# Film-Tech

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Dolby®

# MODEL DA10
# DIGITAL FILM SOUND PROCESSOR
## Installation Manual

# INSTALLATION MANUAL

# FOR

# MODEL DA10 DIGITAL FILM SOUND PROCESSOR

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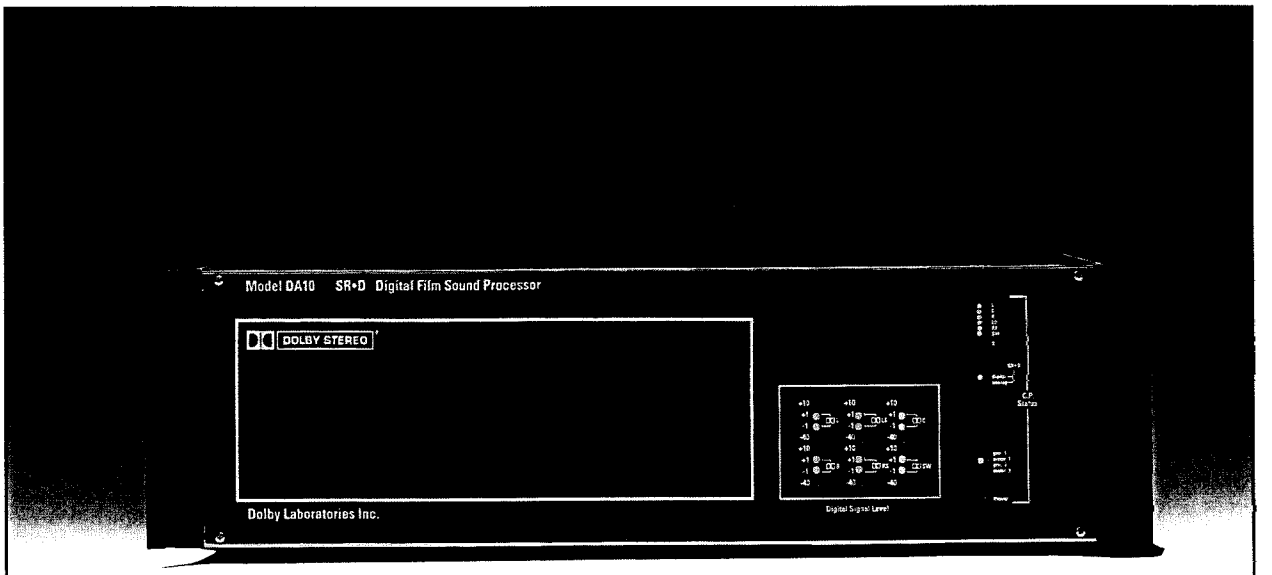
# Dolby® Model DA10 Digital Film Sound Processor




The Dolby Model DA10 Digital Film Sound Processor and its companion Cat. No. 699 Digital Soundhead interface with a Dolby Stereo cinema processor. Together they provide sound from Dolby Stereo SR•D 35 mm prints that rivals that of CDs, professional digital audio formats, and the best Dolby Stereo 70 mm magnetic prints. The Cat. No. 699 mounts on the projector to read the digital optical soundtrack on SR•D prints, while the DA10 decodes the digital signal from the Cat. No. 699 into six channels (left, center, right, left surround, right surround, and subwoofer). The digital processor and soundhead are installed and aligned by Dolby-trained technicians to ensure proper performance, and are for use only in theatres equipped with Dolby CP55, CP65, or CP 200 processors.

The Dolby Cat. No. 699 Digital Soundhead is a compact, film-driven assembly that fits all projectors, some directly and others by means of adapters. It uses a quartz halogen exciter lamp and CCD array to read the digital track, and does not interfere with playback of conventional 35 or 70 mm prints. A rack-mounting exciter lamp power supply is included, as is the cable required for connection to the Dolby DA10 Digital Film Sound Processor.

The DA10 interfaces directly with Dolby CP65 cinema processors, and with Dolby CP200 or CP55 processors by means of upgrade kits. Operation is fully automatic, and there are no user controls (only installer adjustments are provided). Digital playback (Format 10) is selected on the cinema processor's control panel or remote control unit.

Should the digital track suffer severe damage during playback, however, the system will automatically revert to the analog Dolby Stereo SR soundtrack (Format 05) which is provided in addition to the digital track on all SR•D prints. Digital playback is automatically restored once the damaged area has passed.

For audiences to hear the high quality possible with Dolby Stereo Digital, the theatre may require more than just the installation of the digital processor and sound-head. Loudspeakers and amplifiers, air conditioner noise, break-through from adjacent theatres, and theatre acoustics may also require improvements, and should meet the standards for digital playback recommended in the publication "Technical Guidelines for Dolby Stereo Theatres" available from Dolby Laboratories.

# TABLE OF CONTENTS

## INTRODUCTION TO THE INSTALLATION MANUAL

This manual contains essential information on the installation and alignment of Dolby Laboratories' SR·D Digital Film Sound Systems. The Dolby SR·D System is available in four variants: the DA10-CP200, DA10-CP65, and the DA10-CP55. Each consists of a Model DA10 SR·D Digital Film Sound Processor, one or two Cat. No. 699 Digital Soundheads, and any required upgrades and interface cabling. Each system is designed to work with one of Dolby Laboratories' model CP200, CP65, or CP55 Cinema Processors to allow decoding and correct playback of the new Dolby Stereo / SR·D digital optical soundtrack format.

The Components of each system are described:

Model DA10 SR·D Digital Film Sound Processor
The rack-mounted electronic chassis containing the necessary electronics to drive one or two Cat. 699 Digital Soundheads, and decode the scanned digital soundtrack into 5.1 channels of high quality audio.

The Cat. No. 699 Digital Soundhead
The soundhead is an undriven mechanical film transport assembly which provides a stable film path, with a light source, optics, and a CCD (Charge Coupled Device) array which are used to scan digital data from an SR·D print.
The Cat. No. 699 is shipped with a standard 10 meter video cable and a Cat. No. 630 Exciter Lamp Power Supply. One each Cat. No. 699 and Cat. No. 630 are standard with each system; a second Cat. No. 699 may be purchased for systems requiring changeover. Each Cat. No. 630 can power two Cat. No. 699 digital soundheads.

DA10 to Cinema Processor Interface Kit
CP interface cables connect format control and audio signal from the DA10 to the CP as required for each CP type. Some CP types require upgrading to make full use of the 6 channels of digital sound produced by the DA10.

# About this manual

This manual is intended to be used by individuals who are qualified in the area of cinema sound service. The basic day-to-day operation of the DA10 is covered in the DA10 User's Manual.

This installation and alignment manual covers the procedures necessary to ensure that the theater sound system is accurately aligned to standards that have been established by Dolby Laboratories. Following these procedures will ensure that the theater sound system will accurately reproduce the soundtrack the director and sound mixers intended.

The Dolby DA10 Digital Film Sound Processor and Cat. No. 699 Digital Soundhead work together with any of four Dolby Cinema Processors to provide the best possible

signal to the cinema sound system. The projector, the Dolby processor, the power amplifiers and the loudspeakers, as well as the auditorium itself, must be considered when aligning the system for optimum performance.

The system alignment procedure is divided into two parts - the mechanical alignment of the Cat. No. 699 Digital Soundhead, and the electronic adjustment of the DA10 electronics chassis.

