

# Film-Tech

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These manuals are designed to facilitate the exchange of information related to cinema projection and film handling, with no warranties nor obligations from the authors, for qualified field service engineers.

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Please record the following information for your records:

Model: \_\_\_\_\_ Serial Number: \_\_\_\_\_

Date of Purchase: \_\_\_\_\_ Purchased from: \_\_\_\_\_

### **One Year Limited Warranty**



Ultra\*Stereo Labs, Inc. warrants that each product manufactured by it will be free from defects in material and workmanship under normal usage for a period of one (1) year after its purchase new from an authorized dealer. Our obligation under this warranty is limited to repairing or replacing any product or component which we are satisfied does not conform with the foregoing warranty and which is returned to our factory, freight paid, or serviced by one of our authorized contractors. The foregoing warranty is exclusive and in lieu of all other warranties, whether expressed or implied. Such warranty shall not apply to any product or component (A) repaired or altered by anyone other than Ultra\*Stereo Labs or an authorized service contractor; (B) tampered with or altered in any way or subjected to misuse, negligence or accident or (C) which has been improperly connected, installed or adjusted other than in accordance with Ultra\*Stereo Labs instruction.

# Section 1. Introduction

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**Please read the entire manual before beginning your installation.**

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## 1.1 Safety Notices

### General Safety Summary

#### European

Review the following safety precautions to avoid injury and prevent damage to this product. To avoid potential risk, use this product only as specified and only for the purpose described in the instruction manual.

#### To Avoid Fire and Personal Injury:

- **Use Correct Power Cable.** Use only the power cable provided. Ensure that the AC power outlet is located near the product and is easily accessible.
- **Use a Correctly Grounded Power Source.** The Power Supply earth ground is established through the ground conductor in the power cable. To avoid the potential of electric shock, the ground conductor must be correct.
- **Observe Source Ratings.** To avoid risk of fire or electric shock, the power source must be 220 - 240 VAC 50 Hz. (European Models)
- **Avoid Exposed Circuitry.** Do not attempt to open the Power Supply Transformer because its safety certification would be invalidated. The Power Supply Transformer is a non-repairable sealed device.
- **Do Not Operate with Suspected Failures.** If you suspect there is damage or malfunction with this product, call the factory.
- **Do Not Attempt Repair.** Only a trained factory service person is authorized to repair this product.
- **Do Not Operate this Product Near Heat Sources.** This product should not be located near heat sources such as radiators, heat registers, or stoves.
- **Provide Proper Ventilation.** The operating temperature range is between 0° C and 40° C. The humidity range is between 20% and 80%, non-condensing. The cooling method is by convection and an internal fan.
- **Keep Product Surfaces Clean and Dry.** Disconnect the power cable from the power source before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.
- **Do Not Push Objects Into Opening of this Product.** Never insert objects into the product through openings.
- **Do Not Operate In Wet or Damp Conditions.**
- **Do Not Operate In an Explosive Atmosphere.**

- **Prevent the Spilling of Liquids onto the System Components.**
- **Inspect the Power Cable and All Cables Prior to Use.** Confirm that the power cable and other interconnecting cables are free from damage.

#### Safety Standard

The EN 60065 standard specifies safety design requirements that reduce or eliminate the risk of personal injury to both the product user and service personnel. This product is designed and tested to meet the standards of the International Electrotechnical Commission (IEC) European Norm (EN) 60065 (The Standard for Information Technology Equipment Including Electrical Business Equipment).

## Le Résumé de la Sécurité général Européen

Examinez les précautions de la sécurité suivantes éviter la blessure et prévenir le dégât à ce produit. Éviter le risque potentiel, utilisez ce produit seulement comme a spécifié et seulement car le but a décrit dans le manuel d'instructions.

### Éviter Feu et Blessure Personnelle:

- **Utilisez le Câble du Pouvoir Correct.** Utilisez seulement le câble du pouvoir fourni. Assurez que les AC font fonctionner le débouché est localisé près le produit et est accessible facilement.
- **Utilisez une Source du Pouvoir Correctement Fondée.** La terre du monde de la Provision du Pouvoir est établie à travers le conducteur moulu dans le câble du pouvoir. Éviter le potentiel de choc électrique, le conducteur moulu doit être correct.
- **Observez des Estimations de la Source.** Pour éviter risque de feu ou choc électrique, la source du pouvoir doit être 220-240 VAC 50 Hz.
- **N'opérez pas ce Produit avec Toutes Clôtures Ouvertes ou Enlevez.**
- **Évitez l'Ensemble de circuits Exposé.** N'entreprenez pas ouvrir la Provision du Pouvoir parce que sa certification de la sécurité serait invalidée. La Provision du Pouvoir est un appareil scellé non-réparable.
- **N'opérez pas avec les Échecs Suspects.** Si vous suspectez il y a le dégât ou mal fonctionner avec ce produit, appelez l'usine.
- **N'entreprenez pas Réparation.** Seulement une personne du service de l'usine compétente est autorisée pour réparer ce produit.
- **N'opérez pas ce Produit Sources de la Chaleur Proches.** Ce produit ne devrait pas être localisé de sources de la chaleur proches tel que radiateurs, registres de la chaleur, poêles, ou amplificateurs.
- **Fournissez Ventilation Adéquate.** La température du fonctionnement devrait être entre 0° C et 40° C. L'humidité devrait être 20% et 80%. La méthode refroidissante est par convection et un ventilateur interne.
- **Gardez les Surfaces du Produit Nettoient et Sec.** Déconnectez le câble du pouvoir de la source du pouvoir avant de nettoyer. N'utilisez pas de nettoyeurs liquides ou de nettoyeurs de l'aérosol. Utilisez un tissu humide pour nettoyer.
- **Ne poussez pas d'Objets Dans Ouvrir de ce Produit.** Jamais objets de l'encart dans le produit à travers ouvertures.
- **N'opérez pas Dans les Conditions Mouillées ou humides.**
- **N'opérez pas Dans une Atmosphère Explosive.**

- **Prévenez le Répandre des Liquides sur les Composants du Système.**
- **Inspectez le câble du pouvoir et tous les câbles antérieur à usage.** Confirmez que le câble du pouvoir et autres interconnectant câbles sont libres de dégât.

### Le Niveau de la sécurité

L'EN 60065 niveau spécifie exigences du dessin de la sécurité qui réduisent ou éliminent le risque de blessure personnelle à l'utilisateur du produit et personnel du service. Ce produit est conçu et est testé pour satisfaire aux niveaux de l'Electrotechnical Commission International (IEC) Norm Européen (EN) 60065 (Le Niveau pour Matériel de la Technologie de l'Information qui Inclut le Matériel de l'Affaire Électrique).

## Allgemeine Sicherheit-Zusammenfassung Europäisch

Überprüfen Sie die folgenden Sicherheit-Vorkehrungen, Verletzung zu vermeiden und Schaden zu diesem Produkt zu verhindern. Um potentiell Risiko zu vermeiden, benutzen Sie dieses Produkt nur als vorgeschrieben hat und nur dem Zweck beschrieben in der Bedienungsanleitung.

### Um Feuer und Persönliche Verletzung zu vermeiden:

- **Benutzen Sie Korrektes Macht-Kabel.** Benutzen Sie nur das Macht-Kabel, das bereitgestellt wurde. Stellen Sie sicher, daß der WECHSELSTROM-Macht-Abfluß in der Nähe vom Produkt gefunden wird und leicht zugänglich ist.
- **Benutzen Sie eine Korrekt geerdete Macht-Quelle.** Der Macht Versorgung Erde Boden wird durch den Boden-Schaffner im Macht-Kabel gegründet. Das Potential elektrischen Schocks zu vermeiden muß der Boden-Schaffner korrekt sein.
- **Beobachten Sie Quelle-Klassen.** Risiko von Feuer oder elektrischem Schock zu vermeiden muß die Macht-Quelle 220 sein-240 VAC 50 Hz.
- **Operieren Sie dieses Produkt mit Irgendwelchen Gehegen nicht, die geöffnet wurden, oder entfernen Sie.**
- **Vermeiden Sie Ungeschützten Schaltkreise.** Versuchen Sie, die Macht-Versorgung zu öffnen nicht, weil seine Sicherheit-Zulassung ungültig gemacht werden würde. Die Macht-Versorgung ist ein nicht-reparierbares luftdicht verschlossene Gerät.
- **Operieren Sie mit verdächtig Mißerfolgen nicht.** Wenn Sie verdächtigen, gibt es Schaden oder Funktionsstörung mit diesem Produkt, rufen Sie die Fabrik.
- **Versuchen Sie keine Reparatur.** Nur eine erzogene Fabrik-Dienst-Person wird ermächtigt, dieses Produkt zu reparieren.
- **Operieren Sie dieses Produkt Nahe Hitze-Quellen nicht.** Dieses Produkt sollte keine nahe Hitze-Quellen wie Heizkörper, Hitze-Register, Herde, oder Verstärker gefunden werden.
- **Stellen Sie Richtige Belüftung bereit.** Die operierend Temperatur sollte zwischen 0° C und 40° C. Die Luftfeuchtigkeit sollte sein 20% und 80%. Die erfrischend Methode ist durch Konvektion und einen inneren Fächer.
- **Bleiben Sie, Produkt-Oberflächen reinigen und Trocken.** Trennen Sie das Macht-Kabel von der Macht-Quelle vor dem Reinigen. Benutzen Sie keine flüssige Reiniger oder Aerosol-Reiniger. Benutzen Sie einen klammen Stoff für das Reinigen.

- **Schieben Sie keine Gegenstände Ins Öffnen von diesem Produkt.** Nie Beifügung-Gegenstände ins Produkt durch Öffnungen.
- **Operieren Sie In Nassen oder Klammen Zuständen nicht.**
- **Operieren Sie In einer Explosiven Atmosphäre nicht.**
- **Verhindern Sie das Verschütten von Flüssigkeiten auf die System-Bestandteile.**
- **Inspizieren Sie das Macht-Kabel und alle Kabel vorausgehend zu Verwendung.** Bestätigen Sie, daß das Macht-Kabel und andere verbindend Kabel frei von Schaden sind.

### Sicherheit-Standard

Der EN 60065 Standard schreibt Sicherheit-Entwurf-Anforderungen vor, der reduzieren oder das Risiko persönlicher Verletzung zu sowohl dem Produkt-Benutzer als auch Dienst-Personal ausschließen. Dieses Produkt wird entworfen und wird geprüft, um den Standards vom Internationalen Electrotechnical Commission zu entsprechen (IEC) europäischer Norm (EN) 60065 (Der Standard für Informationen-Technologie-Ausrüstung, die Elektrische Unternehmen-Ausrüstung einschließt.).

## 1.2 Unpacking

Unpack the unit carefully. If the container has been damaged, thoroughly inspect the equipment to make certain there is no hidden damage. File a claim immediately with the carrier if any damage is found. Also advise your dealer or the factory.

