head picking up DTS timecode track. Sound head needs lateral adjustment. Thread up buzz track film and make adjustments. A complete "A" chain alignment is recommended. See Section 6.

✦ Sound "wows"
- Check projector motor belts.
- Check platter/reel alignment/adjustments – including balance of intake vs. output.
- Check projector gears and film path when threaded.
- Test the speed of the projector. Follow manufacturer's directions (as indicated in projector manual).

✦ Missing channel(s) or channels don't sound balanced
- Are all power amps on? Are their volume controls turned up?
- Switch to a different sound format and if sound not restored, switch unit to BYPASS. Wait until there is time to troubleshoot.
- Verify connections from DTS-ECP to amplifiers/solar cells. Verify amplifier and solar cell output. Use the monitor to verify output from DTS-ECP and amps.
- If problem occurs only during EXT 6-TRK, use DTS CP Setup Software and laptop PC to enable pink noise. Verify output settings for all 6-track channels. Verify 300mV input levels to DTS-ECP.
- Perform A-chain alignment (Section 6).

(continued)

NOISE, DISTORTION, AND OTHER SOUND ANOMOLIES (continued)

❖ **Channels are mixed together or coming out of the wrong speakers**
  • Check A-chain alignment (Section 6).
  • Verify output at DTS-ECP connectors. If output ok, check cable wiring; check for shorts. Verify ground connection is good and that the correct ground is being used
  • If output not OK, try changing the D741 DSP board. Try changing the D740 CPU board. See if problem follows a board. If boards seem ok, replace DTS-ECP (it's probably a mother board problem).

❖ **Sound not in-sync with picture projected**
  • Check film threading pattern through projector, especially from film aperture to solar cell.
  • Refer to projector manufacturer.

❖ **No sound when in NONSYNC format**
  • Verify NONSYNC source is turned on and is supplying 300mV.
  • Verify that DTS-ECP is not in MUTE. Verify master fader is turned up.

❖ **You hear pops and thumps at change-overs or reel changes**
  • During show break, manually do a change-over using the electronic controls. Have someone listen in auditorium for any noise. If noise is heard when change-over engaged, check change-over wiring.
  • If noise occurs during reel changes, check film splices. **Use quality splicing tape**.
  • Due to static build-up, some noise may be unavoidable when using polyester film. Maintain proper booth humidity so static electricity can be kept at a minimum.

LAPTOP (PC) COMMUNICATION ANOMOLIES

  • Verify that you are using a null modem cable. It should be connected to the "serial" connector on your laptop PC and the "RS232" connector on the DTS-ECP rear panel.
  • The DTS-ECP must be power on *FIRST*, then try using DTS software on your laptop PC.
  • Verify the DTS software on your PC has been correctly and fully loaded. The DTS icon should be visible on your laptop PC "desk-top".
  • If your laptop PC is connected to the DTS-ECP front RS232 connector, verify the COM-PORT switch is set for "**front**".
  • If your laptop PC is connected to the DTS-ECP rear RS232 connector, verify the COM-PORT switch is set for "**rear**".
  • Verify your laptop is loaded with Windows98^{TM}. DTS software will run on Windows95^{TM}, although we recommend '98.
  • If trying to use the DTS CP Setup software, verify the correct COM Port selection ("Options - COM Port") has been made for your laptop PC. **Factory (default) setting** is "COM 1".

10.4.   UPDATING DTS-ECP INTERNAL SOFTWARE

When software is updated on a DTS-ECP, you will have to change out programmed IC chips. The chips requiring the change will be specified in the installation instructions.

10.5.   UPDATING DTS CP SETUP SOFTWARE

When the setup software is updated, it will be delivered to you on a CD-ROM. It will also be posted on our web site 'techcenter' where it can be downloaded to your laptop PC (when connected on-line). See Appendix H for information on installing and using the DTS CP Setup Software.

10.6.   DTS TECHNICAL SUPPORT

*** Please contact the DTS office nearest your location ***

<u>**Europe**</u>   <u>**Japan**</u>
DTS SA (UK)   DTS Japan (Liaison Office)
Telephone: 44 1189 3491 99   **Telephone:** +81 (0) 3 5564 7156
Fax: 44 1189 3491 98   **Fax:** +81 (0) 3 3520 1022

<u>**North Amer ica**</u> (corporate office)
Telephone: (800) 959-4109 ◁ toll free to continental USA *-or-* (818) 706-3525
Fax: (818) 879-2746
DTS engineers are available to assist you. If an emergency occurs after business hours, please leave a message with the answering service. Your call will be returned as soon as possible.

DTS Web Site   `http://www.dtsonline.com`
Access to the DTS on-line 'techcenter' is free to all internet users. Go to the site, click on 'cinema' 'techcenter'. The registration from must be filled out to receive instant access to the site. A password will be sent to you. Once in the site, click on 'cinema products' to view manuals, technical updates, and troubleshooting guides for all cinema products. These items may be printed or downloaded to your PC.

Internet users may **email DTS Technical Support** at: `cinematech@dtsonline.com`

SECTION 11   APPENDICIES

This chapter contains the following Appendices**:**

Appendix A   DTS-ECP Back Panel Connectors

Appendix B   D744 Analog Board Jumper Settings

Appendix C   DTS-ECP System Replacement Parts List

Appendix D   Marquee Order Form

Appendix E   RT-60 Test Section

Appendix F   Using the Upload / Download Software Program

Appendix G   Using the DTS-ECP with Extended Surround Equipment

Appendix H   Installing and Using the DTS CP-Setup Software

Appendix I   Ground Loop Isolator for the DTS-ECP

Appendix J   Installing the DTS Digital Option

Appendix K: Motherboard D742 Revision K and earlier

Appendix L: Adjusting the Optical Levels Without a PC

NOTES

APPENDIX A

DTS-ECP BACK PANEL CONNECTOR PIN-OUTS

CONN.	FUNCTION	PAGE
P1	MONITOR IN	A-2
P2	TO POWER AMPS	A-3
P3	MONITOR OUT	A-4
P4 & P5	PROJ 1 & PROJ 2 OPTICAL INPUTS	A-4
P6	EXTERNAL NOISE REDUCTION	A-5
P7	AUX POWER	A-5
P8	6 TRACK ANALOG IN	A-6
P9A & P9B	NONSYNC LEFT & RIGHT IN	A-7
P10	RS-422	A-8
P11	AUTOMATION	A-8
*P13	PROJ 1 TC	A-9
*P14	PROJ 2 TC	A-9
P15 & P16	STATUS/CONTROL A & B	A-10
P17	RS-232	A-8
P23	HEARING IMPAIRED OUT	A-7
P25	L/R SPDIF OUT	A-9
P26	LS/RS SPDIF OUT	A-9
P27	C/SW SPDIF OUT	A-9
P28	REMOTE FADER	A-7

*NOTE: P13 and P14 used only when DTS-Digital Option is installed. Normally, they are not used.

                                             DTS P/N 9301DECP0002/10

APPENDIX A

DTS-ECP AUDIO MONITOR INPUT FROM POWER AMPS (P1)
"MONITOR IN"

PIN NO.	DESCRIPTION	
1	LEFT LF IN +	
2	LEFT SURROUND LF IN +	
3	CENTER LF IN +	
4	RIGHT SURROUND LF IN +	
5	RIGHT LF IN +	
6	SUB WOOFER/ AUX LF IN +	
7	LEFT HF IN +	WIDE-BAND
8	LEFT SURROUND HF IN +	WIDE-BAND
9	CENTER HF IN +	WIDE-BAND
10	RIGHT SURROUND HF IN +	WIDE-BAND
11	RIGHT HF IN +	WIDE-BAND
12	SUB WOOFER/ AUX HF IN +	WIDE-BAND
13	ANALOG GROUND	
14	LEFT LF IN -	
15	LEFT SURROUND LF IN -	
16	CENTER LF IN -	
17	RIGHT SURROUND LF IN -	
18	RIGHT LF IN -	
19	SUB WOOFER/ AUX LF IN -	
20	LEFT HF IN -	WIDE-BAND
21	LEFT SURROUND HF IN -	WIDE-BAND
22	CENTER HF IN -	WIDE-BAND
23	RIGHT SURROUND HF IN -	WIDE-BAND
24	RIGHT HF IN -	WIDE-BAND
25	SUB WOOFER/ AUX HF IN -	WIDE-BAND

FEMALE 25 PIN D CONNECTOR (BACK PANEL)

When the speakers are <u>not</u> bi-amped, connect the amplifier outputs to HF (wideband) inputs only.

APPENDIX A

DTS-ECP AUDIO OUT (P2)
"TO POWER AMPS"

PIN NO.	DESCRIPTION	
1	LEFT LF OUT +	
2	LEFT SURROUND LF OUT +	
3	CENTER LF OUT +	
4	RIGHT SURROUND LF OUT +	
5	RIGHT LF OUT +	
6	SUB WOOFER/ AUX LF OUT +	
7	LEFT HF OUT +	WIDE-BAND
8	LEFT SURROUND HF OUT +	WIDE-BAND
9	CENTER HF OUT +	WIDE-BAND
10	RIGHT SURROUND HF OUT +	WIDE-BAND
11	RIGHT HF OUT +	WIDE-BAND
12	SUB WOOFER/ AUX HF OUT +	WIDE-BAND
13	ANALOG GROUND	
14	LEFT LF OUT -	
15	LEFT SURROUND LF OUT -	
16	CENTER LF OUT -	
17	RIGHT SURROUND LF OUT -	
18	RIGHT LF OUT -	
19	SUB WOOFER/ AUX LF OUT -	
20	LEFT HF OUT -	WIDE-BAND
21	LEFT SURROUND HF OUT -	WIDE-BAND
22	CENTER HF OUT -	WIDE-BAND
23	RIGHT SURROUND HF OUT -	WIDE-BAND
24	RIGHT HF OUT -	WIDE-BAND
25	SUB WOOFER/ AUX HF OUT -	WIDE-BAND

FEMALE 25 PIN D CONNECTOR (BACK PANEL)

When the speakers are not bi-amped and internal crossovers are used in the DTS-ECP, verify that the crossover jumpers are set correctly. Avoid sending full-range, wideband audio through the HF drivers. See Appendix B "Jumper Settings for Wide-Band or Crossover Outputs"

APPENDIX A

DTS-ECP EXTERNAL SPEAKER OUT (P3)
"MONITOR OUT"

PIN NO.	DESCRIPTION
CENTER	AUDIO OUT
SHIELD	ANALOG GND.