## CAUTION

**This Installation Manual is for use by qualified personnel only. To avoid electric shock do not perform any servicing other than that contained in the User's Manual unless you are qualified to do so.**

# SECTION 1
# EQUIPMENT REQUIRED

a. Triggered sweep oscilloscope and probes with 20 MHz or greater bandwidth.

b. Voltmeter for measuring Exciter Lamp Power Supply (11 V dc)

c. Cat. No. 1010 SR·D Sync Test film (supplied)

d. Cat. No. 1011 SR·D Channel ID Test film (supplied)

e. Metric Allen Wrench (supplied) for Digital Soundhead Flywheel Installation

f. 9/16" Open end Wrench

g. No. 2 Phillips Screwdriver

h. Tools for removing existing Top Reel Arm from Projector

# SECTION 2
# INITIAL SETUP AND INSTALLATION



## Section 2.1
## Power Requirements

### 2.1.1 DA10 Mains Power Requirement

The Dolby Model DA10 may be operated from any nominal 120Vac or 240Vac power source. Voltage selection is accomplished using the selector provided in the power mains entry module located on the rear of the DA10. The switching power supply used in the DA10 has only two mains selections which cover the acceptable voltage range. Any of the three voltage settings in the correct range may be used. Fuse types for the two voltage ranges are specified under the SAFETY Section.

| **Voltage Setting** | **Acceptable Voltage Range** |
|---|---|
| 100 VAC | 85-154 Vac |
| 120 VAC | " |
| 140 VAC | " |
| 200 VAC | 170-265 Vac |
| 220 VAC | " |
| 240 VAC | " |

### 2.1.2 Cat. No. 630 Exciter Lamp Power Supply Mains Power Requirement

The Cat. No. 630 Exciter Lamp Power Supply will operate at a mains voltage range of 90 to 240 Vac, 50-60 Hz. No adjustments for various voltages are needed.

## Safety Information

**WARNING: Check that the unit has been set to the correct supply voltage and that the correct fuse is installed. To reduce the risk of fire, replace the fuse only with the same type and rating.**

**For 100/120 Vac, use 2A/250 V—1/4" x 1-1/4" slow-blow fuse.**
**For 220/240 Vac, use T1A 250 V—5 x 20mm time-lag fuse.**

**Note:** Early Cat. No. 630 exciter lamp power supplies were shipped to U.S. customers with a fused power cord. The fuse is an integral part of the power plug blade (AC line). Replace only with Bussman Type ECF-4 4A 125V Fuse/Blade.

The power supply input connector has positions for two fuses and will accept carriers for either 20 mm or 1.25" fuses; only the rear fuse position is electrically connected. Select the appropriate fuse and carrier, and insert the assembly into the rear position with the arrow on the carrier in the same direction (rearwards) as the arrows inside the compartment door (**Note:** a spare fuse of the same rating and type can be put in the other position). When closing compartment door, make sure that it clicks firmly into place.

### ADDITIONAL INFORMATION FOR THE SAFE OPERATION OF THE UNIT

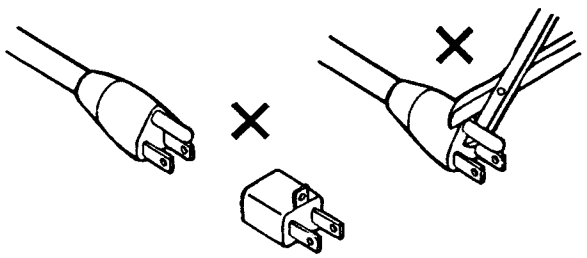
To ensure proper operation and guard against potential shock hazard, the unit must be connected only to a properly wired, grounded (earthed) power outlet. If you are uncertain about the wiring of your outlet **do not use it. Consult a qualified electrician.** The power cable is furnished either with a standard U.S.A. three-prong plug or with unterminated leads for use in other countries. The wires are colored as follows.

| | International | U.S. |
|---|---|---|
| live or hot | brown | black |
| neutral | blue | white |
| earth | green/yellow | green or green/yellow |

Before the power cable is connected to the unit, ensure that a qualified electrician has wired it as above.

### U.S. Style Plugs

The ground terminal of the plug is connected directly to the chassis of the unit. For continued protection against electric shock, a three-pin power receptacle MUST be used, and the ground wire MUST always be connected. DO NOT use a ground-lifting adaptor and NEVER cut the ground pin on a three-prong plug.



### Connections for United Kingdom

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

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

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

## IMPORTANT SAFETY NOTICE

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

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

Live—Brown Neutral—Blue Earth—Green/Yellow

(GB)

## IMPORTANT – NOTE DE SECURITE

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

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

Phase—Brun Neutre—Bleu Terre—Vert/Jaune

(F)

## WICHTIGER SICHERHEITSHINWEIS

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

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

Phase—braun Nulleiter—blau Erde—grün/gelb

(D)

## NORME DI SICUREZZA – IMPORTANTE

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

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

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

(I)

## AVISO IMPORTANTE DE SEGURIDAD

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

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

Vivo—Marrón Neutro—Azul Tierra—Verde/Amarillo

(E)

## VIKTIGA SÄKERHETSÅTGÄRDER!

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

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

Fas—Brun Neutral—Blå Jord—Grön/Gul

(S)

## BELANGRIJK VEILIGHEIDS-VOORSCHRIFT:

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

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

Fase—Bruin Nul—Blauw Aarde—Groen/Geel

(NL)

## Section 2.2
## Mounting the Digital Soundhead

The Cat. No. 699 Digital Soundhead casting has bolt patterns for several common projector types, and may be mounted to these projectors without an adapter plate:

SIMPLEX 35/70 and XL35
CENTURY JJ with 2" bolt adapter
CENTURY SA
CHRISTIE P35

Adapter plates are planned for the following projector types, and additional plates may be designed (consult Dolby Laboratories for availability):

Cat. No. 695 Adapter Kit for Norelco AAII or DP70 Projector
Cat. No. 696 Adapter Kit for Kinoton DP75 Projector
Cat. No. 697 Adapter Kit for Kinoton FP20 Projector
Cat. No. 698 Adapter Kit for Cinemeccanica V8 35/70mm Projector

Mounting the soundhead on a projector is accomplished by selecting the appropriate adapter plates, attaching the plates to the soundhead casting, then bolting the plate to the projector and the reel arm or platter guide roller assembly. Lateral positioning is verified by threading a piece of film through the digital soundhead and the projector, and verifying equal tension on each edge.

INSTALLATION:
1) Remove the package of parts from the top of the shipping box.

2) Pull out the inner box containing the digital soundhead, and slide the digital soundhead out of the surrounding foam. Place the digital soundhead on a table or bench top, with mounting base down. The mounting base is the surface with ten round mounting holes. The diagram below shows how the mounting holes correspond to bolt patterns for various projectors. This diagram shows the hole pattern as viewed from the top, inside the housing.

3) Remove the six screws which hold the back cover onto the digital soundhead. Put the cover in a safe place.

4) Remove the upper reel arm or guide rollers from the projector on which the digital soundhead is to be mounted.

5) Mount the adapter plates (if any) to the top of the projector.

6) Mount the digital soundhead to the projector body (or adapter plate) matching the appropriate set of bolt holes for the projector type.

7) Reattach the upper reel arm or guide rollers to the digital soundhead, using an adapter plate if necessary.