The box should include the following items. If anything is missing, notify your dealer or the factory:

- DSP-60 Chassis
- Power Supply transformer
- Power Supply cable
- Backup Power Supply
- Screw-terminal plugs (6)
- D-9 connectors (2)
- D-25 connector (1)
- Diskette with PC Host program
- This Manual

A piece of packing material has been inserted inside the front cover to prevent the internal cards from shifting and being damaged during shipping. **This must be removed prior to powering up the unit.**

## 1.3 The DSP-60

Ultra Stereo has combined its vast experience with conventional analog theater sound systems with state of the art digital signal processing technology.

The result: The DSP-60, which we believe to be the finest surround decoder available today. Some of the standard features include:

- Dual stereo projector inputs with low-noise preamplifiers, individual gain and high-frequency boost controls, and emergency backup circuitry.
- Stereo line level inputs for Non-Sync (with fade-in), plus an auxiliary input. The Aux input also contains a built-in microphone preamplifier for public address use.
- 100% digital "A" and "SR" type noise reduction that emulates the analog standards.
- 5.1 "discrete" analog inputs for interfacing to existing digital-format decoders.
- Direct digital inputs for future "direct" (no analog) interface from digital decoders.
- 1/3 octave equalization on ALL channels.
- Advanced automation features including level trims for EACH FORMAT plus a "Low Level" feature for reducing the volume on analog trailers.

## 1.4 Configurations and Options

The DSP-60 unit includes all of the above features in every unit. All units come with a 120 VAC, US Standard connector power supply unless otherwise specified. Contact the

factory for information on the following options:

- Power supplies for 100, 220, and 240 VAC
- Three-channel (left, center, right) two-way Crossover Module
- Amplifier Monitor Module for power amplifier monitoring and diagnostics
- Direct Digital Input Module (Digital B)
- Remote Volume Controls
- DST-09 - DB-9 to screw terminal connector
- DST-60 - Automation adapter for DTS player
- DST-DA20 - Automation adapter for DA20 reader

## 1.5 Scope of this manual

This manual contains information on the installation, set-up, and operation of the DSP-60 surround processor. Set-up procedures through the front panel, as well as the PC host software are covered. Also included is fundamental information on alignment of projector soundheads.

## 1.6 Technical Specifications

### Construction:

Rack-mount chassis frame construction with plug-in modules accessible behind hinged front panel.

### Signal Connections

- a. Standard 9-pin D-type female connectors for: Projector 1, Projector 2, Mic/Aux, and RS-232 communications port.
- b. Standard 25-pin D-type female connectors for Digital A (5.1 analog) Input, Automation I/O, and Monitor output.
- c. Standard 15-pin D-type female connector for Digital B (direct digital data) input.
- d. Detachable screw terminal connectors are used for Automation inputs, Automation LED outputs, Preamp Loop (between preamp and noise reduction circuitry), Non-Sync input, Hearing-Impaired output, Line outputs, Crossover outputs, Power supply input, and Change-over pulse.

### Signal Inputs

#### a. Projector Inputs:

Voltage:	8 mV nominal
Impedance:	370 ohms
Voltage adjustment:	± 18 dB (1 mV to 64 mV)
High Frequency Boost:	10.5 kHz to 48 kHz

#### b. Non-Sync Input:

Voltage:	300 mV nominal
Impedance:	15 kOhms
Voltage adjustment:	+10/-15 dB (100 mV to 1.6 V)

#### c. Auxiliary Input:

Voltage (line):	300 mV nominal
-----------------	----------------

Impedance (line): 15 kOhms  
Voltage (mic): 10 mV nominal  
Impedance (mic): 2 kOhms  
Voltage adjustment: +10/-15 dB (100 mV to 1.6 V)

**d. Digital A Input:**

Voltage (subwoofer): 100 mV nominal  
Voltage (all other channels): 300 mV nominal  
Impedance: 10 kOhms  
Voltage adjustment: None

**d. Digital B Input:**

Three I<sup>2</sup>S datapairs @48 kHz sample rate. Direct Digital input module accepts other types of inputs

**Signal Outputs**

**a. Preamp Outputs:**

Voltage: 300 mV nominal  
Impedance: < 100 ohms

**b. Line Outputs:**

Voltage: 300 mV nominal  
Impedance: < 100 ohms

**Audio Signal Paths**

Headroom: 26 dB (With EQ flat. 20 dB minimum with full EQ boost)

S/N Ratio (all film modes): 70 dB minimum

EQ bands (subwoofer): 10 1/3-octave bands from 25 Hz to 200 Hz

EQ bands (all other): 27 1/3-octave bands from 40 Hz to 16 kHz

EQ level adjustment: +6/-10 dB

Surround delay: 10 to 150 mS

**Automation Inputs**

Active low, momentary dry contact closures. Automation common is connected to signal ground inside the DSP-60 through a 10 ohm resistor (to minimize ground loop problems). Contacts may be maintained, but must release before another automation signal can be activated.

**Automation Outputs**

Active high, 14V nominal through 1 kOhms. Recommended indicator circuit is a standard LED with an additional (external) 1 K series resistor.

**Power Input**

24 VAC nominal (21 VAC minimum) at 2.5 amperes from external transformer (included).

## 1.7 Declaration of Conformance, CE DSP-60, Cinema Sound Processor

### EC Declaration of Conformity

Meets intent of Directive 89/336/EEC for Electromagnetic Compatibility and Low-Voltage Directive 73/23/EEC for Product Safety. Compliance was demonstrated to the following specifications as listed in the Official Journal of the European Communities:

EN 55013 Emissions: ②

IEC 1000-3-2 Class A Radiated and Conducted Emission

IEC 1000-3-3 AC Power Line Harmonic Emissions

EN 55013 Immunity: ②

IEC 1000-4-2 Electrostatic Discharge Immunity

IEC 1000-4-3 RF Electromagnetic Field Immunity

IEC 1000-4-4 Electrical Fast Transient/Burst Immunity

IEC 1000-4-5 Power Line Surge Immunity

IEC 1000-4-6 Conducted RF Immunity

IEC 1000-4-7 Voltage Dips, Short interruptions and Variations

### Certifications

1) Low Voltage Directive 73/23/EEC: ①

EN 60065 Audio, Video And similar Electronic apparatus Safety Requirements IEC 60065:1998, Safety and Overall Compliance ①

2) Basler Electric Isolating Transformer

Declaration of Conformity

Safety EN 60742/95 Isolating Transformers and Safety Isolating Transformer Requirements

3) PDE Labs, Inc.

Declaration of Conformity

EMC ②

### VDE Certified Power Cords

### Pollution

Not intended for environments where conductive pollutants may be present

### Equipment Class

Class III Equipment: Equipment in which protection against electrical shock relies upon supply from SELV circuits (Safety Transformer) and in which hazardous voltages are not generated. Insulation and protective fusing are used in addition to these criteria.

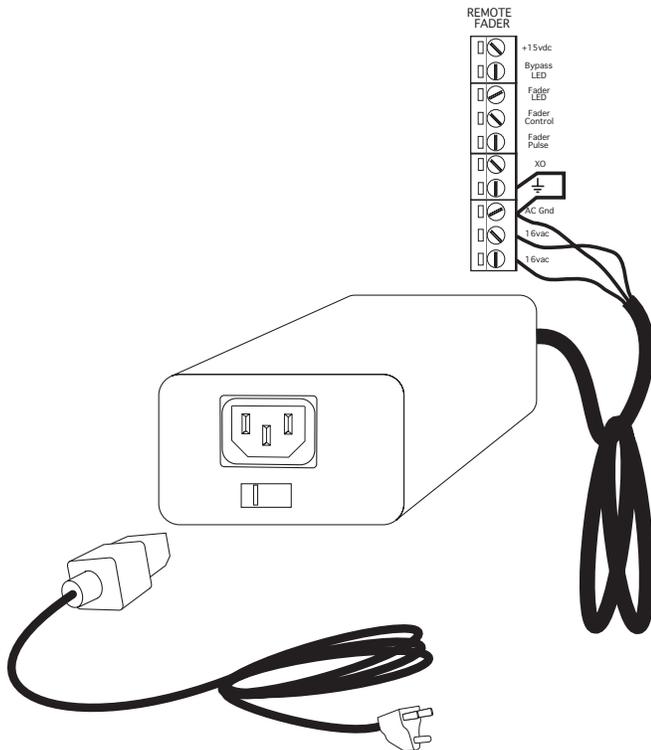
Equipment Type A: Equipment that is intended for connection to the building power supply wiring via non-industrial plugs and sockets or via appliance couplers or both.

## Section 2. Installation

### 2.1 System Hardware Mounting and Grounding

The DSP-60 is designed to mount in a standard 19" rack, and is two standard rack spaces (3-1/2") high. The special design of the DSP-60 chassis maintains adequate airflow with temperatures from 0° to 40° C without blank panels above and below the unit. However, we recommend blank panels above and below whenever space permits. Mounting the unit immediately above a major heat producing component (like a power amplifier) is not recommended. The DSP-60 power supply includes a three-prong grounding plug and a three-wire power cord to accommodate a safe ground path from the DSP-60 chassis to the electrical system ground. Defeating this ground by removing the ground prong or disconnecting the chassis ground wire is not recommended.

In addition, the power connector on the DSP-60 chassis includes a strap between the chassis ground point and the signal ground for the internal circuitry. This ground strap is installed at the factory, but may be removed if necessary to minimize noise and ground loop problems.

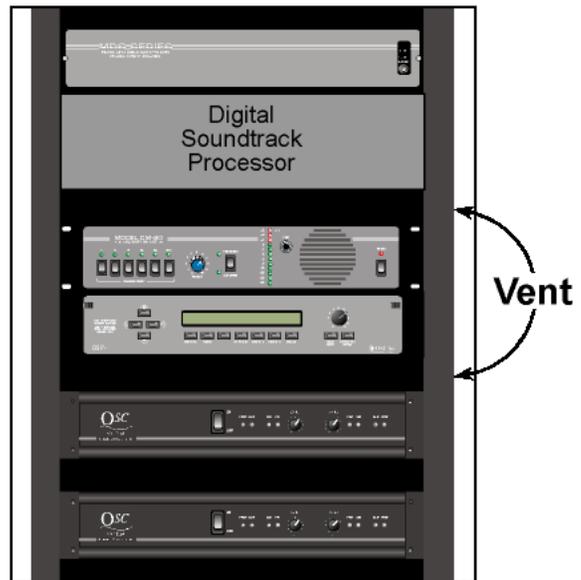


### 2.2 System Cooling and Ventilation

#### Important

Care should be taken to insure the DSP-60 has adequate ventilation for cooling during operation. It is recommended that one rack space below the DSP-60 is left open to allow outside air circulation through the unit. A ventilation panel, USL, Inc. part number V P-1, is recommended for projection booths where the normal ambient temperature exceeds specified equipment operating temperatures listed in the safety section of this manual. Also, it is recommended that equipment with no more than an eight-inch depth be mounted directly above the DSP-60 to insure adequate airflow through the unit's top ventilation slots.

The DSP-60 employs two internal cooling fans for air ventilation. An open cell foam air filter is used in conjunction with the fans for dust filtration. The air filter **must** be removed and cleaned at least once every six to 12 months, depending on the environment. The filter can be removed and cleaned simply by pulling it out of the card slot and washing it out with regular water. Let the air filter dry thoroughly before replacing it.