FEMALE RCA-TYPE PHONO CONNECTOR (BACK PANEL)

DTS-ECP SOLAR CELL INPUTS (P4 & P5)
(P4) "PROJ 1 OPTICAL INPUT" & (P5) "PROJ 2 OPTICAL INPUT"

PIN NO.	DESCRIPTION
1	LEFT +
2	LEFT -
3	N.C.
4	RIGHT +
5	RIGHT -
6	LEFT ANALOG GND.
7	N.C.
8	N.C.
9	RIGHT ANALOG GND.

FEMALE 9 PIN D CONNECTOR (BACK PANEL)

The cable shield should be connected to Pins 6 and/or 9. Pins 2, 3, and 5 are internally tied together.

APPENDIX A

DTS-ECP EXTERNAL NOISE REDUCTION IN/OUT (P6)

PIN NO.	DESCRIPTION	
1	LEFT OUT+	(To N.R.)
2	RIGHT OUT +	(To N.R.)
3	LEFT IN +	(From N.R.)
4	RIGHT IN +	(From N.R.)
5	ANALOG GROUND	
6	LEFT OUT -	(To N.R.)
7	RIGHT OUT -	(To N.R.)
8	LEFT IN -	(From N.R.)
9	RIGHT IN -	(From N.R.)

FEMALE 9 PIN D CONNECTOR (BACK PANEL)

NOTE: The connections for P7 reflect the D742 Rev. L motherboard. Earlier versions are reflected in Appendix K.

AUX POWER (P7)

EXTERNAL SUPPLY INPUT, ±12 to ±15 Volts DC at 2 Amps

PIN NO.	DESCRIPTION	COLOR
1	+12 to +15 VDC	BLUE
2	ANALOG GND.	WHITE
3	-12 to -15 VDC	RED

MALE 3-PIN PHOENIX 5.08 MM CONNECTOR (BACK PANEL)

APPENDIX A

DTS-ECP EXTERNAL ANALOG AUDIO IN (P8)
"6 TRACK ANALOG IN"

PIN NO.	DESCRIPTION
1	LEFT IN -
2	RIGHT SURROUND IN +
3	LEFT SURROUND IN -
4	RIGHT SURROUND IN -
5	RIGHT IN -
6	N.C.
7	CENTER IN -
8	N.C.
9	N.C.
10	N.C.
11	SUBWOOFER IN -
12	N.C.
13	ANALOG GROUND
14	LEFT IN +
15	LEFT SURROUND IN +
16	N.C.
17	RIGHT IN +
18	N.C.
19	N.C.
20	CENTER IN +
21	N.C.
22	N.C.
23	N.C.
24	SUBWOOFER IN +
25	N.C.

FEMALE 25 PIN D CONNECTOR (BACK PANEL)

APPENDIX A

DTS-ECP NONSYNC INPUTS (P9A & B)
NONSYNC LEFT IN (P9A) and NONSYNC RIGHT IN (P9B)

PIN NO.	DESCRIPTION
CENTER	LEFT AUDIO IN
SHIELD	ANALOG GND.

FEMALE RCA-TYPE PHONO CONNECTOR (BACK PANEL)

DTS-ECP REMOTE FADER (P28)

PIN NO.	DESCRIPTION
1	CONTROL IN MUTE
2	FADER WIPER (control voltage)
3	CONTROL FADER IN
4	STATUS FADER OUT
5	+ 5 VDC
6	DIGITAL GROUND
7	DIGITAL GROUND
8	DIGITAL GROUND
9	STATUS OUT MUTE

FEMALE 9 PIN D CONNECTOR (BACK PANEL)

For connection details, see SDE238 in Section 10. Software V1.04 or above shown.

HEARING IMPAIRED OUT (P23)

PIN NO.	DESCRIPTION
CENTER	AUDIO OUT
SHIELD	ANALOG GND.

FEMALE RCA-TYPE PHONO CONNECTOR (BACK PANEL)

APPENDIX A

DTS-6AD RS-232 SERIAL COMMUNICATIONS (P17)

PIN NO.	DESCRIPTION
1	N.C.
2	RXD
3	TXD
4	N.C.
5	DIGITAL GROUND
6	N.C.
7	N.C.
8	N.C.
9	N.C.

MALE 9-PIN D CONNECTOR (BACK PANEL)

NOTE: The connections for P10 and P11 reflect the D742 Rev. L motherboard. Earlier versions are reflected in Appendix K.

DTS-6AD RS-422 (P10)

DTS-6AD AUTOMATION (P11)

PIN NO.	DESCRIPTION
1	V + (12v)
2	TX -
3	TX +
4	RX -
5	RX +
6	GND
7	TX -
8	TX +
9	RX -
10	RX +

MALE 10-PIN PHOENIX 5.08 MM CONNECTOR (BACK PANEL)

APPENDIX A

*DTS-ECP TIMECODE INPUTS (P13 & P14)

(P13) "PROJ 1 TC" and (P14) "PROJ 2 TC"

PIN NO.	DESCRIPTION
1	TC IN FROM PROJECTOR
2	N.C.
3	N.C.
4	SMPTE TIMECODE OUT
5	+5 VDC (FROM DTS-ECP)
6	DIGITAL GROUND
7	DIGITAL GROUND
8	DIGITAL GROUND
9	"TC PRESENT" LED SIGNAL FROM DTS-ECP

FEMALE 9 PIN D CONNECTOR (BACK PANEL)

*NOTE: P13 and P14 used only when DTS Digital (Model DPP) package is added. Normally, they are not used.

L/R SPDIF OUT (P25) ⊰ to left / right digital amps

LS/RS SPDIF OUT (P26) ⊰ to left surround / right surround digital amps

C/SW SPDIF OUT (P27) ⊰ to center / subwoofer digital amps

PIN NO.	DESCRIPTION
CENTER	SPDIF OUT
SHIELD	DIGITAL GND.

FEMALE RCA-TYPE PHONO CONNECTORS (BACK PANEL)

APPENDIX A

DTS-ECP STATUS / CONTROL A & B CONNECTORS (P15 & P16)

(P15) "STATUS/CONTROL A" & (P16) "STATUS/CONTROL B"

PIN NO.	DTS-ECP FUNCTION	FACTORY DEFAULT FORMAT SETTINGS	FRONT PANNEL BUTTON
1	CONTROL 0 IN	MONO	**F1****
2	CONTROL 1 IN	A-TYPE	F2
3	CONTROL 2 IN	SR-TYPE	F3
4	CONTROL 3 IN	TRIM IN	
5	CONTROL 4 IN	EXTERNAL (EXT 6-TRK)	F5
6	CONTROL 5 IN	DTS DIGITAL*	F6
7	CONTROL 6 IN	NONSYNC	F7
8	CONTROL 7 IN	TRIM OUT	
9	CONTROL 8 IN		
10	CONTROL MUTE IN	MUTE	MUTE
11	N.C.		
12	DIGITAL GROUND		
13	+ 5 VDC		
14	STATUS 0 OUT	MONO	
15	STATUS 1 OUT	A-TYPE	
16	STATUS 2 OUT	SR	
17	STATUS 3 OUT	TRIM IN	
18	STATUS 4 OUT	EXTERNAL (EXT 6-TRK)	
19	STATUS 5 OUT	DTS DIGITAL*	
20	STATUS 6 OUT	NONSYNC	
21	STATUS 7 OUT		
22	STATUS 8 OUT		
23	STATUS MUTE OUT	MUTE	
24	CONTROL MTR IN	MOTOR START	
25	CONTROL C/O IN	LOW = PROJECTOR 2	

FEMALE 25 PIN D CONNECTOR (BACK PANEL)

NOTES

* "DTS Digital" used only when DTS Model DPP is installed. Normally, it is not used.

** F1 sound format can be reassigned through programming DTS CP Setup software.

APPENDIX B

D744 ANALOG BOARD JUMPER SETTINGS

APPENDIX B

D744 JUMPER SETTINGS FOR
BALANCED OR UNBALANCED MAIN AUDIO OUTPUTS

	LEFT CHANNEL	CENTER CHANNEL	RIGHT CHANNEL
OUTPUT	JUMPER NO.	JUMPER NO.	JUMPER NO.
HF +	W14	W34	W44
HF -	W12	W32	W42
LF +	W9	W29	W39
LF -	W6	W18	W36

	LEFT SURROUND	RIGHT SURROUND	SUBWOOFER
OUTPUT	JUMPER NO.	JUMPER NO.	JUMPER NO.
HF +	W3	W20	W24
HF -	W2	W19	W23
LF +	W5	W22	W26
LF -	W4	W21	W25

See Page 2-7 for a picture of D744 jumper locations and orientation.