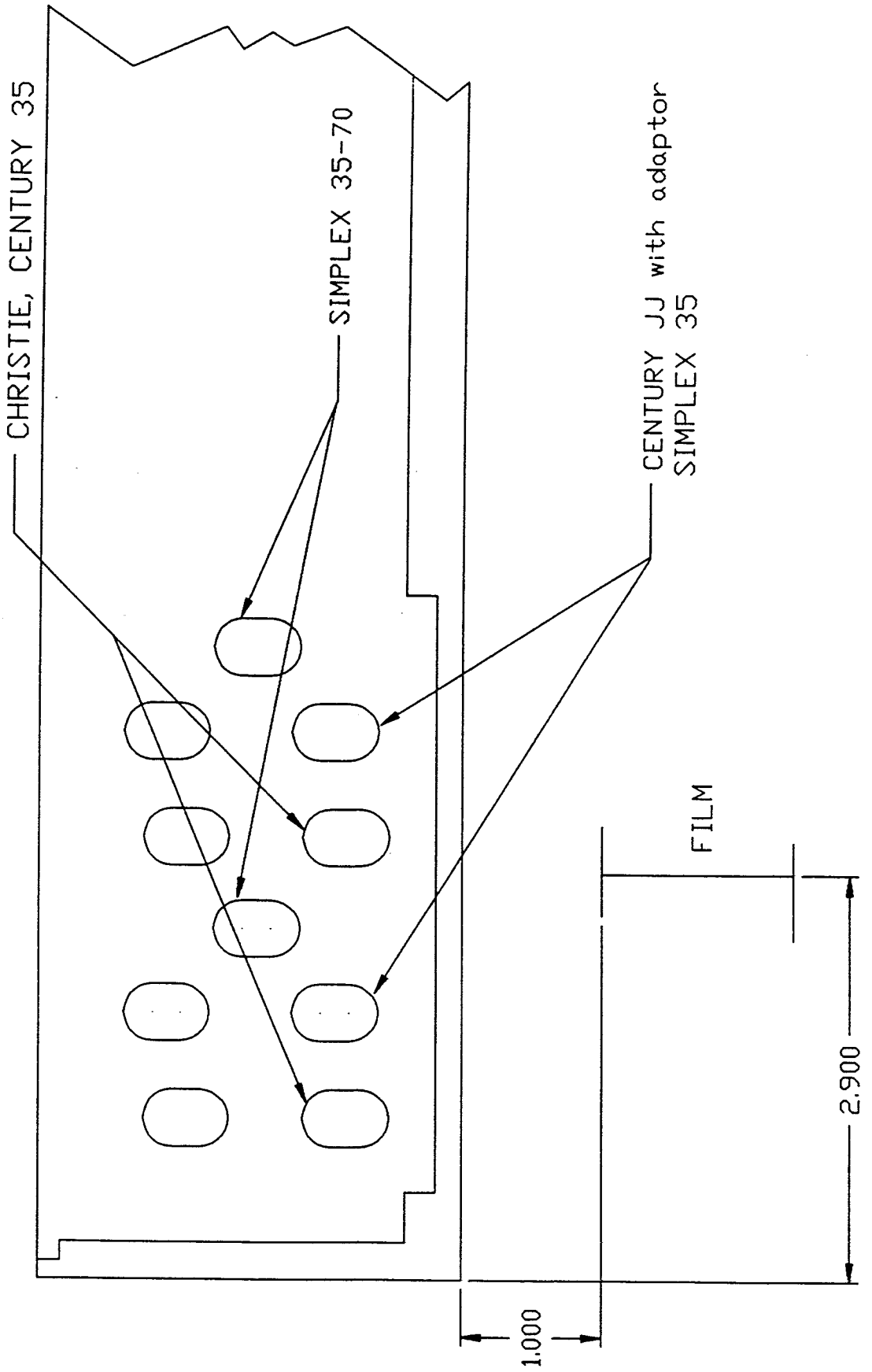
8) Thread film through the digital soundhead and first few rollers of the projector (refer to the threading diagram in Section 6) and adjust the placement of the digital soundhead such that there is equal tension on each edge of the film, then firmly tighten the mounting bolts.

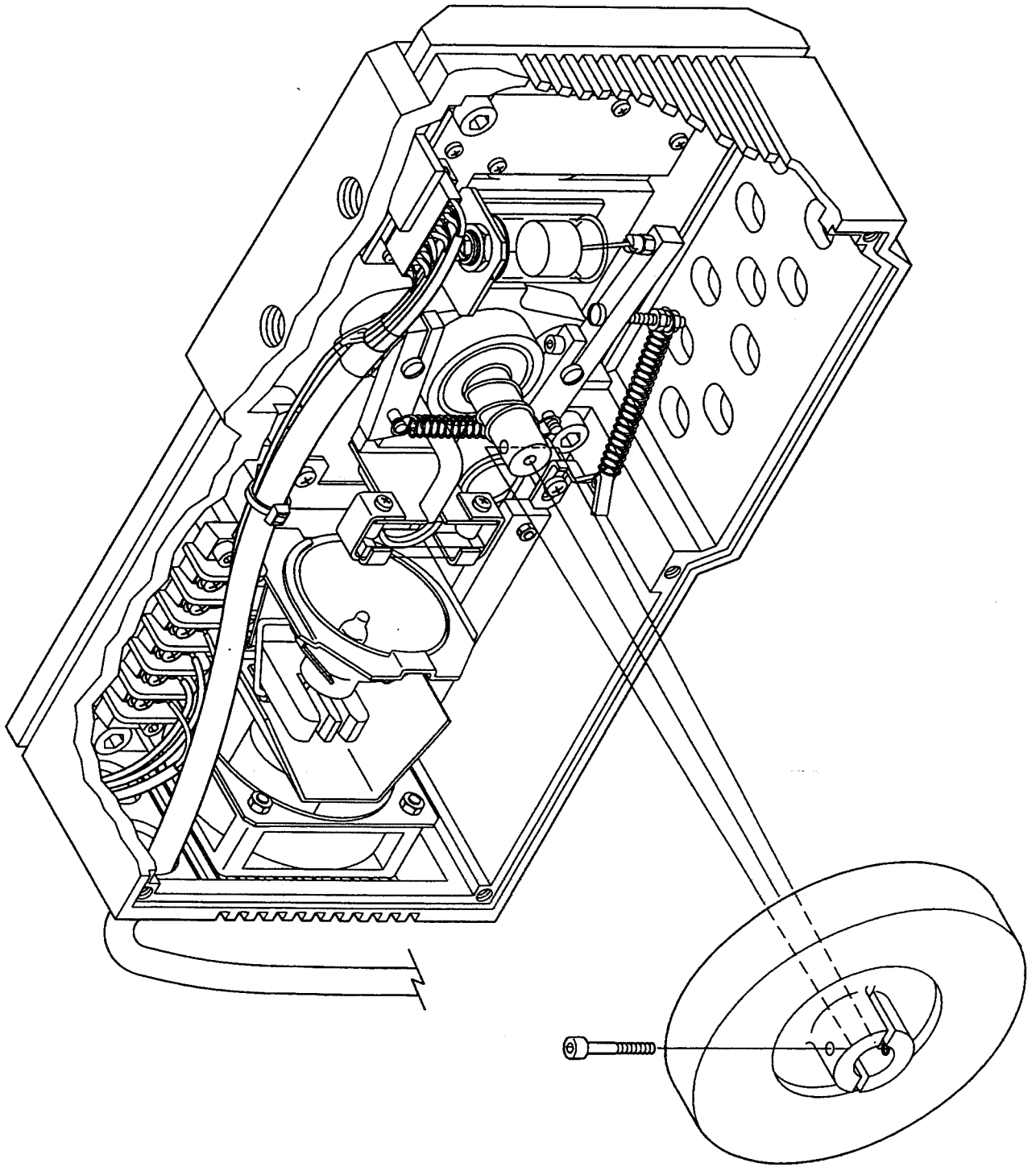
9) Route appropriate conduit from the audio rack where the DA10 is to be installed to the digital soundhead, terminating the conduit at the end of the digital soundhead. Remove a 1/2" or 3/4" plug from the end of the digital soundhead and use a threaded conduit fitting as required. Be sure to follow all local electrical codes.

10) Connect the power cables from the Cat. No. 630 exciter lamp power supply and the video cable (see Section 2.3). Use cable ties to hold the cables in place. MAKE SURE THE VIDEO CABLE DOES NOT INTERFERE WITH FREE ROTATION OF THE FLYWHEEL.

11) Remove the shipping collar using the supplied Allen wrench, and install the digital soundhead flywheel, which is packed separately for shipping.