## Projector Inputs

The projector inputs are connected through standard 9-pin D-type connectors. (These connectors are included with the DSP-60). The pinout is:

- 1 In L+
- 2 In L-
- 3 Gnd
- 4 In R+
- 5 In R-
- 6 Gnd
- 7 -12 VDC
- 8 +12 VDC
- 9 Gnd

(An adapter board with setscrew terminals is available for solderless connections. Ask for part # DST-09.)

## Preamp In/Out

The DSP-60 includes a “loop” point between the projector preamplifier and the input to the noise reduction circuitry for flexibility in some special applications. Normally the “Out” (from the preamplifier) is strapped directly to the “In” (for the rest of the circuitry). One of the plugs provided with the unit will have these jumpers installed.

## Non-Sync Input

The Non-Sync (music) input terminals are located on the same block as the Preamp In/Out. Connect the tape or disk player (or Music Distribution System) to the terminals marked “Non-Sync” “Left”, “Right”, and ground.

## Auxiliary Input

The Aux input is available for public address, or an additional stereo source. (Note: The noise reduction circuits do not operate on the aux input) The Auxiliary signals are connected through standard 9 pin D-type connectors. (These connectors are included with the DSP-60). The pinout is:

- 1 Mic in +
- 2 Mic in -
- 3 Mic out
- 4 Aux in L
- 5 Aux in R+
- 6 Gnd
- 7 N/C
- 8 N/C
- 9 Aux in R-

The “Mic in +” and “Mic in -” terminals are the balanced, medium-low impedance microphone inputs. The shield of the microphone cable should be connected to ground on pin 6. If an unbalanced microphone is used, connect pin 2 (Mic in -) to ground also. Pin 3 (“Mic out”) is the output of the preamplifier, and should be jumpered to one or more of the line-level (Aux) inputs.

Notice there is an “R+” and an “R-” but only a single input for the Left channel. These pins are not intended for

balanced inputs, rather they are available to invert the phase of the right channel input in order to force the surround decoder matrix to send the signal (from a mono source such as the microphone) to the desired speakers. For example: If the “Mic out” terminal is jumpered to the “L” and “R+” terminals, the surround matrix will direct the signal to the center speakers. If the “Mic out” terminal is jumpered to the “L” and “R-” terminals, the surround matrix will direct the signal to the surround (rear) speakers. By connecting the “Mic out” terminal to only the “L” or “R+” terminal, the surround matrix will direct the signal only to the left or right speakers.

## Digital A Input

The Digital A input is a six-channel audio input from a digital soundtrack player. The 25 pin D connector is compatible with most decoders.

## Digital B Input

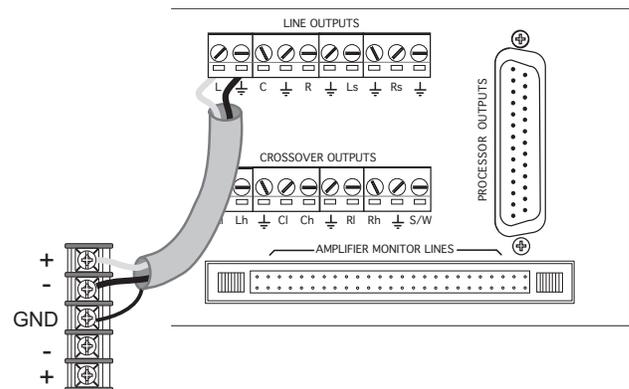
The Digital B input is a digital domain input configured for three I<sup>2</sup>S data pairs @ 48ksps. The Direct Digital input module is required to accept other types of inputs.

## 2.4 Back Panel Signal Output Connections

### Line Outputs

These are the main processor outputs to connect to the power amplifiers. The outputs are unbalanced, and all have a corresponding ground terminal. Use two-conductor shielded cable for each channel. The shield should usually be connected to ground at the power amplifier end only.

The subwoofer line output is on the terminal strip with the crossover outputs.



### Amplifier Input

### Crossover Outputs

These are the outputs from the optional two-way crossover module. Although there is only one ground terminal for both high and low frequency outputs, it is recommended that a separate two-conductor shielded cable be

used for each output. Twist the two “minus” wires together and insert in the ground terminal.

### Monitor Outputs

This is a 25 pin D-type connector containing the line output signals for all six channels, as well as the cross-over outputs. It can be connected directly to any Ultra\*Stereo “CM” series monitors. The pinout for this connector is in the appendix.

### Hearing Impaired Output

This line level output is the sum of the left, center, and right channels. It can be connected to an Ultra\*Phonic or other hearing impaired system. Output level is approximately 300 mV.

## 2.5 Back Panel Automation Connections

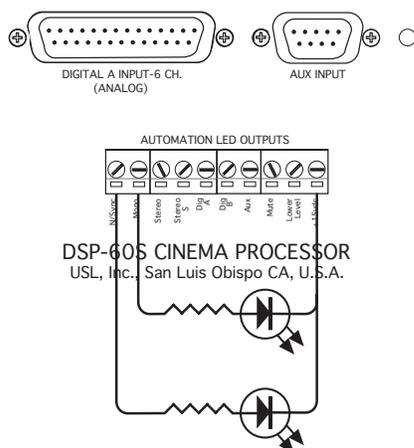
### Automation Inputs

These are contact closure inputs to remotely trigger the DSP-60. There are nine automation inputs: one for each of the seven DSP-60 operating modes, a “Low Level” input, and a “Mute” input. These are intended to be momentary contact closures; however, maintained closures can be used. A maintained contact closure must be released before another automation input can be operated.

The “Low Level” and “Mute” functions are released by selecting (or re-selecting) one of the main input modes. The Automation common terminal is isolated from the system ground through a 10 ohm resistor to minimize ground loop problems.

### Automation LED Outputs

These are active-high outputs that can directly drive remote LEDs for monitoring the status of the DSP-60. The outputs are current limited, however an additional 1 K resistor in series with each LED (at the LED) is recommended in case of wiring faults.



### Automation I/O

This 25-pin D-type connector contains most (not all!) of the automation input and output signals. The pinout for this connector is in the appendix.

(An adapter board is available to convert to the DTS automation pinout. ( DST-6D)

An adapter to allow a DA20 decoder to recognize format changes from the DSP-60 front panel is also available. (DST-DA20)

## 2.6 Other Back Panel Connections and Controls

### Power Input

The DSP-60 uses an external power transformer to convert the power line voltage down to 24 VAC required by the unit. There is also a chassis ground terminal that should be connected to the ground terminal on the transformer.

### Remote Fader

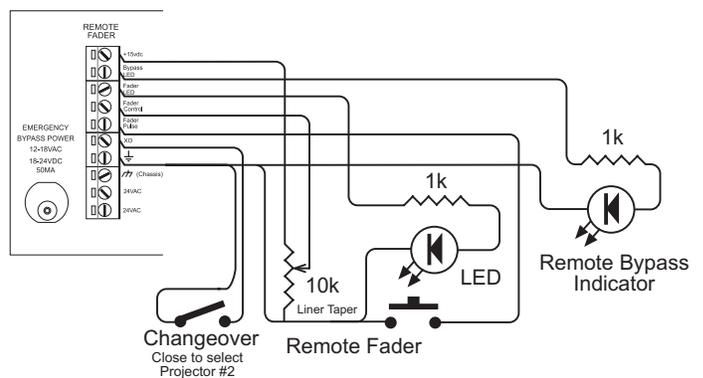
A linear taper potentiometer and switch can be connected to the DSP-60 to allow control of the volume from the house, manager’s station, or other remote location. The remote momentary switch is used to activate the remote fader, and an LED can be wired to show that it is active.

### Changeover

The DSP-60 includes dual preamplifiers for use in two projector changeover systems. Grounding the “XO” terminal mutes the Projector 1 input and selects Projector 2.

### Bypass LED

An LED can be connected to remotely indicate that the unit is in the emergency bypass mode.



### RS232 Port

A standard 9 pin D-type connector connects to a host PC computer. There is a duplicate connector inside the front cover. The cable should be a standard male to female “straight through” type. Only one port should be used at any time.

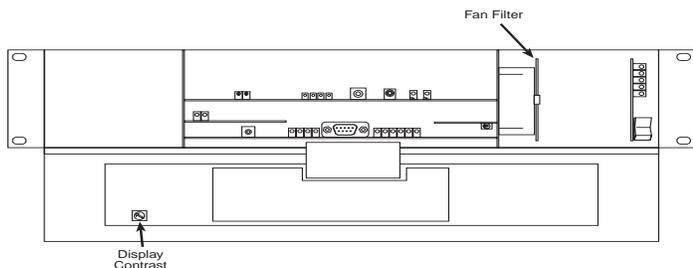
## Program Code

This switch selects the primary surround decoding mode. When set to 0, normal six channel (Left, Center, Right, Left Surround, Right Surround, Subwoofer) decoding is used. When set to 1, two channel (Front, Back) decoding is used. All other switch positions are reserved.

Note: This switch does not affect the channel presentation of externally decoded (Digital A, Digital B) sources.

## 2.7 Inside the DSP-60

To open the DSP-60 front cover, slide the two latches toward the center, and tilt the front panel down. Inside there are slots for six circuit boards. Three boards are required in every unit, the other three are optional. The three required boards are the Power Supply (DSS-60), Digital Control and Processing Board (DSC-60), and Analog Board (DSA-60).

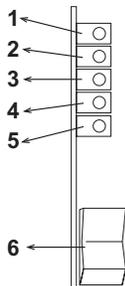


## Power Supply

The power supply is in the far right hand slot. The main power switch is located on this board. There are five LEDs on the power supply that show the status of the various supply voltages.

### Power Supply Board Identification

- 1. + 24V Indicator LED
- 2. + 15V Indicator LED
- 3. + 5V Indicator LED
- 4. + 12V Indicator LED
- 5. - 12V Indicator LED
- 6. Main Power Switch

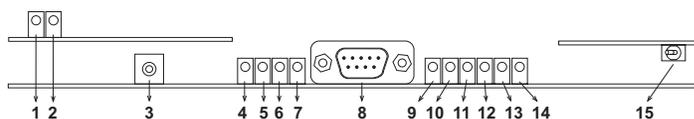


## Digital Control Board

In the center are two larger circuit boards. The lower board is the "Digital" Board, which contains all the DSP processing as well as the microcontroller that operates the user interface. On the left hand side is a master reset switch for the unit. To the right of that are four LEDs that show the status of the local power supply regulators. In the center is a standard D-9 connector for PC interfacing. (There is another PC port on the back panel. Use only one at any time.) To the right of the connector are six LEDs that show the status of the six individual DSPs. When the unit is operating properly, all six of these LEDs will be lit. (This feature is supported in NR, MTX, and EQ software Version 1.1 or later.)

To the right of the six DSP status LEDs there is a small circuit board plugged onto the main Digital Board. This board is known as the "Personality Module", and contains the non-volatile memory in which all of the set-up parameters are stored. If it ever becomes necessary to replace the Digital Board, simply remove the small Personality Module and install it onto the new board. All of the levels, equalization, etc. will automatically be loaded into the new board. There is a switch on this board for additional security against accidental (or deliberate) changes to the set-up parameters. Setting the security switch "On" will prevent changes to the memory.