• Each audio channel must have all it's four jumpers (HF+, HF-, LF+, LF-) at the same setting.

• For **balanced output** (<u>factory default</u>): Place the jumpers between the center pin and the left ("B") pin.

• For **unbalanced output**: Place the jumpers between the center pin and the right ("UB") pin.

APPENDIX B

D744 JUMPER SETTINGS FOR
WIDEBAND OR CROSSOVER OUTPUTS

JUMPER NO.	CHANNEL
W17	LEFT
W35	CENTER
W45	RIGHT
W1	LEFT SURROUND
W15	RIGHT SURROUND
W16	SUBWOOFER

See Page 2-7 for a picture of D744 jumper locations and orientation.

• For **Crossover** (bi-amp) output**:** Place jumpers between the center pin and the left ("B") pin.

• For **Wideband** output (factory default)**:** Place jumpers between the center pin and the right ("W") pin.
  The Wideband outputs appear on the **HIGH FREQUENCY** output pins of P2 for each channel.

CAUTION**:**   When bi-amping speakers, verify jumper settings to ensure that full-range, wideband audio
            is not sent to the HF driver.

APPENDIX B

D744 JUMPER SETTINGS FOR
SCREEN CHANNEL TIME ALIGNMENT DELAY SETTINGS

DELAY TIME	LEFT CHANNEL	CENTER CHANNEL	RIGHT CHANNEL
	JUMPER NO.	JUMPER NO.	JUMPER NO.
0.3 mSec	W11	W30	W41
0.4 mSec	W8	W28	W38
0.5 mSec	W10	W31	W40
0.6 mSec	W7	W27	W37

See Page 2-7 for a picture of D744 jumper locations and orientation.

• To **reduce the delay** to the low frequency output**:** Place jumpers between the center pin and left ("O") pin.

• To **add delay** to the low frequency output**:** Place jumpers between the center pin and right ("I") pin.

• **Factory default is with all jumpers set to "out" for no delay.**

• The **total delay time** is calculated by adding the delay time for each "in" jumper. The chart below illustrates all possible delay times and the jumper settings to achieve each total delay.

JUMPER DELAY ➔	0.3 mSec	0.4 mSec	0.5 mSec	0.6 mSec
TOTAL DELAY IN mSec ↓				
0.0	OUT	OUT	OUT	OUT
0.3	IN	OUT	OUT	OUT
0.4	OUT	IN	OUT	OUT
0.5	OUT	OUT	IN	OUT
0.6	OUT	OUT	OUT	IN
0.7	IN	IN	OUT	OUT
0.8	IN	OUT	IN	OUT
0.9	OUT	IN	IN	OUT
0.9	IN	OUT	OUT	IN
1.0	OUT	IN	OUT	IN
1.1	OUT	OUT	IN	IN
1.2	IN	IN	IN	OUT
1.3	IN	IN	OUT	IN
1.4	IN	OUT	IN	IN
1.5	OUT	IN	IN	IN
1.8	IN	IN	IN	IN

See Page 2-7 for a picture of D744 jumper locations and orientation.

APPENDIX B

D744 JUMPER SETTINGS FOR
SCREEN LOSS COMPENSATION EQ

LEFT CHANNEL	CENTER CHANNEL	RIGHT CHANNEL
JUMPER NO.	JUMPER NO.	JUMPER NO.
W13	W33	W43

See Page 2-7 for a picture of D744 jumper locations and orientation.

• To **disable** the screen loss equalization (factory default)**:** Place the jumpers between the center pin and the left ("O") pin.

• To **activate** the screen loss equalization**:** Place the jumpers between the center pin and the right ("I") pin.

APPENDIX B

D744 JUMPER SETTINGS FOR
EXTERNAL NOISE REDUCTION
BALANCED OR UNBALANCED INPUT AND OUTPUT

	LEFT CHANNEL	RIGHT CHANNEL
OUTPUT TO EXT. N.R.	JUMPER NO.	JUMPER NO.
+	W51	W56
-	W48	W53
INPUT FROM EXT. N.R.	JUMPER NO.	JUMPER NO.
+	W49	W57
-	W50	W54

See Page 2-7 for a picture of D744 jumper locations and orientation.

• For each channel, set "+" and "-" jumpers to the same setting.

• For **Balanced** operation (output or input) (factory default)**:** Place the jumpers between the center pin and the left ("B") pin.

• For **Unbalanced** operation (output or input)**:** Place the jumpers between the center pin and the right ("UB") pin.

APPENDIX B

D744 DIP SWITCH SETTINGS FOR
BOOTH MONITOR POWER-ON STATE

SWITCH NO. Units after S/N 1075	SWITCH CLOSED JUMPER "IN"	SWITCH "OPEN" JUMPER "OUT"	JUMPER NO. S/N 1075 & earlier
S2 - 1	Internal Speaker ON	Internal Speaker OFF	W55-1
S2 - 2	Amplifier Returns	Processor Output	W55-2
S2 - 3	LS & RS ON	LS & RS OFF	W55-3
S2 - 4	Center ON	Center OFF	W55-4
S2 - 5	Left & Right ON	Left & Right OFF	W55-5

See Page 2-7 for a picture of D744 jumper locations and orientation.

• To wake-up with **internal speaker on:** Set DIP switch S2-1 closed (<u>factory default</u>).

• To wake-up with the **internal speaker off:** Set DIP switch S2-1 open.

• To **monitor the output of the power amplifiers** connected to (P1) "MONITOR IN"**:** Set DIP switch S2-2 to closed (factory default).

• To **monitor the output of the DTS-ECP:** Set DIP switch S2-2 open.

• To select which **audio channels will be monitored** upon wake-up, using the chart above, set DIP switches S2-3, S2-4, and S2-5 as needed:

    • **Closed** = to monitor selected channel(s)

    • **Open** = to not monitor selected channel(s)

  Factory Defaults: S2-3 open, S2-4 closed, S2-5 closed

• All the above switches select the "wake-up state" of the booth monitor after the DTS-ECP is powered or after a RESET. After power-up, pushing the desired button on the monitor panel can change any monitoring choice.

APPENDIX B

D744 RESISTOR VALUES FOR
CROSSOVER RESISTOR PACKS

Part No. 9030-D755-xx (surface mount version)

Part No. 9020-D755-xx (component carrier version)

"xx" = 01, 02, etc., depending on frequency (see table below)

RESISTOR		DTS PART NO. AND CROSSOVER FREQUENCY						
PACK		D755-01	D755-02	D755-03	D755-04	D755-05	D755-06	D755-07
		500 Hz	800 Hz	1200 Hz	630 Hz	1000 Hz	297 Hz	330 Hz
R1	RA	10.0 K	6.49 K	4.22 K	7.87 K	4.99 K	16.9 K	15.0 K
R2	RB	20.0 K	13.0 K	8.45 K	15.8 K	10.0 K	34.0 K	30.1 K
R3	RA	10.0 K	6.49 K	4.22 K	7.87 K	4.99 K	16.9 K	15.0 K
R4	RA	10.0 K	6.49 K	4.22 K	7.87 K	4.99 K	16.9 K	15.0 K
R5	RA	10.0 K	6.49 K	4.22 K	7.87 K	4.99 K	16.9 K	15.0 K
R6	RC	10.0 K	6.49 K	4.22 K	7.87 K	4.99 K	16.9 K	15.0 K
R7	RB	20.0 K	13.0 K	8.45 K	15.8 K	10.0 K	34.0 K	30.1 K
R8	RC	10.0 K	6.49 K	4.22 K	7.87 K	4.99 K	16.9 K	15.0 K

• Through-hole version: All resistors are 1%, ¼ Watt; 16 pin component carrier Part No. 2020-0007-00.

• Surface Mount version: All resistors are 1%, 1/10 Watt; Header Part No. 2005-2X08-06; Circuit Board Part No. 9040-D755-00

• Crossover resistor values for RA, RB, and RC are determined by the following formula**:**

  RA = (500 / Fn) x 10,000   Fn is the new frequency in Hertz. RA is the new resistance value for RA and RC in ohms

  RB = RA x 2

The table below lists schematic 'R' resistor numbers (on D744) for each resistor pack (RP)
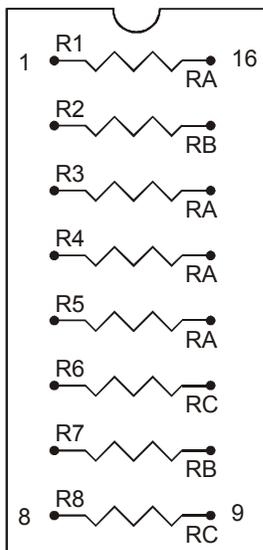
	LFT	CTR	RT	LS	RS	SW	
RP	RP 4	RP 5	RP 6	RP 1	PR 2	RP 3	
R#							
R1	R127	R181	R258	R83	R145	R149	RA
R2	R140	R201	R274	R82	R144	R148	RB
R3	R124	R178	R255	R84	R146	R150	RA
R4	R126	R180	R257	R63	R134	R136	RA
R5	R125	R179	R256	R58	R117	R118	RA
R6	R152	R208	R275	R62	R133	R135	RC
R7	R139	R200	R272	R80	R137	R138	RB
R8	R151	R207	R273	R81	R143	R147	RC

APPENDIX C

DTS-ECP System Replacement Parts List

DTS-ECP Internal Parts

9030 D740 01	CPU board assembly for a DTS-ECP (**not same board as in DTS-6AD**)
9030 D741 00	DSP board assembly (for a DTS-ECP or DTS-6AD)
9030 D744 00	Analog board assembly (for a DTS-ECP or DTS-6AD)
9030 D273 00	Front Panel CONTROL board assembly (same board used for remote control)
9030 D272 00	Front Panel MONITOR board assembly