NOTE: When two Cat. No. 699 Digital Soundheads are mounted for use in a changeover-based theater, care must be taken to assure that the film path lengths between the digital soundhead and the picture gates in the two projectors are identical. The soundhead delay setting in the DA10 is adjusted for correct synchronization of sound and picture during installation. Since only one adjustment is provided, both projectors must have the same film path length from the digital soundhead to the picture gate.


CHRISTIE, CENTURY 35
SIMPLEX 35-70
CENTURY JJ with adaptor
SIMPLEX 35
FILM
1.000
2.900



## Section 2.3
## Electrical Connections to the Digital Soundhead

### 2.3.1 Exciter Lamp Power

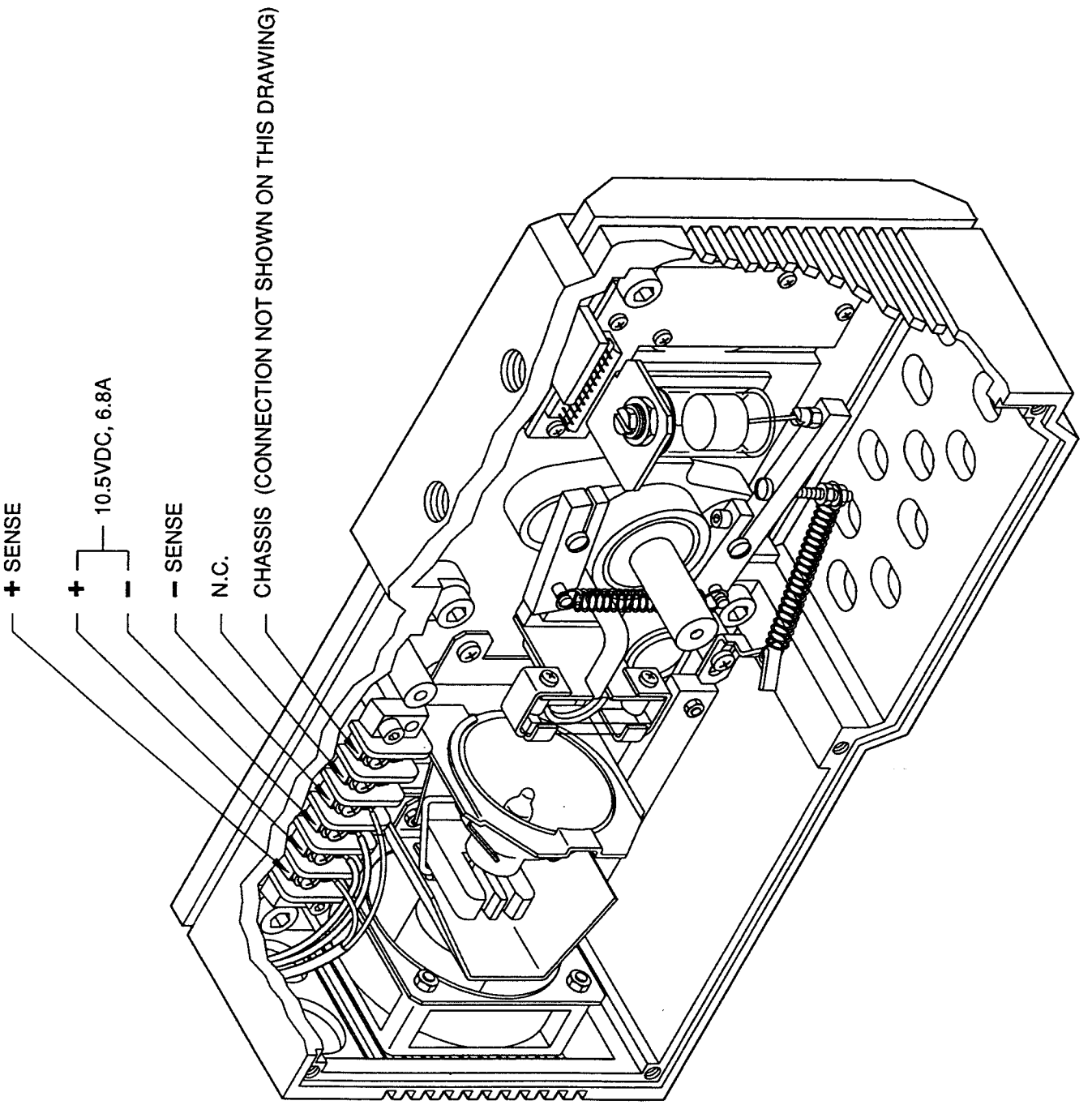
Power to the exciter lamp is provided using up to 30 meters (100 feet) of standard 14 AWG (2.5mm$^2$ cross section) or larger wire between screw terminals on the Cat. No. 699 Digital Soundhead and on the Cat. No. 630 Exciter Lamp Power Supply. These power wires carry approximately 6 Amperes of current to the digital soundhead. The supply should be initially adjusted for approximately 11 V dc. This voltage will be more accurately adjusted during alignment of the Cat. No. 699 Digital Soundhead (see section 3). When two lamps are powered from the same supply, the same type and length of power cable must be used for the second lamp.

Table 2.3.1 Shows connection between SOLA brand power supply shipped with early units and Cat. No. 699 Digital Soundhead.

| SOLA Screw Terminal | Wiring | Cat. No. 699 Proj.1 Screw Terminal | Cat. No. 699 Proj.2 Screw Terminal |
|---|---|---|---|
| SIG.GND. | N/C | | |
| SHUTDOWN | N/C | | |
| -SENSE | N/C (Strapped to -output) | N/C | N/C |
| -OUTPUT | > #14 AWG | -11 VDC | |
| -OUTPUT | > #14 AWG | | -11 VDC |
| +OUTPUT | > #14 AWG | +11 VDC | |
| +OUTPUT | > #14 AWG | | +11 VDC |
| +SENSE | N/C (Strapped to +output) | N/C | N/C |

Table 2.3.2 Shows connections between Cat. No. 630 with SSI brand power supply and Cat. No. 699 Digital Soundhead.

| Cat. No. 630 Screw Terminal (SQM150-1222) | Wiring | Cat. No. 699 Proj. 1. Screw Terminal | Cat. No. 699 Proj. 2 Screw Terminal |
|---|---|---|---|
| +V4 | N/C | | |
| -V4 | N/C | | |
| +V3 | N/C | | |
| -V3 | N/C | | |
| +V2 | > #14 AWG * | + 11V DC | + 11V DC |
| -V2 | > #14 AWG * | - 11V DC | - 11V DC |
| -S | N/C | | |
| -V1 | N/C | | |
| -V1 | N/C | | |
| +V1 | N/C | | |
| +V1 | N/C | | |
| +S | N/C | | |


+ SENSE
+
10.5VDC, 6.8A
−
− SENSE
N.C.
CHASSIS (CONNECTION NOT SHOWN ON THIS DRAWING)

2.3.2 Video Cable

The video cable connects the Cat. No. 604 CCD Board in the digital soundhead to the DA10. This cable must be pulled through grounded metal conduit or other shielded wireways to meet EMI emission standards; the cable is therefore furnished partially assembled. The male DB25 connector is attached to the DA10 end of the cable; on the other end the pins for a 12-way Molex connector are installed on the individual conductors but not inserted into the Molex connector housing. The end of the cable is enclosed in clear shrink tubing for protection during wire pulling. The Molex connector housing is furnished in the bag with the cable and should be installed after all wiring is completed. Cables are furnished in 10 m (about 30 foot) and 30 m (about 100 foot) lengths. An extra set of connector pins are included in case it is necessary to cut the cable for any reason.