### Digital Board Identification

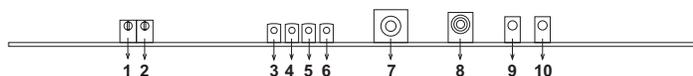


- 1. + 5V Status Indicator LED
- 2. - 5V Status Indicator LED
- 3. Master Reset Switch (Push)
- 4. + 5V A/D LED
- 5. + 5V D/A LED
- 6. + 9V LED
- 7. - 9V LED
- 8. RS232 Port
- 9. NR Left Status LED
- 10. NR Right Status LED
- 11. Matrix Status LED
- 12. EQ1 Status LED
- 13. EQ2 Status LED
- 14. EQ3 Status LED
- 15. Memory Protect Switch

## Analog Board

The upper of the two large boards is the "Analog" Board. It contains the projector preamplifiers, the input signal switching, input and output level amplifiers (all levels are adjusted in the analog domain for maximum dynamic range and fidelity), and the built in pink noise generator. To the left side of this board are two trim pots. These adjust the preamplifier gain for the emergency bypass circuitry (Projector 1 and Projector 2). They are the only "Physical" adjustments on the unit. To the right of these are four test points for the preamplifier outputs: left, right, mono, and ground. Next are two mini phone jacks. The larger 1/8" jack provides an insertion point for external pink noise or other test signals. The smaller 3/32" jack provides a means to remotely turn the test signal on and off. Finally, there are two LEDs that indicate which of the two projector inputs is active. The green LED indicates Projector 1, Red indicates Projector 2.

### DSP-60 Audio Board Identification



1. Emergency Bypass Level, Projector #1
2. Emergency Bypass Level, Projector #2
3. Test point, Preamp Output Left
4. Test point, Preamp Output Right
5. Test point, Preamp Output Mono
6. Test point, Ground
7. External Pink Noise Input
8. Pink Noise Trigger
9. Active Indicator, Projector #1
10. Active Indicator, Projector #2

## 2.8 Emergency Power Supply

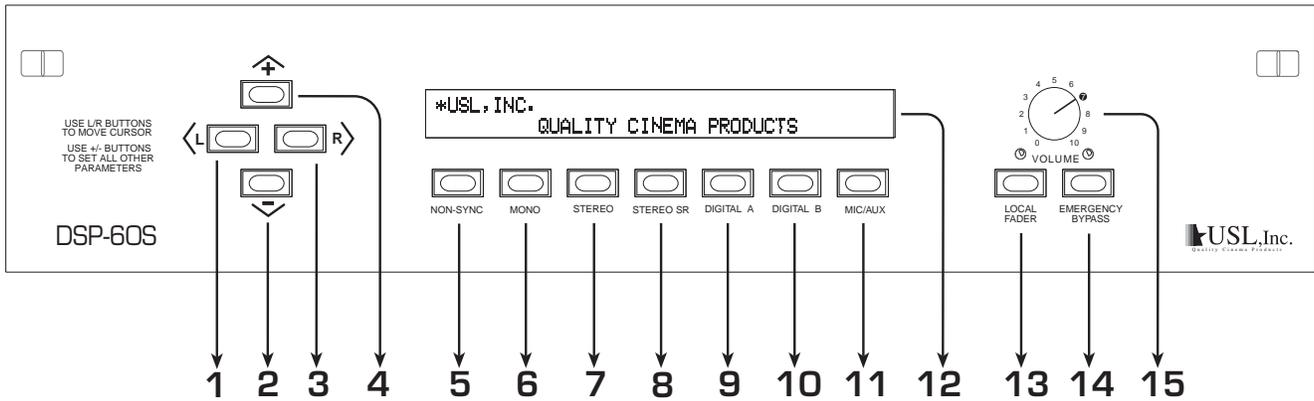
The DSP-60 provides for a backup power supply to run the emergency bypass circuitry. The emergency bypass circuits are also powered from the main internal supply, and will provide show-saving operation for anything but a power supply failure. If the secondary supply is installed, it will operate the emergency circuits even if the power supply itself does fail. Switching between the main and secondary supplies is automatic.

# Section 3. Front Panel Controls and Programming

## 3.1 Front Panel Controls

The DSP-60 front panel consists of three main areas. On the left are the “cursor” controls used in the setup menus and for adjusting the mode trim levels. In the center is the display and the mode selection buttons. On the right is the main volume control, and buttons for clearing the remote fader and activating the emergency bypass.

DSP-60 Front Panel and Display



1. Left Cursor. Use to select field for editing. Clears Low-Level.
2. Down. Use to adjust selected parameter, or trim input levels.
3. Right Cursor. Use to select field for editing. Sets Low-Level.
4. Up. Use to adjust selected parameter or trim input levels.
5. Non-Sync mode select.
6. Mono mode select.
7. Stereo “A” mode select.
8. Stereo “SR” mode select.
9. Digital A mode select.
10. Digital B mode select.
11. Mic/Aux mode select.
12. Display.
13. Local Fader. De-activates remote fader.
14. Emergency Bypass
15. Master Volume Control.

## 3.2 Entering Set-Up Mode

### Main Operation Screen

When power is turned on, the unit will boot and test each of the DSP circuits. This takes about eight seconds. When it has completed the tests, it will display the main screen, which looks something like this:

```
P1 BYPS L C R Ls Rs SW
00dB
```

### Entering Setup

To enter the set-up mode, press and hold the “Non-Sync” button for five seconds. The display will prompt for an access code.

The default access code is 1 2 3 4. Press <1> <2> <3> <4> then <enter>. The calibration menu will appear:

```
-PLEASE ENTER ACCESS CODE-
1 2 3 4 5 6 enter
```

## 3.3 Calibration Menu

There are five separate sub-menus: preamp, aux, matrix, eq, and output.

```
-CALIBRATION MENU-
exit preamp aux matrix eq output
```

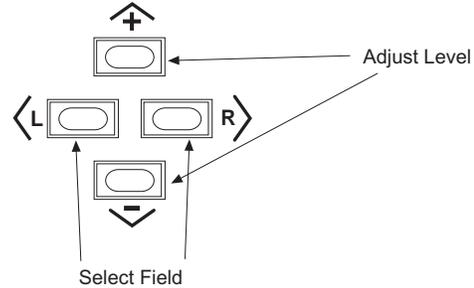
### Preamp

The preamp set-up menu allows adjustment of the gain, and slit loss eq, for each projector, and a separate eq setting for the mono mode. The display will show:

```
PREAMP P1-S LT RT FREQ 10.5kHz
menu
```

P1 indicates which projector is active. (The level and EQ settings are stored separately for each projector) “S” (or “M”) indicates whether the Stereo or Mono EQ settings are being modified. Next to “LT” and “RT” are bargraphs showing the signal level coming from the projector. The lower line bargraphs show the gain setting for that channel. The arrows (^) point to the 0 dB reference level.

To set up the preamplifier gain, while running a test tone loop, use the “L” and “R” cursor buttons until “LT” is blinking, which indicates the left channel is being adjusted. Use “+” and “-” to adjust the level until the bar directly above the arrow is on. Repeat the procedure for the right channel.



To adjust the slit loss EQ, move the cursor so “FREQ” blinks, and use the +/- keys to adjust the frequency for the desired response. The peak frequency is adjustable from 10.5 to 50 kHz. The mono eq is an additional low pass filter active only in the mono mode. It is adjustable from 6.8 to 12 kHz. See Section 5 for more details on projector alignment and theater set up.

### Aux

The aux menu allows you to set up the input sensitivity for the Non-Sync and Auxiliary inputs. Each can be varied from -10 to +15 dB. 0 dB is a good starting point for a normal “line” level input. The “L” and “R” cursor control buttons select which input is being modified. The “+” and “-” cursor controls modify the setting.

```
AUX INPUTS NON/SYNC 00dB MIC/AUX 00dB
menu
```

### Matrix

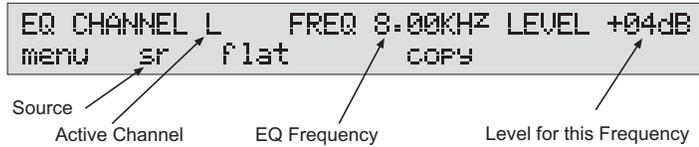
This menu is for adjusting the surround delay, and the levels for the surround and subwoofer channels when decoded from an analog stereo source. The surround delay time is adjustable from 10 to 150 mS. The surround and subwoofer level adjustments allow increasing (or decreasing) the levels for material decoded from analog stereo film tracks without affecting the level of these channels in the digital, discrete channel modes. The surround level is adjustable  $\pm 6$  dB, the subwoofer level is adjustable  $\pm 10$  dB.

```
MATRIX DELAY 010MS SURROUND 0dB S/W 00dB
menu
```

## EQ

This menu allows changing of the EQ settings for all six audio channels. The subwoofer channel has 1/3 octave controls from 25 to 200 Hz. All other channels have 1/3 octave controls from 40 Hz to 16 kHz. Each frequency band is adjustable +6 to -10 dB.

The DSP-60 internal pink noise generator is automatically activated in the EQ menu. The display above the second button will show “pink” to indicate the source. It is possible to change the source to any other input by pressing this key.



The “Channel” mode (Use “L” and “R” until the channel is blinking,) steps through the channels in this order: L, L+C, C, C+R, R, Ls, Ls+Rs, Rs, SW, SW+C. The multiple channel modes allow listening to and measuring the combined signals blended from adjacent channels. These are useful for checking speaker phasing. The EQ settings can only be altered when a single channel is active.

The “flat” key is a quick way to set all controls for a given channel to 0. After pressing this key, the DSP will ask you to verify this is really what you want to do, since this will overwrite all of the settings for this channel and cannot be undone:



The “copy” key allows the settings for one channel to be copied to another. This is useful in getting a “close” starting point. For example, after equalizing the center channel, this EQ setting can be copied to the left and right channels, which will most likely have a similar response curve. The left surround can be copied to the right surround.



Use the buttons below “From” and “To” to select the desired combination, then press “copy.”