2806 0002 00	Fan, card cage
2806 0003 00	Fan, back panel
1902 0006 00	Power switch (updated May 2001)
2013 0002 00	Universal AC input module
2201 SW0D 05	± 12 VDC and +5 VDC supply module
2201 150D 02	± 15 VDC supply module

DTS-ECP Options

E345	DTS DIGITAL, Model DPP (Digital Processing Package), upgrade
E342	DTS E342 Remote Front Panel, option

Installation Accessories

2007 0009 05	9-pin male D-connector w/solder cups
2022 0001 00	9-pin D-connector back shell
2007 0025 10	25-pin male D-connector w/solder cups
2022 0003 01	25-pin D-connector back shell
2011 1X03 01	3-position, Phoenix contact 1757022 terminal block, plug-type, 5.08mm
2011 1X10 02	10-position, Phoenix contact 1757093 terminal block, plug-type, 5.08mm

2501 0001 00	Power cord, straight, detachable, standard *bare-ended available, call DTS*
2501 0002 00	Power cord, right angle, detachable
2403 0007 00	Ferrite Bead Assembly, Fair-rite snap-it 0444164281

DTS Test Materials

6800 0001 00	DTS "BUZZ AND BILL" Demo Test Film, 35mm
E361	DTS Cinema Processor Setup Software

DTS Digital Replacement Parts List given in Appendix J.

NOTES

DTS MARQUEE SIGN ORDER FORM

For every DTS unit installed in a theater, we will provide one-sheet posters, 4" mini-marquee, 8", 10", or 12" marquee signs at no charge. Please fill out the following information and they will be shipped within 2 to 3 weeks upon receipt of this completed order form. Marquees and posters can be sent directly to the theater or dealer for distribution. If the marquees are directly sent to the dealer, the name(s) and location(s) of the theater(s) is needed for our records.
January 1999

Dealer:_____   Theater: _____

Address: _____   Address:_____

    _____   _____

Contact:_____   Contact: _____

Phone:_____   Phone: _____

FOR DTS-EQUIPPED THEATERS

☐ 4" mini marquee   Qty. _____

☐ 8" panel   Qty. _____

☐ 10" panel   Qty. _____

☐ 12" panel   Qty. _____

☐ One sheets   Qty. _____

Please return this form to:

    Natasha Norris
    Digital Theater Systems
    5171 Clareton Drive
    Agoura Hills, CA 91301 USA
    Telephone: (818) 706-3525 or (800) 959-4109
    Fax: (818) 879-2746

NOTES

Thank you for choosing DTS !

APPENDIX E   RT-60 Test Section

Description
"RT" is an abbreviation for Reverberation Time. This is the time in seconds for a sound to decay to inaudibility after the source stops. This time in measured in seconds for the sound level at a specific frequency to decrease 60dB in level after the sound source stops.

Tools required: DTS CP Setup Software, Laptop PC, R2 unit (or similar RTA device), microphone multiplexer with calibrated microphones, and a remote control device (see diagram below).

• Connect the remote control device to the DTS-ECP P15 or P16 "Status/Control" connector (either one) on the rear panel.

• On the to begin, enter the OUTPUT TRIM menu. Click cursor on RT-60 button. The screen below should appear:
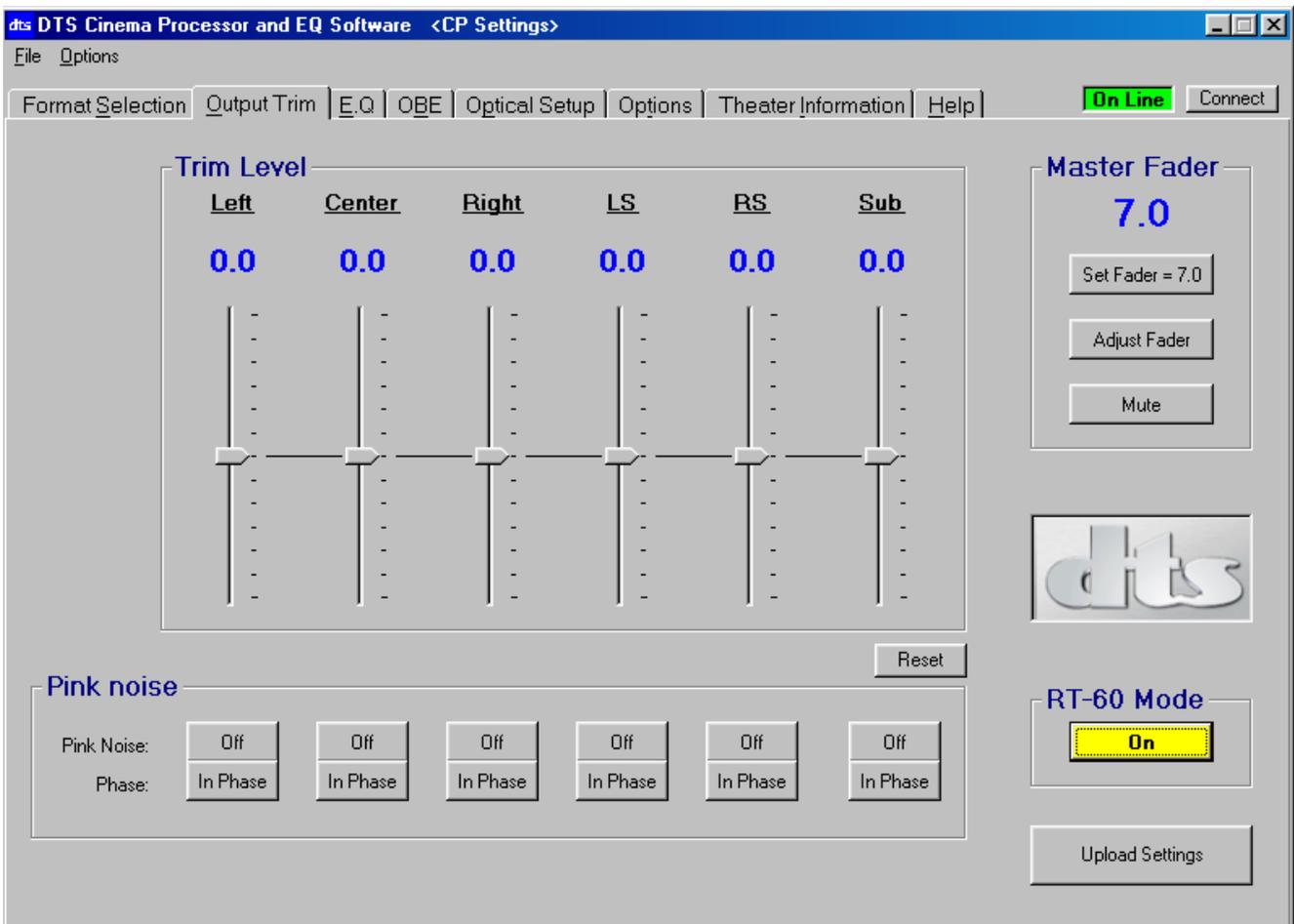
• The Remote Control device is used to enable pink noise on each individual or on all channels. As channels are selected, the corresponding channel will highlight on the screen.

- The remote sends control pluses to the DTS-ECP STATUS/CONTROL connector via the rear panel P15/16 STATUS/CONTROL connector.   When in the RT-60 Test Section **s**creen, the STATUS/CONTROL connections function as shown below. When not in the RT-60 Test Section screen, the STATUS/CONTROL connections function as normal.

P15/16 PIN# (DB-25)	DTS-ECP Function	External Button (pulsed contacts)	Factory Default Format Settings
1	Control 0 IN	1 - Left	MONO
2	Control 1 IN	2 - Center	A-TYPE
3	Control 2 IN	3 - Right	SR-TYPE
4	Control 3 IN	4 – Left Surround	TRIM IN
5	Control 4 IN	5 – Right Surround	EXTERNAL
6	Control 5 IN	6 - Subwoofer	DTS DIGITAL
7	Control 6 IN	7 - All Channels	NONSYNC
12	Ground		

A simple RT-60 interface can be made with a BNC wired to Pins 7 & 12 of a DB-25 connector.   The DB-25 connector on the back of the DTS-ECP is female.

APPENDIX F USING THE UPLOAD/DOWNLOAD PROGRAM

DTS CP Upload/Download Program

This program will upload and/or download complete software configuration to and from the DTS-ECP or DTS-6AD cinema processors using a laptop PC (that has a serial connector) with Windows™ 95 (or after). The program may be downloaded free of charge from the DTS web site or may be purchased from DTS, kit number E250. This kit consists of the program on a floppy disc and a null modem cable.

The program organizes each DTS CP unit into a field hierarchy of <u>Circuit name</u> (or theater chain name), <u>Theater name</u> (the name of the theater in the circuit), and <u>Screen</u> (screen number). These fields must be filled in by the user. For each screen defined, the program will keep the configuration information that was downloaded from the DTS-ECP unit. It also allows you to enter installation notes and unit history.

This program should be used to save all setup information on computer after installing and setting up a DTS CP in a theater. Whenever necessary, the configuration information and setup notes may be viewed offsite (from a computer). The same configuration information can be uploaded back to a DTS CP if replacement is needed.