2.3.2.1 Wiring to the Molex connector

The pins must be inserted in the Molex connector block in the order given in the table below. NOTE: Incorrect placement of pins will result in damage to the Cat. No. 604 CCD board or the DA10. Pin 1 is to the left when the Molex connector is connected to the Cat. No. 604 CCD Board in the Cat. No. 699 Digital Soundhead.

**Wiring table for inserting pins in red Molex connector block**

| Molex pin # | Wire Color | Cable Pair shield color | Signal name |
|---|---|---|---|
| 1 | Black | Red | Video 0 |
| 2 | Shield | Red | GND |
| 3 | Black | Blue | Video 1 |
| 4 | Green | Blue | –15V |
| 5 | Shield | Blue | GND |
| 6 | Red | Red | +15V |
| 7 | Blue | Blue | TTC |
| 8 | Black | Blue | FTC |
| 9 | Shield | Blue | TC GND |
| 10 | White | Green | TSC |
| 11 | Shield | Green | SC GND |
| 12 | Black | Green | FSC |

The ground lug is fastened to the chassis ground screw (terminal on the far right of the terminal block in the Cat. No. 699 Digital Soundhead housing). If The Cat. No. 699 Soundhead is grounded to the projector by being bolted to the body, **DO NOT** attach the ground lug to the far right terminal. Attach it to the second terminal from the right (N.C.). This will prevent ground loops.

Three ferrite blocks are shipped with the Cat. No. 699. These should be installed on the video cable at the Soundhead end if possible. If the cable is installed in conduit then place the blocks wherever possible.

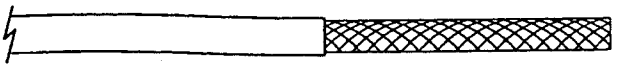
2.3.2.2 Wiring to the DB25 connector

The following information is included for use when a cable is being made up on site. The cable should be Belden Datalene 8164, which contains 4 shielded twisted pairs of computer-grade cable with the shields isolated from each other plus a 100% coverage overall shield. Using other types of cable may result in unsatisfactory operation. The overall shield is necessary to prevent RF interference signals from radiating from the video cable, possibly causing complaints and violating government standards. A metal shell MUST be used on the D-connector and the overall shield MUST be grounded to the connector shell to ensure proper operation and compliance with EMI regulations.

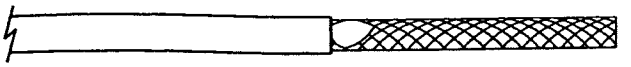
**Wiring table for DB25 end of video cable**

| D-connector pin # | Molex pin # | Wire Color | Shield Description | Signal name |
|---|---|---|---|---|
| 1 | | | | n/c |
| 2 | | | | n/c |
| 3 | | | | n/c |
| | | | | |
| 4 | 7 | Blue | Pair number 3 (Blue shield) | TTC |
| 5 | 9 | Shield | | TC GND |
| 6 | 8 | Black | | FTC |
| | | | | |
| 7 | 10 | White | Pair number 4 (Green shield) | TSC |
| 8 | 11 | Shield | | SC GND |
| 9 | 12 | Black | | FSC |
| | | | | |
| 10 | | | | n/c |
| 11 | | | | n/c |
| 12 | | | | n/c |
| 13 | | | | n/c |
| | | | | |
| 14 | 1 | Black | Pair number 1 (Red shield) | Video 0 |
| 15 | 2 | Shield | | GND |
| 16 | 6 | Red | | +15V |
| | | | | |
| 17 | 3 | Black | Pair number 2 (Blue shield) | Video 1 |
| 18 | 5 | Shield | | GND |
| 19 | 4 | Green | | -15V |
| | | | | |
| 20 | | | | n/c |
| 21 | | | | n/c |
| 22 | | | | n/c |
| 23 | | | | n/c |
| 24 | | | | n/c |
| 25 | | | | n/c |

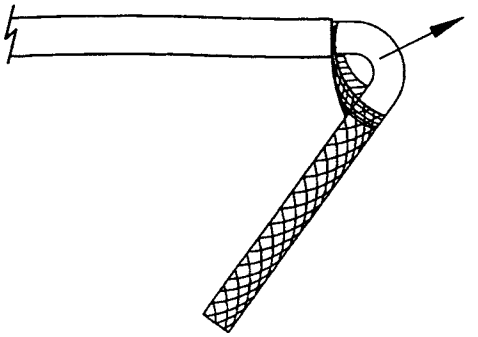
1. Strip back vinyl outer jacket to 3.0 inches.



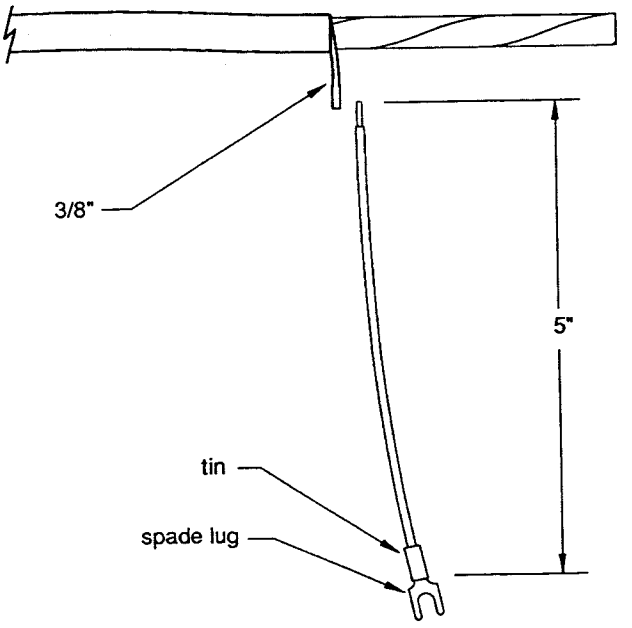
2. Open hole in woven braid near base.



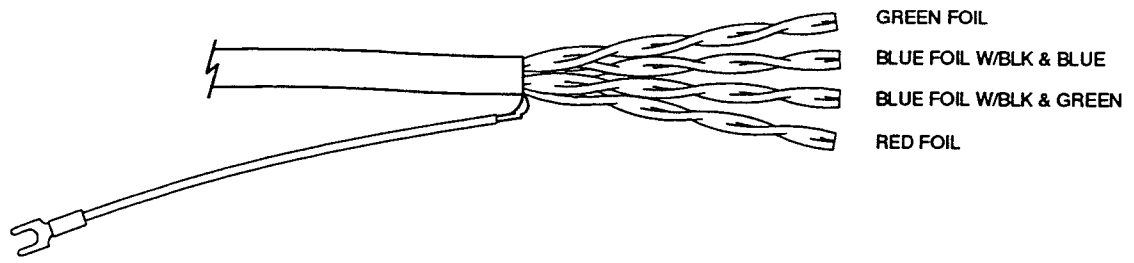
3. Push inner cable through hole in braid.



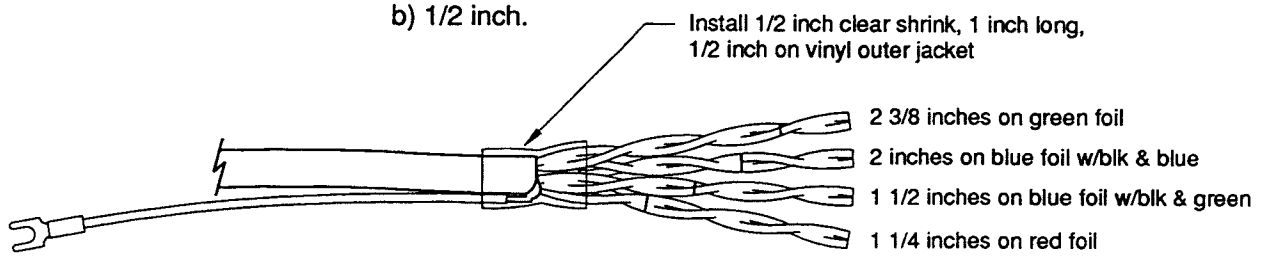
4. Twist braid clockwise, cut to 3/8 inch long, tin end with solder. Solder 5 inch length of #18 stranded black wire. Crimp blue spade lug to the other end.