## Output

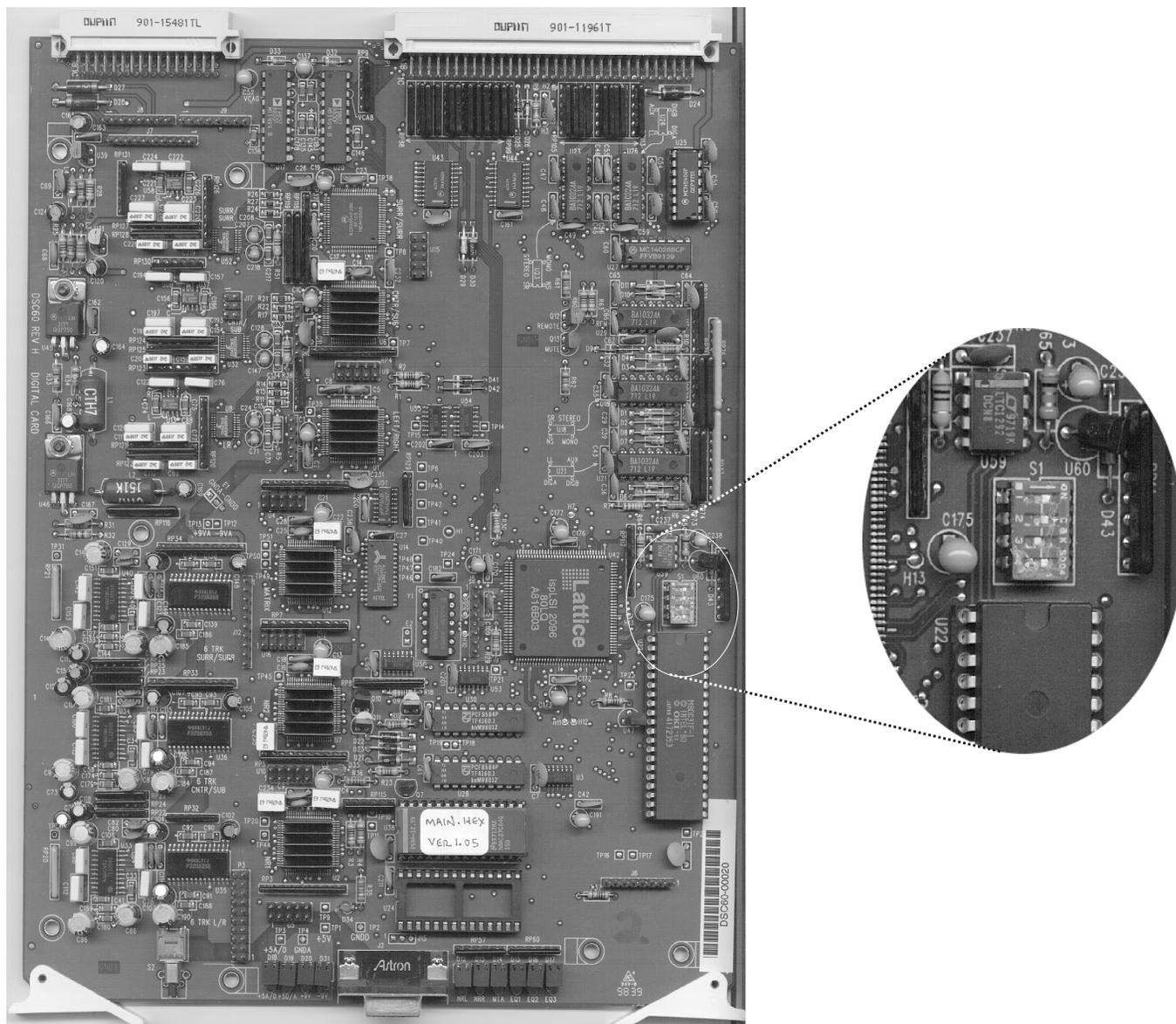
The output menu is for setting up the overall level of each of the six channels. As with the EQ menu, the DSP-60 will automatically activate the internal pink noise source. Other sources can be selected manually as desired by pressing the button underneath the displayed source. Each channel level can be adjusted -15 to +10 dB.



If the optional crossover card is present, “biamp” submenu appears. This allows adjustment of crossover point and high frequency gain.

### 3.4 Changing the Access Code

The password used to enter the setup mode can be selected from one of 16 different preset combinations. The access code is selected from a DIP switch on the Digital Control Board inside the unit.



<u>Setting</u>	<u>Access Code</u>	<u>Setting</u>	<u>Access Code</u>
0000	1 2 3 4	1000	3 4 3 6
0001	2 1 1 4	1001	6 4 5 1
0010	1 1 2 2	1010	6 1 6 5
0011	1 3 4 2	1011	1 5 6 2
0100	2 5 4 1	1100	1 6 1 4
0101	3 6 3 5	1101	4 5 1 6
0110	1 3 1 5	1110	6 3 1 2
0111	4 2 2 3	1111	2 4 6 1

# Section 4. PC Host Programming

## 4.1 Software Installation

The PC host API (application program interface) is comprised of three files. The file names are (DSP60.exe), (DSP60.ini), and (SETUP.exe). The files are on the program disk that comes with the DSP60 manual and accessory kit. To install the application program simply place the application program disk in Drive A, and double-click on the (SETUP.exe) file. Make a short cut to the DSP60.exe program and place it on the desktop. See example of DSP60 Icon below.



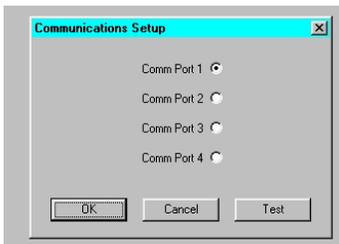
To activate the DSP60 application double click on the short cut icon on the desk top.

## 4.2 Connecting to the DSP-60

Communications to the DSP-60 using a laptop computer is established through a standard RS232, 9 pin DB-type serial connector. The DSP-60 has two 9 pin DB-type connectors available for communications. One is located on the rear back panel, labeled "RS232 Port". The other serial connector is located behind the front panel, on the digital processor board. The cable should be a straight through "pin to pin," not null-modem type.

### Communications port selection

The communications setup window, shown below will pop up if the laptop or computer can not communicate with the DSP-60. If the window is displayed select COM2 and press the test button. Continue this until the test passes then select OK to open the program. NOTE: The default COM port is COM1.

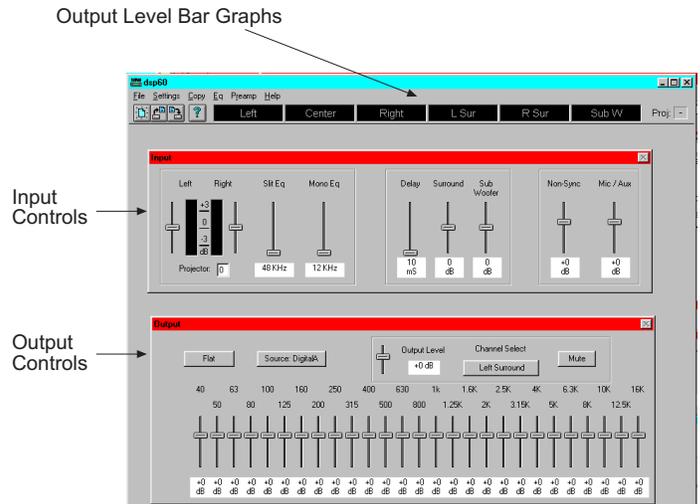


## 4.3 Host Interface Control Panel Introduction

The PC Host interface consists of two main control windows.

The top window shown here is used to control all input levels. Access to this control panel is typically used during the initial set-up of the "A chain" alignment and calibration procedure. Additional adjustments here include the input levels for the Sub, Surround, Non-Sync and Aux/Mic inputs

The bottom window controls the output channel levels and EQ functions (B chain). From this panel all of the Output channels and equalization controls are easily accessed, making the EQ process simple and quick when using the DSP-60's built-in Pink Noise Generator.



### Additional Controls

Other controls available from the output window include: Input source selector, Output channel selector, Output level controls, mute and the Set EQ "flat" buttons. The operation of these controls will be discussed further in the upcoming sections of this chapter.

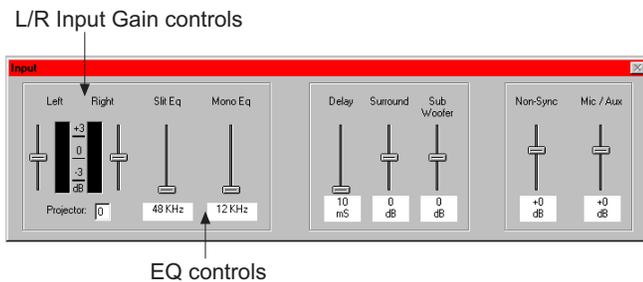
## 4.4 Input Control Panel

The Input window consistent of three groups of control handles.

### Input Level Gain Adjustments

The left-most section contains the L/R Input Gain adjustments for projector inputs (1-2) as well as the EQ slit filter and Mono EQ filter controls.

The Input gain control provides approximately  $\pm 18$  dB of gain adjustment. Bar graphs beside each control handle indicate the right and left input signal level. The input gain is adjusted by clicking and dragging the control handle up or down or by clicking on the handle and then using the up and down arrows from the keyboard to move the handle in 1/8th dB increments when fine adjustments necessary.



### EQ Adjustments

The Mono EQ adjustment also provides 16 separate low pass filters to optimize the frequency response for mono films.

The Slit EQ adjustment provides 16 separate peaking filters (from 10.5 kHz to 48 kHz) to optimize frequency response and performance of the projectors stereo optical reader.

### Projector Selected Indicator

The small window directly under the right pre-amp control handle will always indicate the currently selected projector input. The projector can only be selected from the Automation input on the back panel.

### Matrix Surround Delay

The surround delay control provides a 10 to 150 mS delay between the front and surround channels. Both Left and Right surround channels are adjusted equally when using the delay control. See Section 5 for tips on calculating the proper delay time. This delay only applies to material decoded from the stereo film tracks. Delays for external digital decoders must be set separately on the decoding equipment.

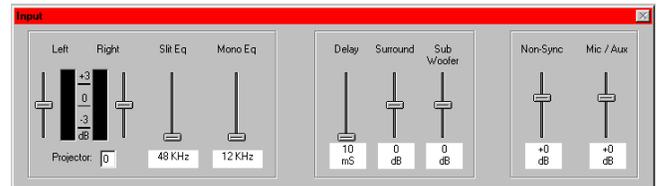
### Matrix Surround Level

The surround output level is a  $\pm 6$  dB boost/cut for the analog stereo decoded surround channels only. It does

not affect the surround levels for externally decoded (Digital A and Digital B) signals.

### Matrix Subwoofer Level

The Sub Woofer output level is a  $\pm 10$  dB boost/cut for the analog stereo decoded subwoofer channels only. It does not affect the subwoofer levels for externally decoded (Digital A and Digital B) signals.



### Non-Sync and Mic/Aux Levels

The Non-sync control provides a +10/-15 dB boost/cut for any two-channel signal fed into the Non-Sync input. The Non-Sync input is ideal for background music and other audio sources during intermission.

The Mic/Aux control provides a +10/-15 dB boost/cut for any signal fed into the Mic/Aux input.

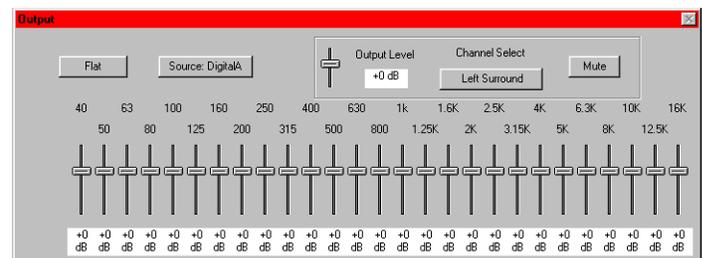
## 4.5 Output Control Panel

### 1/3 Octave Graphic Equalizer

The bottom section of the output control panel provides control handles for the 27-band, 1/3 Octave graphic equalizer. Each control handle provides a +6/-10 dB boost/cut for its specific frequency. The level setting for each band is displayed in the window directly underneath the control handle. The levels can be adjusted by clicking on the desired control handle and sliding it up and down; or by clicking on the control handle, then using the up or down arrows on the keyboard to adjust the level.