The following configuration items are uploaded or downloaded from the DTS CP:

- Timecode reader offset delay setting.
- Surround delay setting.
- F1 key assignment option.
- Option to disable the matrix decoder.
- Default format.
- NONSYNC format mode.
- System password setting.
- NONSYNC trim.
- Automation trim values for Mono, A, SR, Digital, and External formats.
- Current audio setup information (Level, Bass, Treble, and EQ) for each channel.
- Alternate audio files Setup 1 and Setup 2.

<u>Cable</u>

Use a serial null modem cable (pin-out below) to connect the DTS-6AD -or- DTS-ECP (RS-232 connector) to a laptop PC serial connector. See below for connector pin-out:

DTS-ECP Side	PC Side
(DB-9 Female)	(DB-9 Female)
Pin 2 (Rx) -------------------	Pin 3 (Tx)
Pin 3 (Tx) -------------------	Pin 2 (Rx)
Pin 5 (Gnd) -----------------	Pin 5 (Gnd)

<u>Installation & Setup</u>

1. The laptop PC must have a serial port and Windows™ 95 (or after) installed. A null mode cable must be used.
2. Create a new subdirectory on the PC hard drive for the DTS CP program.
3. Copy the program file 6AD.EXE and the help file HELP.TXT onto the new subdirectory.
4. Run the 6AD.EXE program.

RUNNING THE DTS-ECP DOWNLOAD/UPLOAD PROGRAM

<u>**Uploading from DTS-6AD -or- DTS-ECP to a laptop PC**</u>

1. The serial communications port (COM1-COM4) must be selected. Most laptop PCs have only one port, so in this case, use COM<u>1</u>

2. Select "Add Circuit". Enter the name of the theater chain. Example: EDWARD

3. Select "Add Theater". Enter the name of the theater. Example: Camarillo16

4. Select "Add Screen". Enter the screen name or number. Example: House1

5. Select "Load Settings From DTS-6AD".   All settings in the DTS CP will now load into the laptop PC. Once the downloading is completed, the PC screen will display "success".

6. Select "View Configuration" to see what has been downloaded.

7. To add notes to what has been downloaded, select "Edit Notes". Once the Notes screen appears, the circuit name, theater name, and screen will appear at the top left corner. The user may now type in notes. Once notes are completed, save them (go to file, save).

<u>**Sending Settings to DTS-ECP from a PC**</u>

1. Select "Send Settings to DTS-6AD".   A warning screen will appear "you are about to change settings on the DTS-6AD". Select OK to continue. The upload will proceed. NOTE: Even though the program declares it's for the DTS-6AD, it also works for the DTS-ECP.

2. Verify settings were uploaded by entering the DTS-6AD on-screen MENU or DTS-ECP setup software on laptop PC. All configurations (noted on the first page) should be loaded into the DTS cinema processor.

APPENDIX G   DTS-ES Wiring to DTS-6AD (ECP with DTS Digital added)
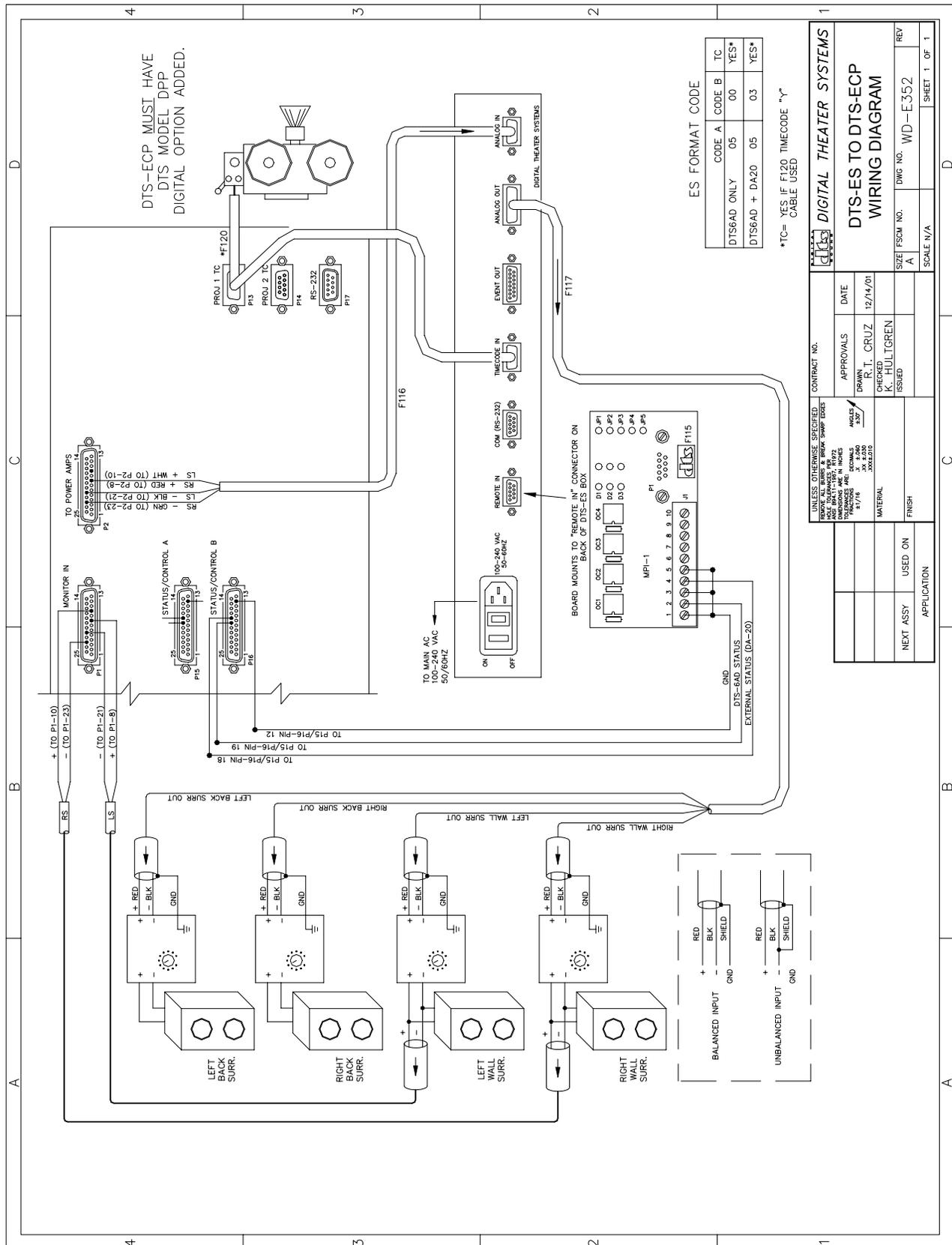
NOTES

APPENDIX H   Installing and Using the DTS CP Setup Software

This describes how to install and use the DTS CP Setup Software that will come to you on a CD-ROM disc. You will need**:**
- a laptop PC that has a CD-ROM drive and a serial port
- a null modem cable
- certain software programs loaded into your laptop, requirements are given below.

PC and Software Requirements
- PC must be capable of running at 9600 Baud rate (19200 optional), 800 x 600 pixels is mandatory.
- Windows 98 is preferred but the program will run on Windows 95.

Installing CP Setup Software into a laptop PC
1. Power on your laptop and allow Windows to load.
2. Open the CD-ROM drive and insert the DTS CP Setup Software disc.
3. Close drive. The disc will load itself to your desktop (unless you specify otherwise).
4. While loading, if any necessary software programs are not found on your laptop, a pop-up window will describe what is missing.
5. Once finished loading, a pop-up window will tell you of the success.
6. The icon for the program will be a small blue box with "DTS" in the center. Double-click on the box to open.
7. Take a few minutes to browse around the program. You will not be able to "Connect" until your laptop is connected to the DTS-ECP with a null modem cable.
8. Get a null modem cable and connect it to your laptop's serial port. Connect the other side of the null modem cable to the DTS-ECP "RS-232" port. The RS-232 port is in two locations, on the DTS-ECP rear panel (P17) or behind the front panel.
   - When using the port behind the front panel, set the front/back switch to "front".
   - When using P17 on the rear panel, set the front/back switch (behind front panel) to "back".
9. Power on the DTS-ECP. Once the DTS-ECP is fully booted, click cursor on "Connect". The box next to "Connect" should turn green and say "On-Line".
   - If the laptop will not connect, go to "Options". Verify the "Com Port Selection" (most people will use COM1) and "Baud Rate" (standard is 9600).

Operation Notes
1. When making adjustments using the CP Setup Software, you must click cursor on "UPLOAD SETTINGS" to send that information to the DTS-ECP.
2. In "Options" you may choose to automatically download settings to the DTS-ECP. To enable this, enter "Options", click cursor on "Upload Options", and then click on "Automatically Upload". A small check will appear next to the selection.
3. If connecting null modem cable to the DTS-ECP front RS232 connector, be sure the switch on the COM-PORT is set for "front".

KEYBOARD SHORTCUTS

To use keyboard shortcuts, first enter "Options". Click cursor on "Upload Options" and then "Enable Shortcuts". Once enabled, the keyboard shortcuts, given below, can be used.