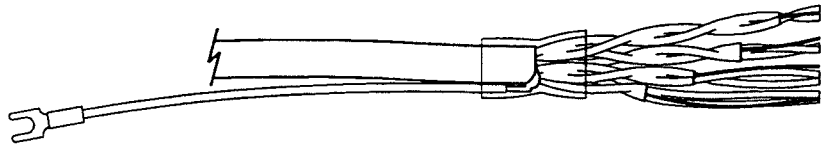
5. Trim back outer foil shield and plastic cords.



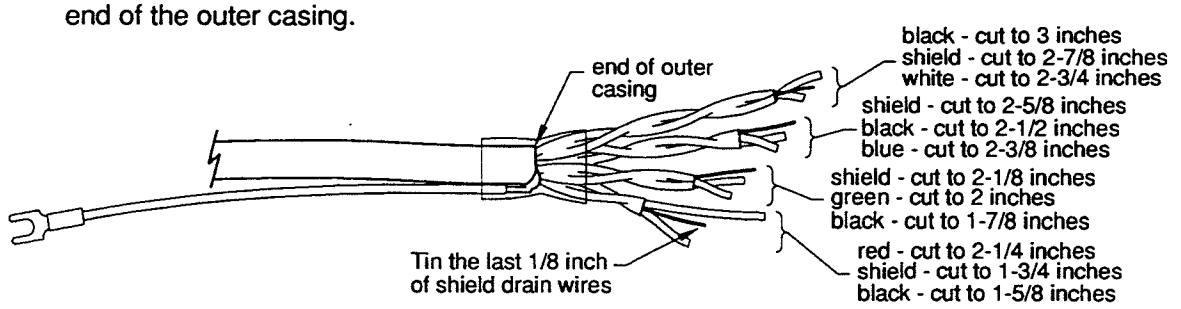

6. Install clear shrink tubing: a) 1/8 inch.
b) 1/2 inch.



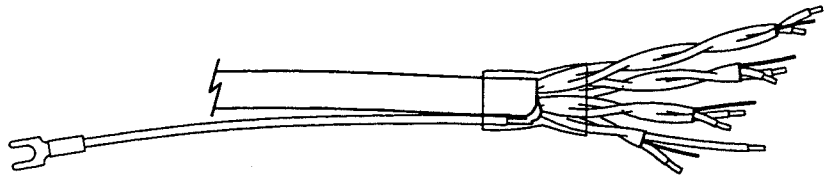

7. Strip back colored foil to edge of 1/8 inch shrink tube.



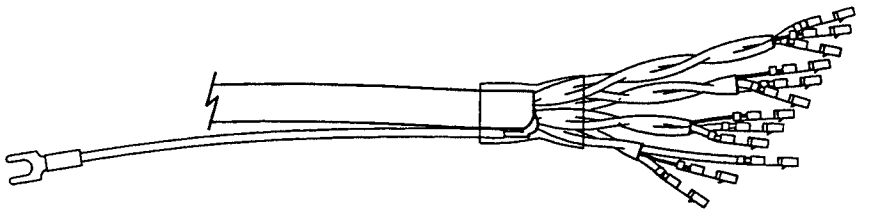
8. Cut exposed wiring and twisted shield to the lengths indicated below; measured from end of the outer casing.



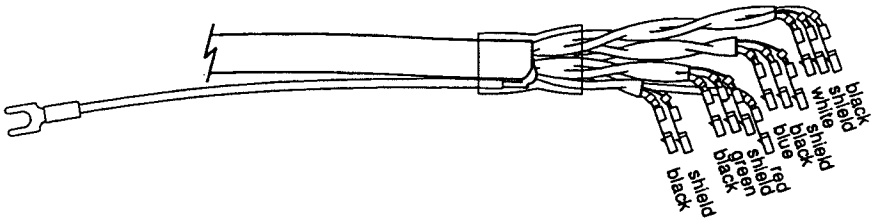
9. Strip insulated wires back 1/8 inch and tin.



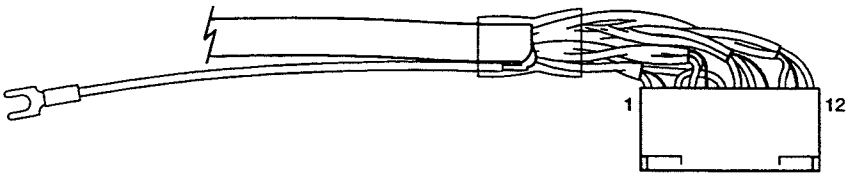
10. Crimp molex pins on to wires using HTR-2262-20A, then solder them.



11. Arrange wires in the following order and bend them 90 degrees as shown.




12. Install in molex housing with pin 1 = black of red foil.
pin 12 = black of green foil.



## Section 2.4 Connection to Motor Start Relays

Because the digital data on the SR-D track may be read in advance of the picture gate, in a two projector changeover system the DA10 requires signals in advance of a changeover. Motor Start contact closures provide these signals (see DA10 to CP wiring diagrams).

In a single projector system, the DA10 requires the MS1 signal to be valid when the projector motor is running to allow switching to analog when digital data is not present. If the MS1 signal is not connected to Digital Ground, the DA10 will not switch to analog. Installation of a relay is preferred, but a wire link from J9 pin 1 to J9 pin 5 will cause the DA10 to assume that a motor is running constantly, allowing switching to analog. The drawback of a wire link is that the system will always be in analog, rather then muted digital during projector startup.

Signal Levels: Normally pulled to +5V through 10k ohms. Low: less than 1.0 Vdc with respect to signal ground. High: greater than 3.5 Vdc, less than 18 Vdc with respect to signal ground. Isolated contact closures from mechanical or opto-isolated relays wired across projector motors must be used.

**Projector Motor Start Input Connector J9 (DB9 Female) Pinout:**

| DA10 Motor Start Conn. J9 (DB9 Female) Pin | External Relays |
|---|---|
| 1 MS1 | Close to pin 5 when Proj. 1 running |
| 2 | |
| 3 | |
| 4 | |
| 5 DGND | Common Contact |
| 6 | |
| 7 | |
| 8 | |
| 9 MS2 | Close to pin 5 when Proj. 2 running |

## Section 2.5 Connections to Dolby Cinema Processors

The DA10 may be connected to any of three Dolby Cinema Processors: the CP55, CP65, or CP200. Two types of electrical connections must be made between the DA10 and the cinema processor with which the DA10 is to be used: Audio, and Cinema Processor Sensing and Control. DA10 rear panel connectors J7 and J8 provide audio in and out, and J6 provides Cinema Processor format sensing and control. The specifics of connection to these connectors are described for each Cinema Processor type.

## Section 2.5.1
## Installation of DA10 with CP55

Refer to the CP55 wiring diagram fold-out.

### 2.5.1.1 Revised SRA5 installation procedure (if your theater is so equipped)
**If you do not have an SRA5, you should skip to Section 2.5.1.2.**

Introduction

The original SRA5 installation procedure was developed to avoid soldering anything to the backplane of the CP55. Unfortunately, this method uses the AUX format, which will be needed for use with the DA10. Therefore, if your theater is equipped with an SRA5 installed in the original way, you will need to change that installation before proceeding further. If you are reconnecting an SRA5 that was previously connected with the original method, make sure to remove the shielded wire that connected the OBE terminal on TB2 of the SRA5 to J18 on the CP55. Unplug the D-Sub connector from CP55 J18, cut the wire at the SRA5 end and discard this wire.