### Flat

The flat button will reset the entire 27-band EQ to +0 dB on the currently selected output channel when pressed. A confirmation dialog box will appear, since your current EQ settings will be erased and can not be recovered unless it is backed up in a file.



## Input Source Selector

The “Source” button provides a method for selecting the input source while using the laptop interface. The name of the selected source appears on the button when using the mouse pointer to select a new input source as shown. The up /down arrows on the keyboard can also be used to scroll through the inputs sources. All of the front panel sources plus Pink noise are available.

## Output level

The Output Level handle provides a +10/-15 dB boost/cut for each output channel independently. The level setting of the selected output channel is displayed in the window to the right of the handle. Any adjustment of the handle will only affect the selected output channel indicated by the seen channel select button. These levels affect all inputs, including externally decoded (Digital A and Digital B) inputs.

## Channel Select

The Channel Select button selects which of the six output channels is being modified. It steps through the channels in this order: L, L+C, C, C+R, R, Ls, Ls+Rs, Rs, SW, SW+C. The multiple channel modes allow listening to and measuring the combined signals blended from adjacent channels to verify speaker phasing. The EQ and level settings can only be altered when a single channel is active.

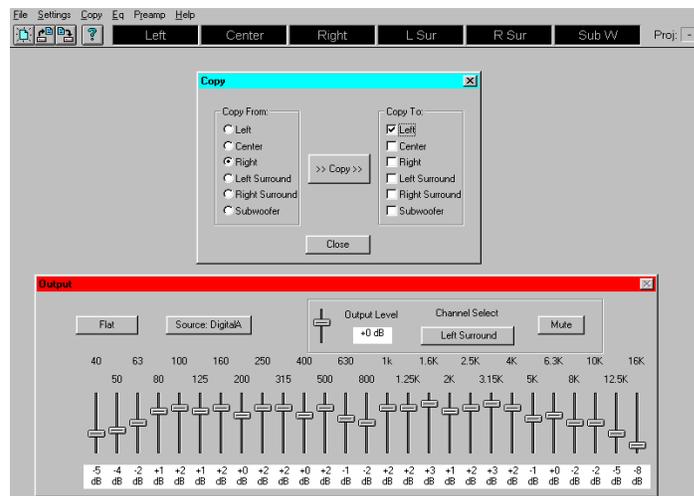
## Mute

The Mute button acts in a toggle fashion, muting all output channels when selected and restoring or unmuting the output when pressed a second time.

## Copy Feature

The DSP-60 has a convenient copy feature that allows you to copy any channel’s EQ to any other channel. This feature is especially useful to save time when setting up a theater’s EQ. For example, after setting up the right front channel EQ its settings can be copied over to the left channel and the same can be done for the surround channels quickly providing a reference to complete the opposite channel EQ.

To display the copy window select the copy option on the main menu. The copy window will appear. Select channel button on the left side from which to copy the EQ setting. Check the right-hand box corresponding to the channel to which the EQ setting will be copied, then press the copy button. The example below shows the right front channel being copied to the left front channel. If desired, the EQ can be copied to more than one channel at a time. Simply check all channels to which the EQ setting will be copied to before pressing the copy button.



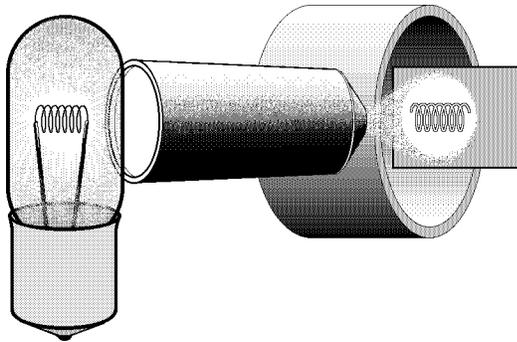
# Section 5. Alignment

## 5.1 Preliminary Alignment

### Equipment Needed

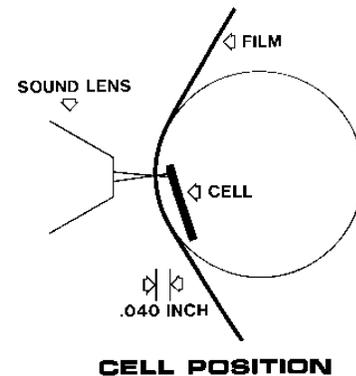
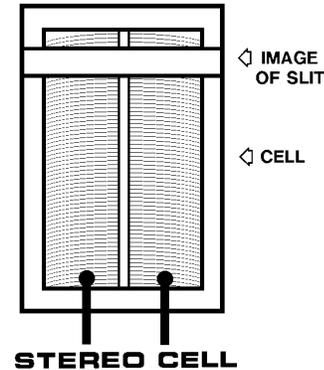
- Dual trace oscilloscope
- Real-time spectrum analyzer, with microphone
- Sound pressure level meter
- Set of test films

1. Clean the soundhead optics thoroughly. If the film guide rollers are worn, replace them. Excessive side to side weave will cause insurmountable problems for the stereo circuitry and must be corrected prior to installation.
2. If the exciter lamp is old or blackened inside, replace it. Make sure the lamp is operating at a voltage greater than 60% of its rating. We strongly recommend converting the projector to be compatible with the new cyan soundtracks with a Jaxlight red LED lamp source.
3. With the mono solar cell in the projector, run the SMPTE BUZZ TRACK film and align the guide rollers for minimum output.
4. For stereo installations, remove the mono solar cell and place a white card about an inch away from the sound lens. The image of the exciter lamp filament should look as in the illustration below. If necessary, raise or lower the lamp and move it in and out until the filament is centered in the spot of light. This will insure that the slit is evenly illuminated, thereby producing the least distortion in playback.



## 5.2 Alignment of Solar Cell and Preamplifier (“A” Chain)

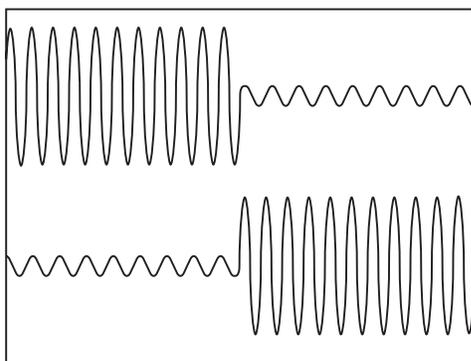
1. Mount the stereo solar cell on the projector and position the bracket, so that the slit image hits the upper part of the cell. The cell should be approximately 0.040 inch (1 mm) behind the film such that the slit image just fills the cell width, but does NOT spill over.



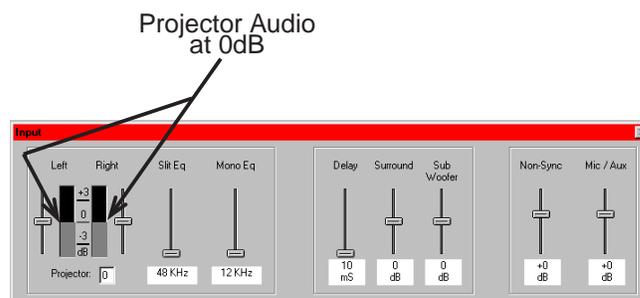
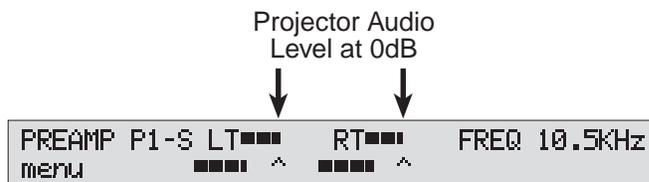
2. Install the audio line from the cell to the DSP-60. Use Belden N<sup>o</sup> 8723 or equivalent four-conductor twin-shielded cable, or a pair of two-conductor shielded cables such as Belden N<sup>o</sup> 8451. (A single two-conductor or three-conductor shielded cable is not recommended.) Connect the lines to a 9 pin male D-type connector. The pinout for this connector is in the Appendix. Model DST-09 screw terminal connector assembly is available. Contact the factory. Be sure that the RED lead of the cell is connected to the “L” input terminal marked “+” and the GREEN lead of the cell is connected to the “R” input terminal marked “+”. The BLACK cell leads connect to the low “-” input terminals of BOTH Left and Right channels respectively. Connect the shielding of the cable to the “GND”

terminal. Do not connect the shielding at the projector end. The D-9 connector should be plugged into the Projector 1 input of the DSP-60.

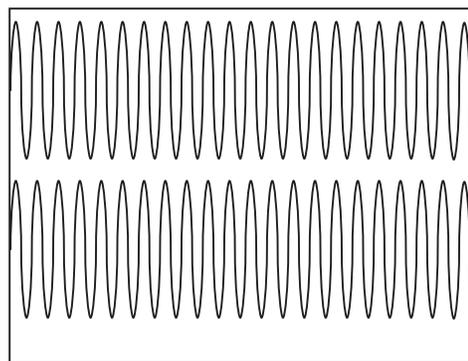
- Film readers with active circuits, such as a Jaxlight line amplifier or a reverse scan reader, will require a ground connection at the reader. Good results can be achieved using the drain (shield) wire of the cables listed above, however, some agencies (such as CE) prohibit using the drain conductor for this purpose. In that case, use two three-conductor shielded cables (such as Belden N° 9939), three-pair cable (such as Belden N° 8777).
- If there are two projectors, the changeover is accomplished by grounding the "X-OVER" terminal. Connect a latching relay, with the appropriate rating, so that one coil is powered by the dowser circuit of Projector 1 and the other coil is powered by the dowser circuit of Projector 2. The relay contacts must be connected to the "XO" and "E" terminals so that the contacts are closed when Projector 2 is operational.
- Set the DSP-60 stereo preamp controls so the gain is at the midpoint and the high frequency boost filters are at the maximum frequency (48 kHz). This can be accomplished from the front panel or the PC host program. See Section 3 for details on using the front panel menus. Connect a dual trace oscilloscope to the test points on the DSP-60 "Analog" board (See Section 2.5) marked "Left", "Right", and "GND" (Audio ground). Run a 100% alternating left/right STEREO ALIGNMENT film and move the cell in and out until the crosstalk is at a minimum on both channels as shown. It may be necessary to set the gain of the preamp roughly at this time.



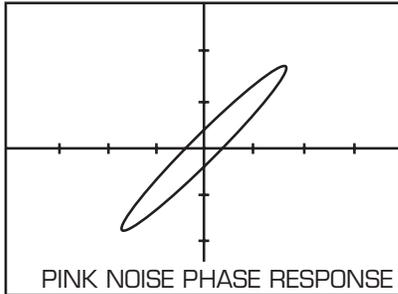
- Run a 50% level film such as the ULTRA\*STEREO Type 1 (TT-1) Test Film or equivalent. Adjust the Left and Right level controls on Projector 1 until the bargraphs on the preamp set-up menu (or PC host) read "0" VU (marked with a ^ on the front panel display). Repeat the procedure for Projector 2 if applicable.