Global Shortcuts**:**

Alt + S = Format Selection Tab
Alt + O = Output Trim Tab
Alt + E = EQ Tab
Alt + B = OBE Tab
Alt + P = Optical Setup Tab
Alt + T = Options Tab
Alt + I = Theater Information Tab   *These shortcuts are enabled in th*e
Alt + H = Help Tab   *upload options menu bar*:

Ctrl + N = New Settings   F1 = Connect
Ctrl + O = Open Settings   F2 = Upload Settings
Ctrl + S = Save Settings
Ctrl + A = Save Settings As
Ctrl + X = Exit

Shortcuts on the EQ Tab**:**

Ctrl + M = Toggle Mute
Ctrl + 7 = Set Fader = 7
Ctrl + G = Activate Pink Noise
Ctrl + L = Select Left Channel
Ctrl + C = Select Center Channel
Ctrl + R = Select Right Channel
Ctrl + P = Select Left Surround Channel
Ctrl + Q = Select Right Surround Channel
Ctrl + E = Select Subwoofer Channel

APPENDIX I   Ground Loop Isolator for the DTS-6AD/-ECP

This device prevents ground noise from being introduced through the DTS-ECP NONSYNC inputs that can sometimes occur from long audio cable runs. Most susceptible is a single CD player's output distributed to multiple DTS-ECP units at one multiplex facility. Multiple grounding points, at different potentials, may cause currents to flow over the audio interconnect wire shield resulting in noise. Use of this ground loop isolator blocks these currents.

Kit number 9020E27900. Use <u>one</u> isolator <u>per</u> DTS-ECP unit.

Part number	Description
5206000100	Ground Loop Isolator
2511000500	Cable tie
2512000400	Cable tie mount

Peel off paper from adhesive pads and mount the transformer to the back of the DTS-ECP as shown below:
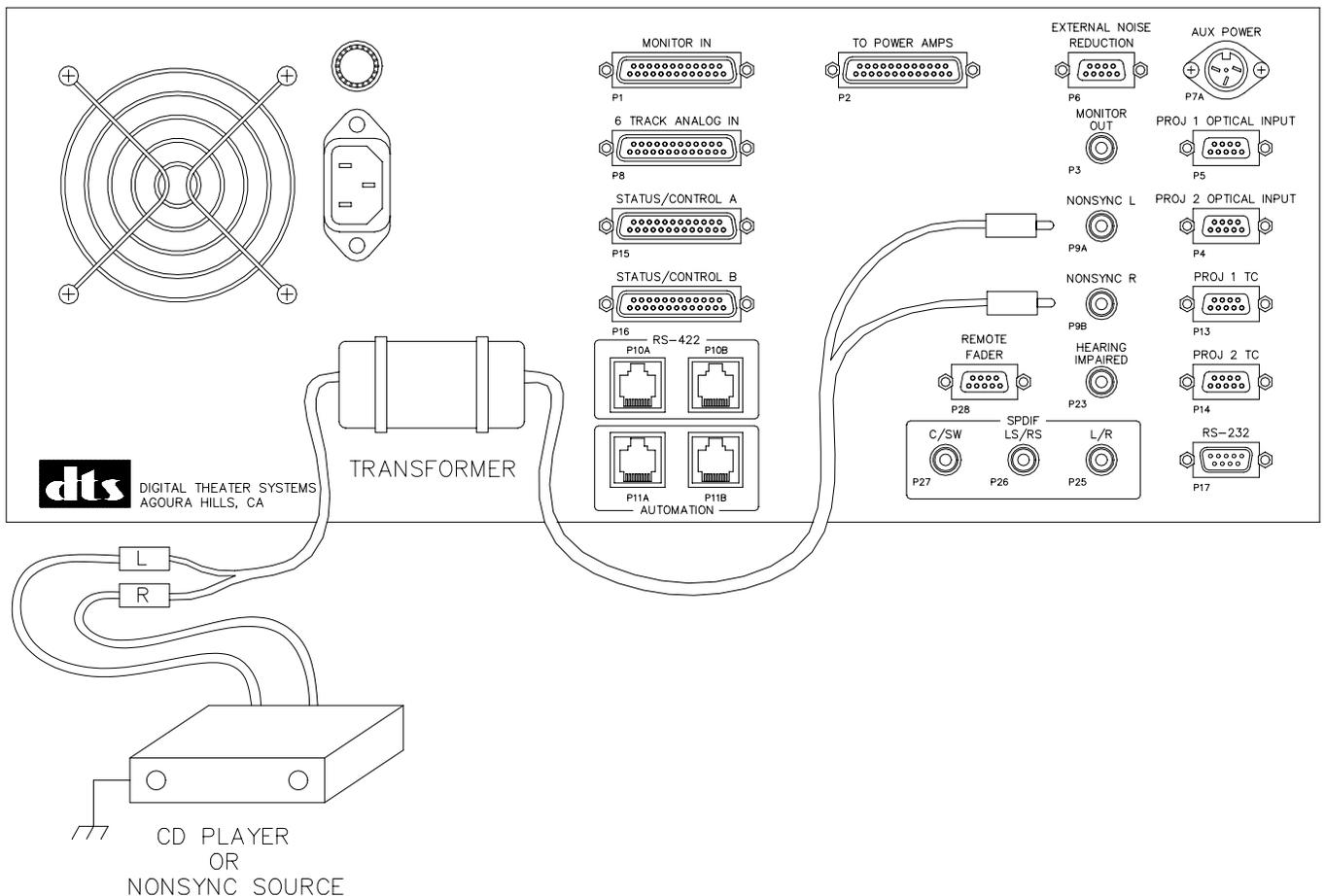
NOTES

APPENDIX J   Adding DTS Digital, Model DPP, to the DTS-ECP

The Model DPP, Digital Processing Package, adds DTS Digital to a DTS-ECP. When the Model DPP is ordered, the **customer must specify** the projector model and if the theater has dual projectors or uses a platter Essentially, when added, the Model DPP upgrades a DTS-ECP to a fully functioning DTS-6AD.

<u>Required Tools</u>	<u>Tools to Have On-Hand</u>
• Laptop PC loaded with the DTS Upload/Download Software	• RTA with calibrated microphone(s)
• Null Modem Cable	• Oscilloscope and SPL meter
• #1 Phillips screwdriver	• DTS Technician's kit
• Model DTS DPP Kit (parts list below)	• Test films**:** BUZZ Track & 50% Mod. Tone
• Flat-bladed screwdriver (small)	

Model DPP Parts List

QTY	Description
1	D740-00, CPU Board
1	CD-ROM Subassembly kit for the DTS-6AD (three CD-ROM drives connected together)
1	DTS-6AD Display/Monitor sub-assembly
1	DTS Setup Disc
1	DTS Timecode Reader, (2) if dual projectors; 35mm is standard, 70mm special order
1	DTS Reader Mounting Bracket, type depends on projector model; (2) if dual projectors
1	Timecode Cable, (2) if dual projectors; customer determines cable length
1	DTS-6AD Manual
1	DTS-6AD System (software) Disc
4	DTS trailers, two scope and two flat

Installation Procedure

A.   Use the DTS Upload/Download program to save all EQ and software settings on your laptop PC.
- Get a null modem cable and connect it to your laptop PC's serial port. Connect the other side of the null modem cable to the DTS-ECP "RS-232" port. The RS-232 port is in two locations, on the DTS-ECP rear panel (P17) or behind the front panel.
- When using the RS232 port behind the front panel, set the front/back switch to "front".
- When using P17 (RS232) on the rear panel, set the front/back switch (behind front panel) to "back".

B.   Power off the DTS-ECP, disconnect rear panel cables, and remove the unit from the rack.

See AS-E353 assembly diagrams and follow steps:

①   Remove the DTS-ECP front panel. Disconnect D752 and D751 cables from the front panel boards.
②   Remove old D740-01 CPU board.
③   Install the new D740-00 CPU board.
④   Reach into the chassis and pull out (3) power cables to the CD-ROM drives. Connect cables to drives.
⑤   Reach into the chassis and pull out (3) SCSI cables to the CD-ROM drives. Connect cables to drives.
⑥   Connect D752 cable (fromD740 audio board) and D751 cable (from D740 CPU board) to the display.
⑦   Connect display to front panel.
⑧   Verify the CD-ROM jumpers (see page 2-6 in the DTS-6AD manual for reference).
⑨   Tilt drives so that washers fit into opening. Slide drives all the way in and rotate so that their bottom washers fit under the slots in (inside chassis) mounting bracket.
⑩   Use Phillips screwdriver to tighten CD-ROM drives mounting screw to chassis.

C.   Use the DTS Upload/Download software to download all saved EQ and software settings from your laptop PC (that you saved in Step A).

(continued)

Installation Procedure (continued)

D.   Connect the DTS reader head(s) to projector(s).
- Use reader mounting bracket that best suits your projector. See DTS-6AD manual, Section 7.1 and 7.2.
- Connect timecode cable(s) from reader(s) to DTS-ECP using the small flat-bladed screwdriver. Attach a (DTS supplied) ferrite suppressor around each timecode cable.

E.   Determine reader delay setting and program it into memory. See DTS-6AD manual, Sections 7.3 and 7.4.

F.   Perform final programming as detailed in Section 8.3 in the DTS-6AD manual.

G.   Perform a complete system test as detailed in the DTS-6AD manual, Section 9.
- Be sure to do a listen test and verify unit performance – both in analog and DTS Digital.
- Test the delay setting as detailed in the DTS-6AD manual, Section 7.5.