This procedure describes an alternative method of interfacing the Dolby SRA5 to a CP55 cinema processor. An advantage of this method is that the SRA5 signal output is returned to the CP55 via the Dolby tone inputs of the Cat. No. 222 card instead of using the non-sync inputs as in the standard method. As a result, the non-sync source can remain connected to the CP55 non-sync terminals. Using the Dolby tone input also provides a fixed input buss level, so no signal calibration needs to be performed.

This method uses the CP55 "03" format button to select the Dolby Stereo SR format, which keeps the "AUX" signal input and selector button available for use in selecting the SR·D format.

The only drawback to this method is that the Dolby tone inputs are only accessible by soldering directly to the Cat. No. 222 edge connector. This is a simple procedure, but one that must be done carefully to avoid splashes that can cause short circuits.

Installation

1. Set the SRA5 CP selector switch to the "55" position.

2. Set the SRA5 Mode switch located behind the front access panel to "Remote".

3. Use a shielded pair such as Belden #8451 for the audio and an 18-24 gauge single conductor for the control line. Connect the shields at the SRA5 end only. Perform the following wiring steps (refer to Fig. 2.5.1.1.1):

    a. Connect the Lt and Rt inputs on the SRA5 to the Optical Preamp Outputs on TB2 of the CP55.

b. Connect the Lout and Rout outputs from the SRA5 to the pins of edge connector **J14** on the backplane of the CP55, (Fig. 2.5.1.1.2) by carefully soldering the wire for the Left channel to pin 15 and Right channel to pin 1. Solder the ground to pin 9.

c. Connect the ID7 terminal on the SRA5 to the ID1 terminal on TB1 of the Cat. No. 321 on the back of the CP55.

4. Remove the Cat. No. 243 from the CP55 and modify the programming of the control matrix. Locate the line of diodes labeled "F1". First remove diodes D29 and D33 from the card and then add two other diodes (Fig. 2.5.1.1.3). The small holes that the anode end of the diodes are soldered to may be filled with solder. Use a solder removing tool to clear out these holes before installing the new diodes. Make sure the polarity is correct on the added diodes. Reinstall the Cat. No. 243 in the CP55.

5. Check for proper operation by performing the following tests:

   a. Select a non-Dolby format ("01" for example). The "SR OUT" LED on the SRA5 front panel should be on.

   b. Select the "03/SR " format button. The "SR IN" LED should be on.

6. Run a pink noise film loop (Cat. No. 69) and observe the frequency response in the auditorium when switching between formats 04 and 05 (SR). Observe that the pink noise sounds slightly louder and brighter when Dolby SR format 05 is selected. The LEDs on the SRA5 front panel should indicate "SR IN" for the "05" format and "SR OUT" for any other format.

This change is necessary because it moves format **05** to the former **03** button, freeing up the **aux** button for the SR-D input.