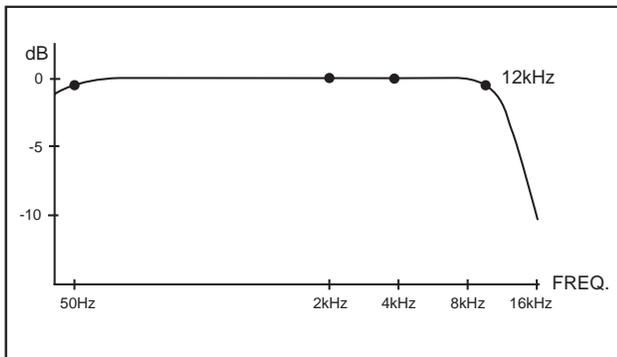
- Double check the cell alignment by running a 100% STEREO ALIGNMENT film. The amplitude of the two 100% modulated waveforms should be identical (see illustration). If one is greater than the other, while the modulated waveforms of the 50% level film are identical, there is a problem with the scanning beam. Either the slit is not uniformly illuminated along its length, or the scanning beam is not in perfect alignment with the film guide roller and solar cell. Since most soundhead optics cannot be moved in or out, it will be necessary to reposition the film guide roller and realign the solar cell, so that both the 50% and 100% modulated tones match from channel to channel. When this fine alignment is not done, loud sounds (above 50% modulation) will be distorted and will leak into the surround loudspeakers.



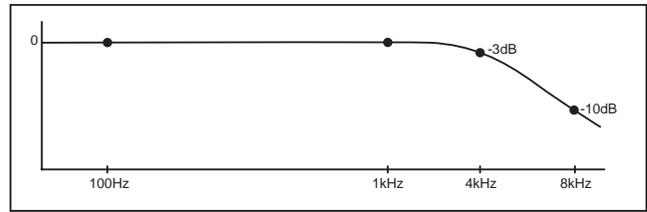
8. Connect a REAL TIME ANALYZER to the test jack “Left” on the “Analog” board. Run a FOCUS, “P TONE” or PINK NOISE film and adjust the focus of the soundhead optics for the best high frequency response on the analyzer. At the same time, adjust the azimuth of the thinnest display on the oscilloscope (see below). The focus and azimuth adjustments interact, so it will be necessary to keep adjusting both until the best combination is achieved.



9. Once the projector is adjusted, adjust the high frequency controls until a flat response  $\pm 1$  dB is observed on a REAL TIME ANALYZER with the pink noise loop. The DSP-60 adjusts both left and right channels identically to minimize phase errors that could cause dialog leakage into the surround speakers. Move the RTA to the test jack “TP-R” and verify that the right channel frequency response is similar. With the newer type .047 mil slit lenses it is possible to achieve a flat response  $\pm 1$  dB to about 14 kHz. Make sure the LENS AND solar cell is clean, since a small amount of oil can substantially reduce high frequency output.



10. Connect the REAL TIME ANALYZER to the test point “MONO” and adjust the “MONO EQ” control for the response shown. Note that there is only one “MONO EQ” adjustment for both projectors 1 and 2.



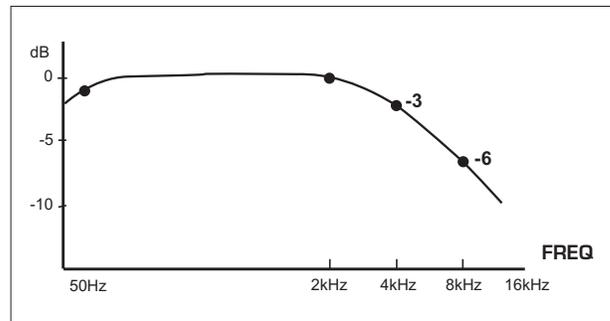
The curve shown, plus the auditorium rolloff, approximately equals the standard Academy Curve.

### 5.3 AUDITORIUM EQUALIZATION (“B” Chain)

1. Set up the REAL TIME ANALYZER with the microphone two-thirds of the way back and one-third of the way in from the side of the auditorium. If a multiple microphone system is being used (such as the ULTRA\*STEREO MMP-10) set up the microphones according to the instructions provided with that system. Set the main fader to “7.” Access the channel output controls from the “Output” screen on the DSP-60 front panel or from the PC host “Output” panel. Set the channel to LEFT, and source to PINK. Make sure the output is set to its minimum level (-15 dB) Slowly raise the level of the left channel power amplifier to its full “On” position. Slowly raise the output level until it reaches approximately 85 dB, SPL (82 dB for the surround channels).

NOTE; If aligning the auditorium from the DSP-60 front panel, it is recommended to set the levels for all six channels first, then exit the “Output” screen. Next, enter the “EQ” screen to do the frequency alignment. If adjusting the alignment from the PC host program, it may be easier to do level and EQ for one channel, then switch channels.

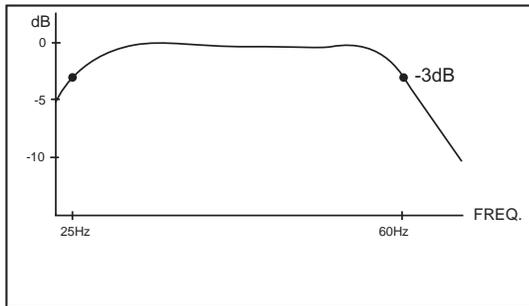
2. Adjust the equalizer until the response shown is obtained. After making the EQ adjustments it may be necessary to fine-tune the level setting.



3. Repeat the tuning procedure for the center, right, and surround channels. The DSP-60 includes a copy feature that minimizes the time required for this. After equalizing the left channel, copy these settings to the center and right channels. Since all three front speak-

ers are usually similar if not identical, the EQ settings will be a close starting point. Similarly, after equalizing the left surround, copy these settings to the right surround channel.

4. Equalize the subwoofer channel in the same way. The response of the subwoofer will depend somewhat on the type of speaker system and subwoofer used. Generally it should cover from about 25 to 60 Hz, and roll off above that. The response should be tuned to look somewhat like this:



Check the Subwoofer and Center channels together to make sure there is not too much overlap in their response. This will cause a bump in the combined response around 100 to 200 Hz.

5. It is necessary to double check the surround channel with a surround pink noise TEST LOOP. First, set the Matrix subwoofer and surround levels to 0. Set the surround delay to its minimum setting, 10 mS. This is done through the “Matrix” screen on the DSP-60 front panel, or through the PC host interface. Thread the loop and select “STEREO.” Set the volume at “7.” Run the loop and listen for the balance of sound from the front and back channels from the center of the auditorium. They should be subjectively the same level. If necessary, adjust the “Matrix Surround” level to achieve this. DO NOT adjust the surround channel output levels, or playback levels will be incorrect in digital playback modes. DO NOT raise the surround channel more than 6 dB louder than the front channels. Hollywood sound mixers have become more aggressive in their use of surrounds in the last few years, so that an exaggerated surround level can overpower the dialog at times. Set the DELAY on the SURROUND module according to the following formula for an observer sitting 2/3 towards the back of the auditorium:

Length of Theater - (Width of Theater/2) = Delay (in mS)

NOTE: Sound travels approximately 1 foot per mS.

**Please take note of the following:**

1. Make absolutely certain that the solar cell lines run in their own conduit from the cell to the processor inputs, without passing through any electrical or automation boxes. They must not be placed adjacent to

loudspeaker lines. Failure to do so may lead to system noise or oscillations due to the amplification required to reproduce the solar cell signals.

2. Make sure to keep all ambient light off the solar cells during alignment or operation (i.e. framing light or room lights and particularly any fluorescent lights).
3. If it is necessary to disconnect system ground from earth ground, simply remove the jumper between the points marked AC GND and E near the power input on the rear panel.
4. If after careful alignment, the theater just doesn't sound like other installations, you may want to check inter-loudspeaker phasing and phasing between the high frequency horns and their associated low frequency woofers. A phasing problem is not immediately obvious and often hard to find. The symptoms include decreased intelligibility in the dialog, as well as a general degradation of sound quality and poor localization of the sound sources. The DSP-60 includes a feature to activate left and center, center and right, left and right surround, and center and subwoofer speakers simultaneously. Activating the left and center (or center and right) speakers together should produce a 3 dB increase in SPL, and little change in frequency response. Similarly, the left and right surround channels together should produce a sound that is similar response but 3 dB louder than either channel separately. The center and subwoofer should produce a smooth frequency response over their combined range with no significant peaks or dips in their crossover region. If you do not get these results, there is clearly a problem of phasing, which must be corrected immediately.

**WARNING:** ULTRA\*STEREO Type 1 (TT-1) test film is supplied on Polyester Support in order to give the user long term usefulness and reliability due to freedom from shrinkage. This base material is far stronger than Cellulose Tri-Acetate that is used for most release prints. Great care must be taken to ensure that it is correctly threaded into the projector or sound reader to avoid any possible damage. Make certain that the loudspeakers are set at a very low level or turned completely off before running any of these films. We take no responsibility for any damages, consequential or otherwise, from the use of these films.

**Test Films...**

ULTRA\*STEREO Type 1 (TT-1)- Pre-amp adjustment and optical alignment

- a) 1 kHz tone at 50% Modulation. Adjust the pre-amp level controls so that the noise reduction meters read “0”.
- b) Pink noise at 50% Modulation. Align the focus and azimuth of the exciter lamp optics for maximum high frequencies and phase match between channels. Then

adjust the pre-amp high frequency control for flat response  $\pm 2$  dB between 50 Hz & 10 kHz (50 Hz - 12 kHz with .6 mil or smaller slit lenses). The 'A' chain should read flat  $\pm 2$  dB between 50 Hz & 10 kHz. The 'B' chain should read  $\pm 3$  dB between 100 Hz & 10 kHz in accordance with ANSI PH22.202M & ISO 2969.

Dolby Cat. No. 97 - Solar cell alignment film

1 kHz tone at 100% modulation alternating between left and right channels. This film is used to set the lateral (in/out) position of the solar cell. Use a dual track oscilloscope to view and maximize the channel separation.

SMPTE Buzz Track - Guide roller alignment film

This film contains tones just outside the soundtrack area. A low frequency tone is used on one edge and a high frequency tone is used on the other edge. Align the guide rollers for either equal or minimum tone levels.

Dolby Cat. No.151 - Surround channel level adjustment

Band limited pink noise alternating between center and surround channels. Set delay at minimum. Listen for equal volume in center and surround channels.