H.   Update the unit (with DPP added) by using the DTS System Disc. Follow instructions printed on the disc.

DPP Replacement Parts List

Internal Parts

9030-D740-00	CPU board assembly for a DTS-6AD (used when DPP installed)
9020-E225-00	Display assembly (includes panel, fader, format switches, monitor speaker & switches)
5102-0008-00	CD-ROM Drive, TEAC 32x, single drive

Installation Accessories

2007-0009-05	9-pin male D-connector w/solder cups
2022-0001-00	9-pin D-connector back shell
9003-E100-00	Standard screw kit for reader and bracket installation
(contact DTS)	Dual projector kit for DTS-6AD

Timecode Cables

D435-01	30 ft. Timecode cable (standard)	*single-ended available, call DTS*
D435-02	40 ft. Timecode cable	many *lengths available, call DTS*

DTS Timecode Reader Heads and Auxiliary Rollers

D600-00	DTS 35mm reader head (auxiliary roller attached)
E108	Auxiliary roller assembly kit, 35mm
D600-02	DTS 70mm reader head (auxiliary roller attached)
E163	Auxiliary roller assembly kit, 70mm

Mounting brackets for TCRH (hardware included), permanent 35mm or 70mm

D614	Standard bracket (for Century, Simplex, Ballantyne projectors)
D616	Phillips AA bracket (for Norelco projector)
D617	"L" bracket (for Kinoton projector)
D622	Front mount bracket (use with Dolby SR-D™ or Sony SDDS™ readers)
5006-0001-00	Cinemeccanica bracket (use with D614 standard bracket)
E102	70mm spacer kit (used to fit a 35mm reader in a 70mm space)

Mounting brackets for TCRH (hardware included), switchable 35mm / 70mm

D615	Universal bracket
D625	35mm/70mm standard bracket used with breakaway plates
D628	Adapter panel for D617 "L" bracket (so breakaway plates can be used)
D626	Breakaway ("spacing block") plates for 35mm DTS reader head
D627	Breakaway ("spacing block") plates for 70mm DTS reader head

Technician supplies and film:

|	
E107	DTS Technician Kit (includes demo disc & 35mm film, setup & empirical test discs)
6060-0006-00	Empirical Test Disc, dated June 7 '97
6060-0005-0D	6-Track Setup Disc Rev. DS1
6060-0003-00	Buzz and Bill Show Disc (used w/DTS Demo film), dated Feb 1 '99
6800-0002-02	DTS 70mm (measuring delay) offset film

NOTES: UNLESS OTHERWISE SPECIFIED

NOTES: UNLESS OTHERWISE SPECIFIED

NOTES

Thank you for choosing DTS !

APPENDIX K   Motherboard D742 Revision K and earlier

Aux. Power In
⇩
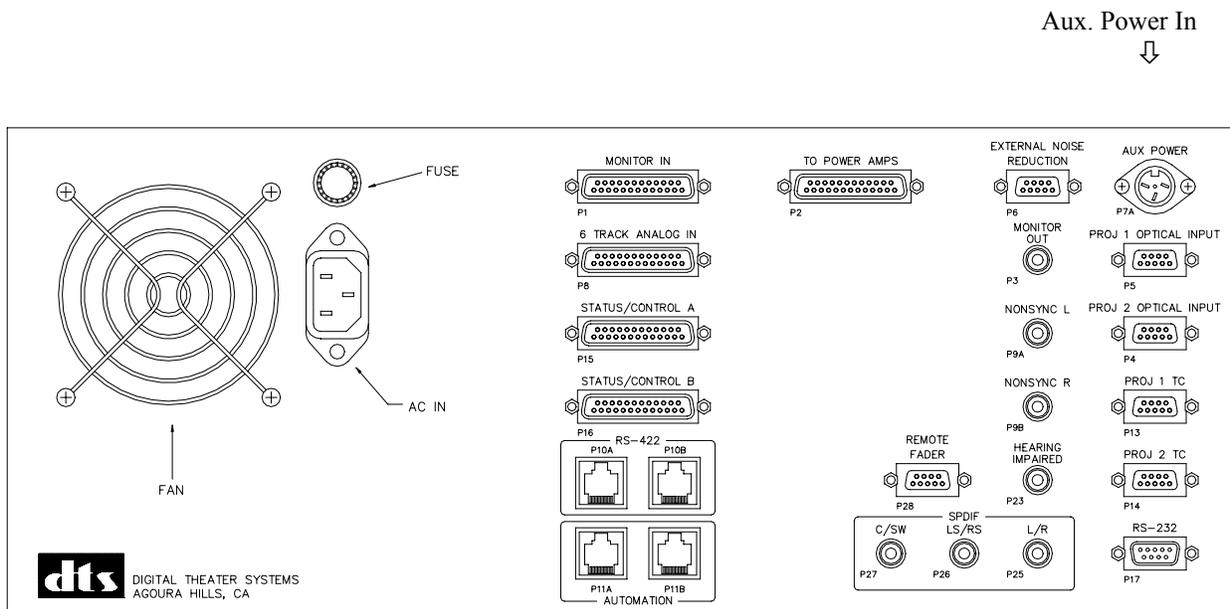
⇧   ⇧
RS422 and "AUTOMATION"

Auxiliary Power Supply Wiring (motherboards Rev. K and earlier)

A separate DIN connector is available for emergency power. A backup supply is highly recommended for failsafe operation. The BYPASS circuits on the D744 board require +12 VDC *and* −12 VDC to operate. If the internal power supplies fail, an external DC supply that has both positive and negative voltage output is required. It connects to the rear panel AUX POWER P7A via a 3-pin DIN connector. This is true for DTS-6AD and DTS-ECP D742 motherboards revision **K** and earlier.
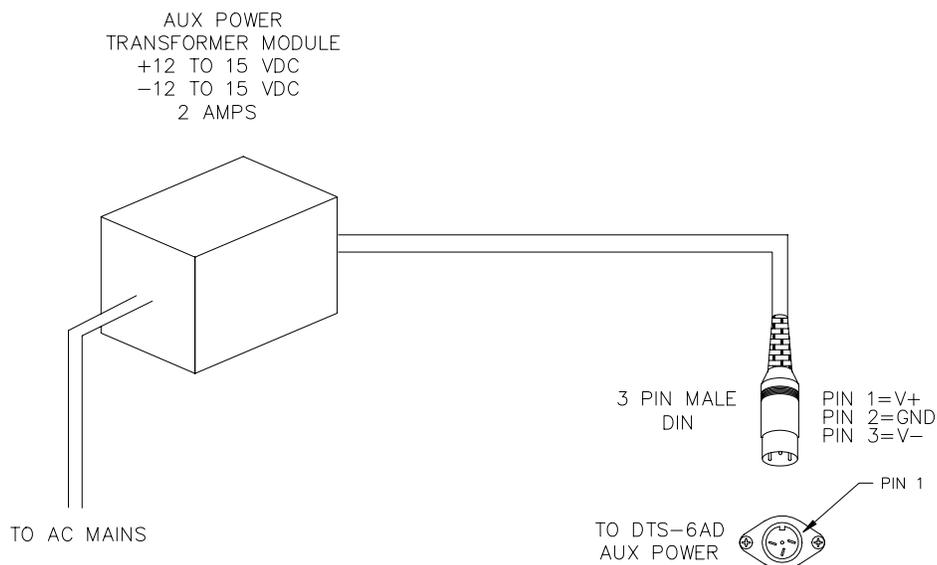
RS-422 DCP I/O and Local I/O "Automation" Wiring (motherboards Rev. K and earlier)

DTS-6AD RS-422 DCP I/O (P10A & B)

PIN NO.	DESCRIPTION
1	TXB -
2	TXB +
3	DIGITAL GND.
4	N.C.
5	RXB -
6	RXB +

FEMALE 8-PIN RJ45 CONNECTOR (BACK PANEL)

DTS-6AD LOCAL I/O (P11A & B)

"AUTOMATION"

PIN NO.	DESCRIPTION
1	TXC -
2	TXC +
3	DIGITAL GND.
4	+12VDC
5	RXC -
6	RXC +

FEMALE 8-PIN RJ45 CONNECTOR (BACK PANEL)

# APPENDIX L   ADJUSTING THE OPTICAL LEVELS WITHOUT A PC

The DTS-ECP must be upgraded to software V2.00 to enable this feature. V2.00 can be obtained by contacting your local DTS dealer and requesting the ECP V2.00 upgrade kit, DTS part number 9005E63900. In the kit, you will receive two IC ships, U8 and U9, programmed to V2.00.

How To Install V2.00

①   ⊠   **IMPORTANT!!** Use the DTS upload/download program to save all EQ settings to a PC before starting upgrade.

②   Power off DTS-ECP. Remove display and unplug both ribbon cables.

③   On bottom board (D740 CPU board), gently pull out the ejector tabs until the board releases. Pull D740 out.

④   Remove programmed chips, U8 and U9, in the D740 CPU board.

      • Install the updated chips. Pin 1 must be lined up for proper orientation. Pin 1 is marked on the board and pin 1 is next to the notch on the IC. See page 2.

      ⊠ **WARNING   U8 and U9 are sensitive to static discharge.** Precautions must be taken, such as using a grounding strap or touching case before removing or inserting ICs into board.

⑤   Put D740 back into DTS-ECP. Slide into side rails and push in until the board seats in place.

⑥   Plug the two display cables back in and attach display to front panel.

⑦   Power DTS-ECP on and verify unit boots properly.

⑧   Connect a PC via a null modem cable to the DTS-ECP. View the Format Selection tab screen to be sure the screen below appears.   Verify the correct software version is shown for DSP Controller (under "processor unit information").

ECP software version is shown here

Pin 1

U8   U9

Change
U8 and
U9

D740 PC BOARD

P1 LEFT (MONO)
P1 RIGHT (A)
P2 LEFT (SR)
P2 RIGHT (EXTERNAL)

DTS-6AD
CINEMA PROCESSOR

dts

D744
ANALOG
BOARD

PIN 1   PIN 1
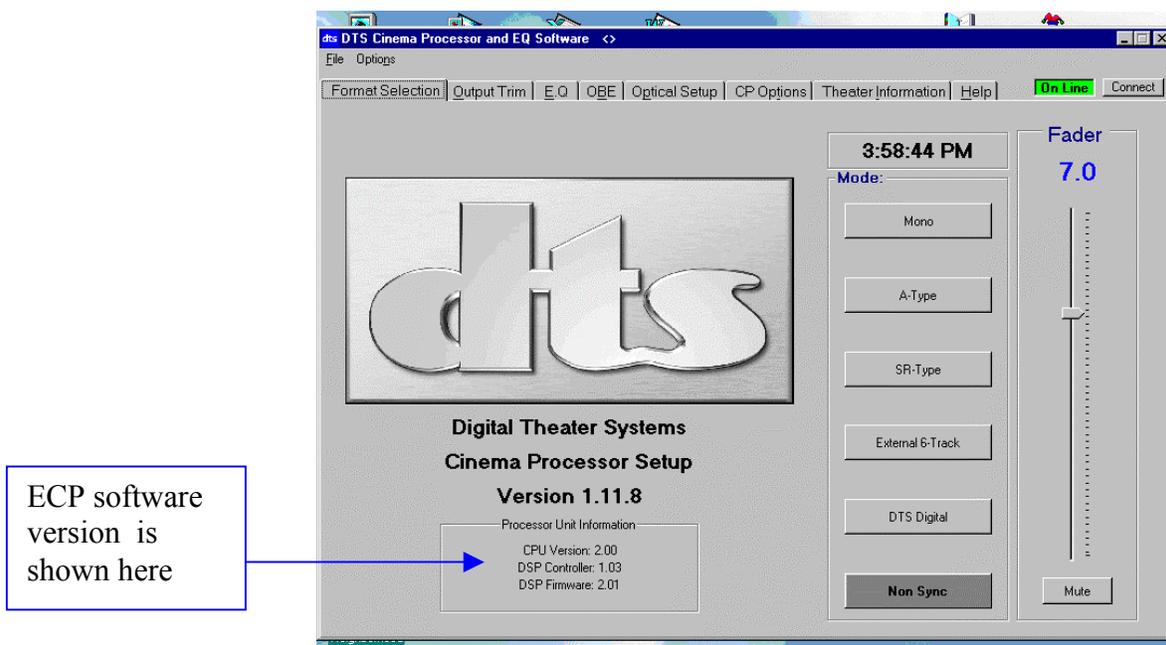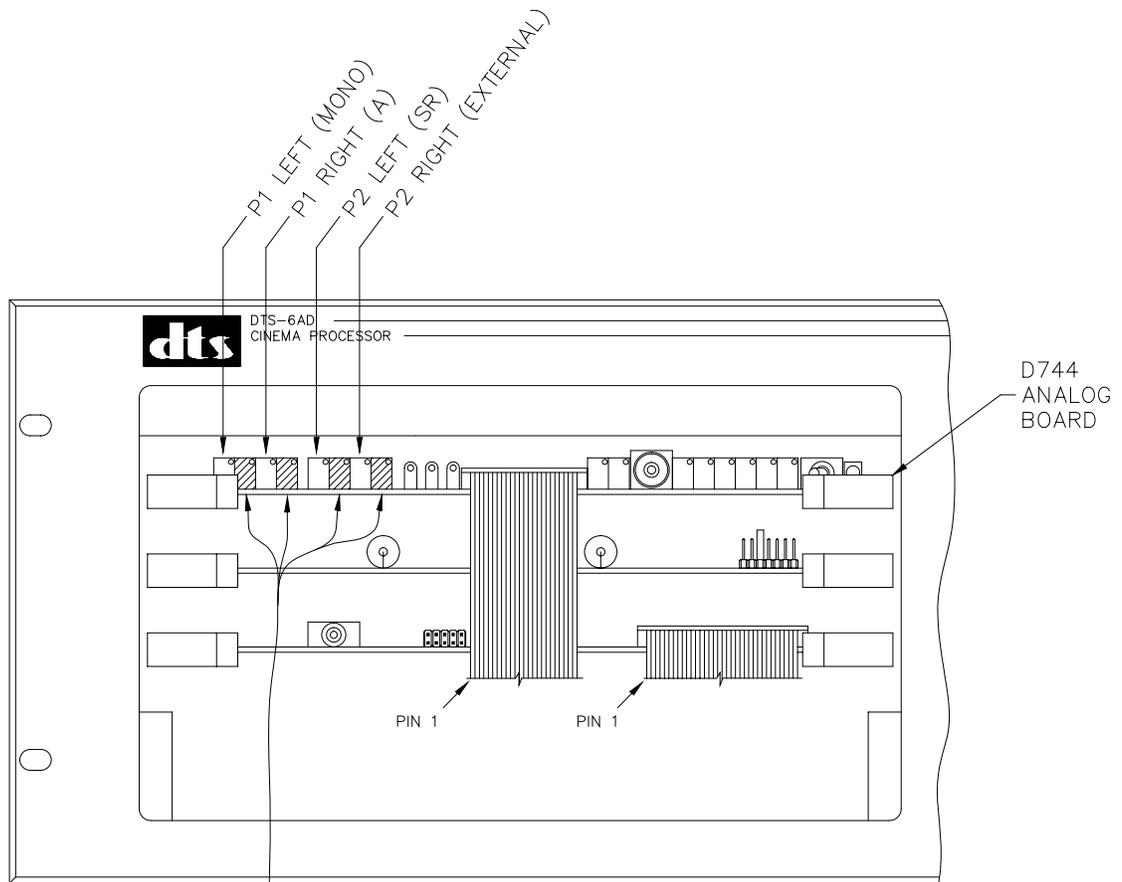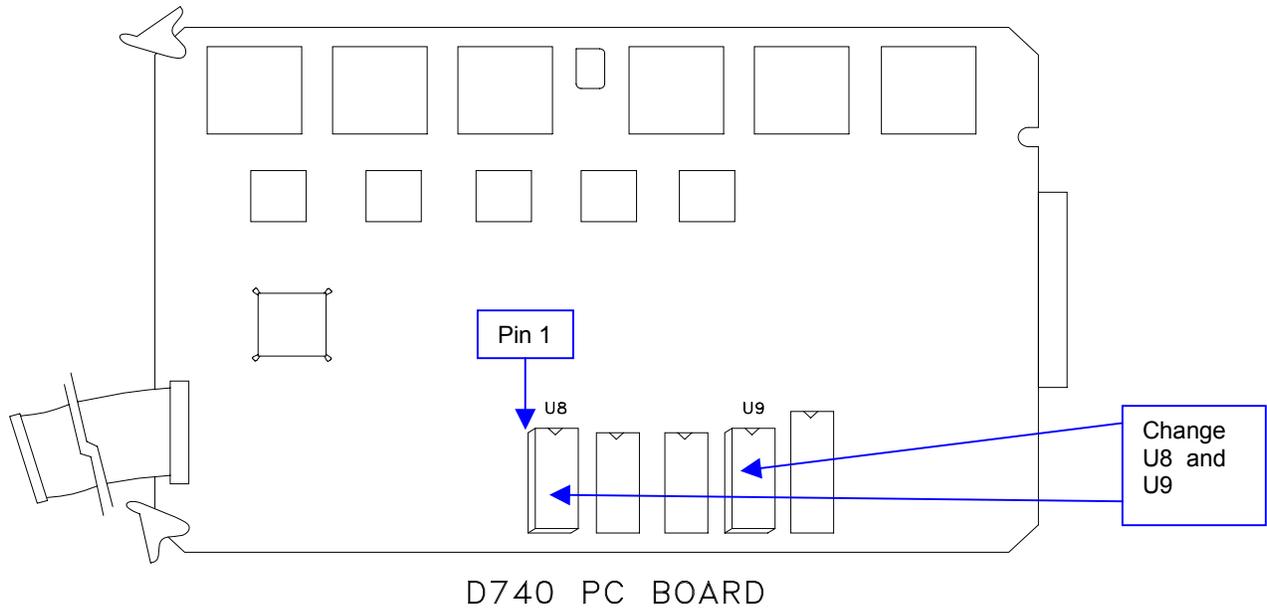
CONTROL PANEL NOT SHOWN

*WARNING
NEVER ATEMPT TO
MAKE ADJUSTMENTS TO
THESE POTS WITHOUT
PROPER TEST EQUIPMENT.

How To Use

①   Enter the optical gain mode by holding down the DTS-ECP front control panel **MONO** key until the MUTE button lights. This should take about 5 seconds.

②   Thread and run 1kHz 50% modulation optical test tone film.

③   Once in optical gain mode, the volume display becomes the gain display. The channel displayed maybe selected using the FORMAT keys. While in this mode, format LEDs will flash indicating which adjustment has been selected.

MONO	Press this key to adjust Projector 1 left channel
A	Press this key to adjust Projector 1 right channel
SR	Press this key to adjust Projector 2 left channel
EXTERNAL	Press this key to adjust Projector 2 right channel
NONSYNC	Pressing this format key will return the ECP to normal mode

④   The target level of –20dB is displayed as "5.0" (ref).

Level (during gain check)	Reading at volume display	
-7.50 dBu (or greater)	9.9	
-29.75 dBu	5.1	(– 0.25 dBu from reference)
-20.00 dBu	**5.0**	**(reference)**
-20.25 dBu	4.9	(+ 0.25 dBu from reference)
-32.50 dBu (or less)	0.0	

⑤   Gain adjustment is made with the D744 board's optical gain pots (see page 2 for their location).   Rotate the appropriate gain pots on D744 to achieve "5.0" on the front panel volume display.

      • For single projector operation, check projector 1 left and right channel.
      • For dual projector operation, check both projector's left and right channels.

⑥   Once levels are set, press the NONSYNC key to exit the optical gain mode and return to ECP normal mode.