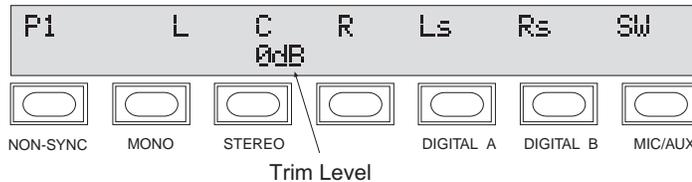
# Section 6. Operation

## 6.1 Selecting Modes Manually

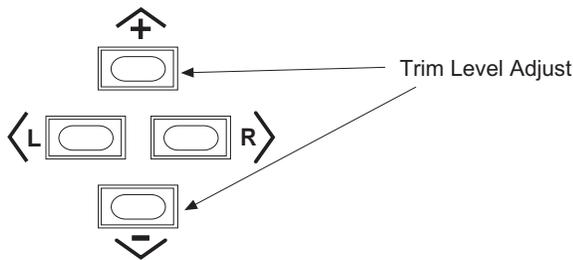
The DSP-60 has Seven input modes:

- Non-Sync: Usually used for background music, no noise reduction
- Mono: Projector input, mono EQ filter on, no noise reduction
- Stereo: Projector input, "A" type noise reduction enabled, matrix decode
- Stereo SR: Projector input, "SR" type noise reduction enabled, matrix decode
- Digital A: 5.1 channel analog input from an external decoder
- Digital B: 5.1 channel digital input from an external decoder (requires optional interface card)
- Mic/Aux: Public address microphone or other mono or stereo source, no noise reduction

To select a mode, simply press the corresponding button. Directly above the button, the display will show the trim level for that mode.



The trim level allows the projectionist to slightly adjust the volume for each mode in order to minimize volume changes between different sources. The Non-Sync and Mic/Aux inputs can be trimmed  $\pm 12$  dB. The remaining "Film" modes are limited to  $\pm 3$  dB. The trim level is adjusted using the + and - cursor buttons.



## 6.2 Low Level Feature

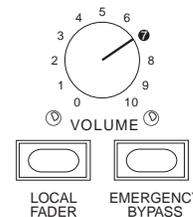
The "Low Level" feature allows the projectionist to automatically or manually reduce the volume of trailers. For instance, digital trailers may need to be reduced in level compared with a digital feature film. From the front panel, this feature is activated by pressing the "R" cursor button. The display will show "LOW" in the upper left hand corner to indicate that the lower level is active.



Once activated, the volume can be reduced by up to 9 dB using the "+" and "-" buttons. To return to normal level, press the "L" cursor button or re-select the desired input. Low Level is automatically cleared when any mode change occurs. NOTE: The Low Level feature is not available in Non-Sync or Mic/Aux modes.

## 6.3 Remote/Local Fader

The "Local Fader" button de-activates the remote fader. When the remote fader is activated, the LED above this button lights, and the remote fader can adjust the output level by  $\pm 12$  dB. Pressing the "Local Fader" button deactivates the remote and turns the LED off. NOTE: The local fader is always active, whether the remote is active or not.



## 6.4 Emergency Bypass

The DSP-60 includes a completely redundant "show saver" preamplifier and volume circuit in case any of the primary circuits fail. All of the primary amplifier, volume, and DSP circuits are bypassed, and the mono sum of the projector inputs is sent to the left, center, and right channels. Pressing the "Emergency Bypass" button will toggle the unit in and out of this mode. The LED above the button will blink when activated.

# Appendix

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## Connector Pinouts

### Projector Inputs (DE-9F)

- 1 In L+
- 2 In L-
- 3 Gnd
- 4 In R+
- 5 In R-
- 6 Gnd
- 7 -12 VDC
- 8 +12 VDC
- 9 Gnd

### Digital A Input (DB-25F)

- 1 Gnd
- 2 Surr Right
- 3 N/C
- 4 N/C
- 5 N/C
- 6 N/C
- 7 N/C
- 8 N/C
- 9 N/C
- 10 N/C
- 11 N/C
- 12 N/C
- 13 N/C
- 14 Left
- 15 Surr Left
- 16 N/C
- 17 Right
- 18 N/C
- 19 N/C
- 20 Center
- 21 N/C
- 22 N/C
- 23 N/C
- 24 Subwoofer
- 25 N/C

### AUX Input (DE-9F)

- 1 Mic in +
- 2 Mic in -
- 3 Mic out
- 4 Aux in L
- 5 Aux in R+
- 6 Gnd
- 7 N/C
- 8 N/C
- 9 Aux in R-

## Automation I/O (DB-25F)

- 1 Mono pulse
- 2 Stereo pulse
- 3 SR pulse
- 4 N/C
- 5 Digital A pulse
- 6 Digital B pulse
- 7 Non-Sync pulse
- 8 Mic/Aux pulse
- 9 N/C
- 10 N/C
- 11 N/C
- 12 Gnd
- 13 +15 VDC
- 14 Mono LED
- 15 Stereo LED
- 16 SR LED
- 17 N/C
- 18 Digital A LED
- 19 Digital B LED
- 20 Non-Sync LED
- 21 Mic/Aux LED
- 22 N/C
- 23 N/C
- 24 N/C
- 25 Changeover

## Monitor Output (DB-25F)

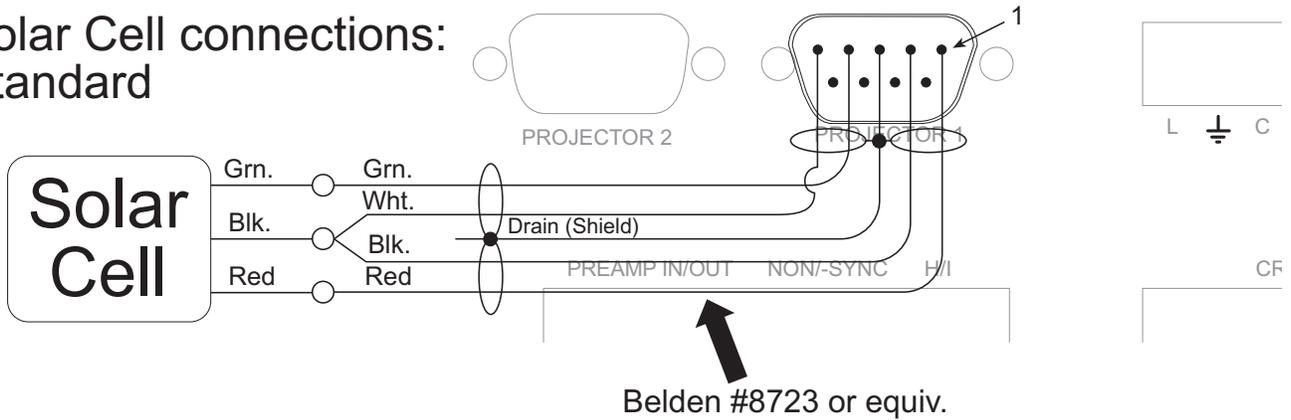
- 1 Gnd
- 2 Left
- 3 Gnd
- 4 N/C
- 5 Center
- 6 Gnd
- 7 N/C
- 8 Right
- 9 Gnd
- 10 Gnd
- 11 Gnd
- 12 Gnd
- 13 N/C
- 14 Gnd
- 15 Left LF
- 16 Left HF
- 17 Gnd
- 18 Right LF
- 19 Right HF
- 20 Gnd
- 21 Center LF
- 22 Center HF
- 23 Surr L
- 24 Surr R
- 25 Subwoofer





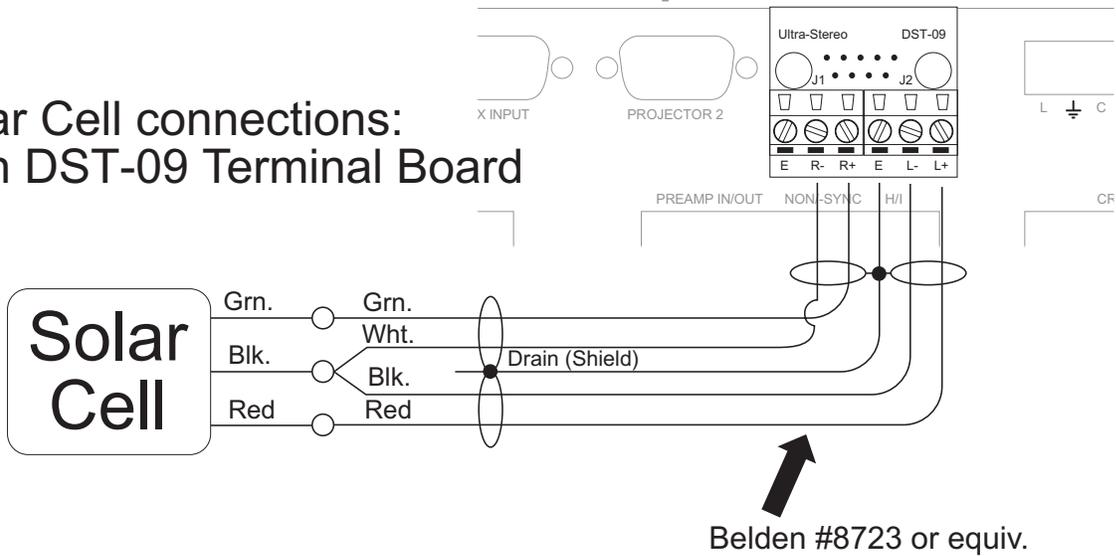
## DSP-60 Backplane

Solar Cell connections:  
Standard



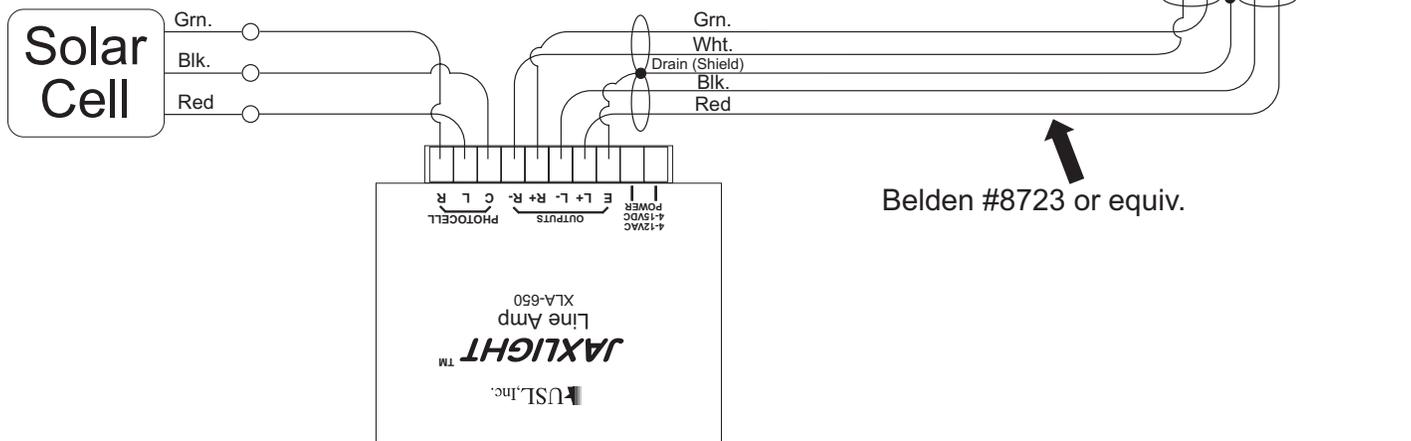
## DSP-60 Backplane DST-09

Solar Cell connections:  
With DST-09 Terminal Board



## DSP-60 Backplane DST-09

Solar Cell connections:  
Jaxlight or Reverse Scan Reader



## DSP-60 Backplane DST-09

Solar Cell connections:  
Jaxlight or Reverse Scan Reader,  
CE Method