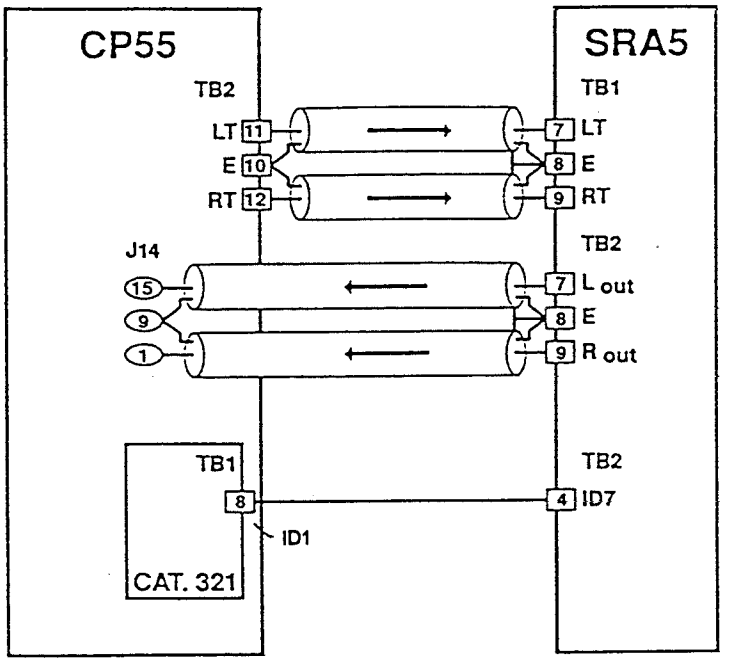



FIG. 2.5.1.1.1 SRA5 to CP55 Connections for Alternative Method

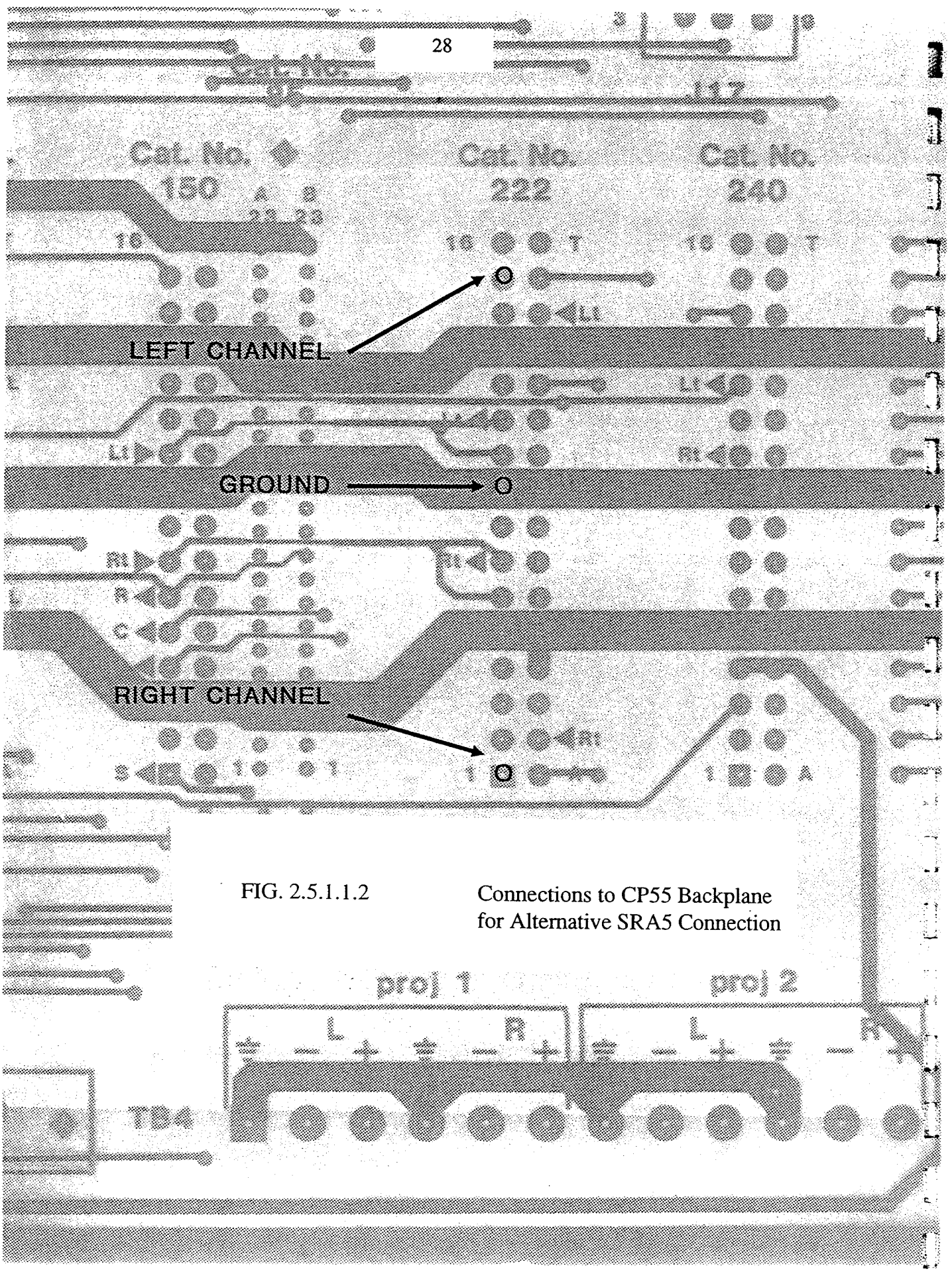
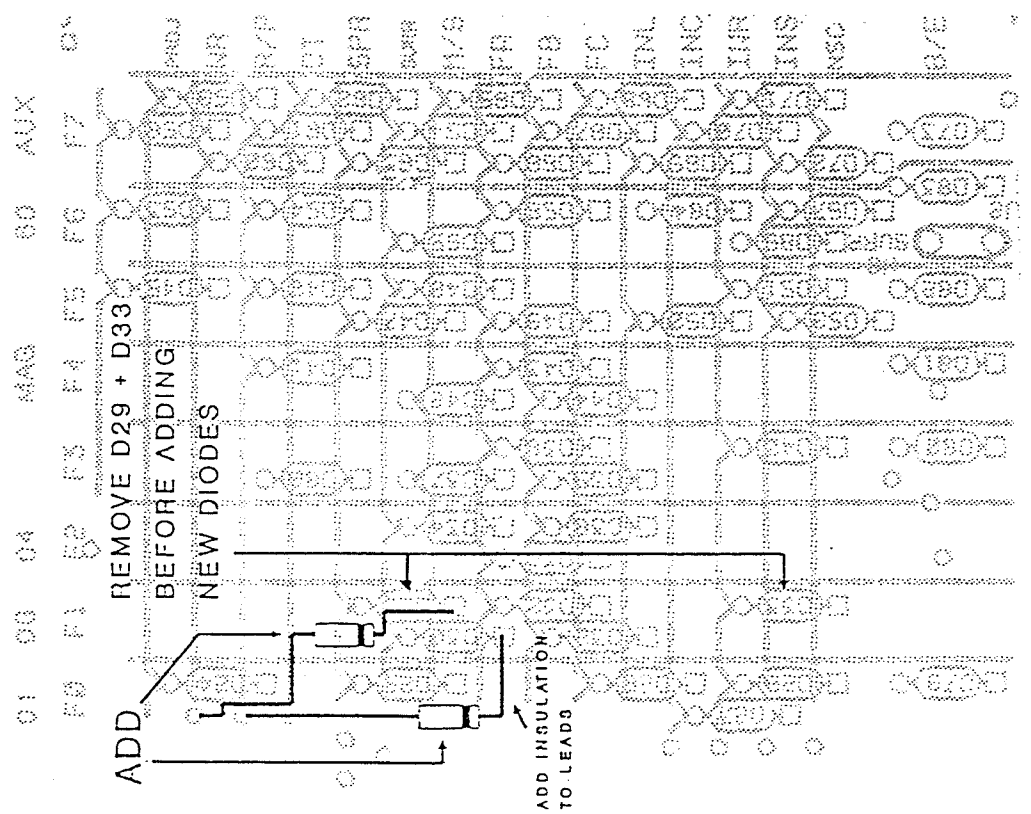



FIG. 2.5.1.1.2 Connections to CP55 Backplane for Alternative SRA5 Connection




## CONTROL FUNCTIONS

INHIBITS PROJ 1/PROJ 2 PANEL INDICATOR

INHIBITS A-TYPE NOISE REDUCTION

ENABLES RECORD MODE OF CAT. NO. 222

SWITCHES CAT. NO. 222 TO ALTERNATE INPUTS

SPARE

INHIBITS SURROUND OUTPUT OF CAT. NO. 150

ENABLES STEREO DECODING ON CAT. NO. 150

'A' BIT IN INPUT SELECTION CONTROL LOGIC

'B' BIT IN INPUT SELECTION CONTROL LOGIC

'C' BIT IN INPUT SELECTION CONTROL LOGIC

INHIBITS LEFT CHANNEL OUTPUT

INHIBITS CENTER CHANNEL OUTPUT

INHIBITS RIGHT CHANNEL OUTPUT

INHIBITS SURROUND CHANNEL OUTPUT

ENABLES DECODED SURROUND IN NON-SYNC

INHIBITS OPTICAL BASS EXTENSION

FIG. 2.5.1.1.3

### 2.5.1.2. Cat. No. 441 installation

The Cat. No. 441 board will work in a CP55 even if the CP55 is not modified, but will only do what a Cat. No. 241 will do. To enable its full functioning as required for SR·D installations, modification of the CP55 backplane is required.

Ensure that you have good access to the backplane side of the CP55 and have adequate light. Add leads between pins as described in the table below:

| Cat. No. 242 pin | Cat. No. 441 pin | Other pin |
|---|---|---|
| 19 | 10 | |
| 17 | 11 | |
| 16 | 12 | |
| 9 | 3 | |
| | T | gnd (441 pin 9) |
| | S | gnd (441 pin 9) |
| | M | Rs input from DA10 |
| | 7 | Rs out (TB3 pin 1) |
| | R | SR·D SW input from DA10 |

In addition, ground TB3 pin 2 to the circuit ground at TB3 pin 4. This arrangement provides muting of the Rs output when in bypass and is necessary to prevent loud thumps when power to the CP55 is turned on.
The Rs output is now conveniently available at TB3 pin 1. **NOTE: the output labeled "S" on the CP55 is now the Ls output.** When any format but SR·D is selected, the mono surround signal feeds both surround outputs.

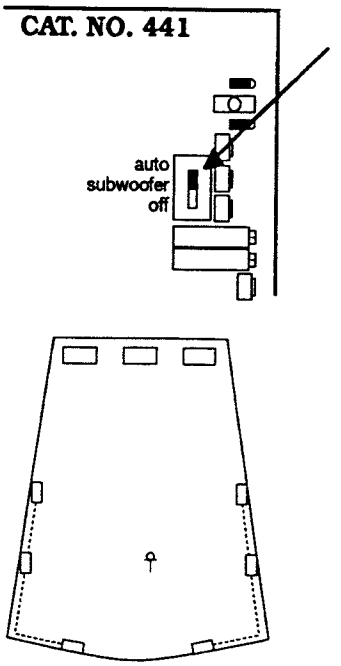
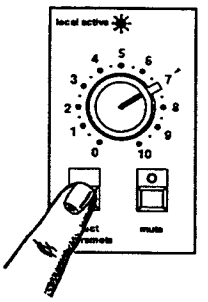
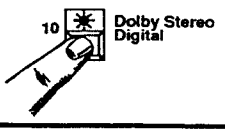
The two inputs from the DA10 (Rs and SW) will have to be soldered directly to the indicated backplane pins of the Cat. No. 441. As the cable plugs in to the DA10 end of things, it will still be possible to disconnect the units from each other without soldering.

**The subwoofer output on the CP55 is called B/E (bass extension) and is found at TB3 pin 12.** It will now automatically select either the optical input or the SR·D input according to the format selected by the front panel switches or remote control inputs.

In order to get the correct input level from the Cat. No. 85C pink noise generator, two more modifications are needed. First, cut the trace that leads from the Cat. No. 441 socket pin D toward your right. Solder a wire from the side of the cut trace away from the Cat. No. 441 to Cat. No. 441 pin A. Next, connect a 105K resistor (furnished) between Cat. No. 441 connector pins A to D. **Warning:** The subwoofer pink noise level in a CP55 so modified but with a Cat. No. 241 plugged in will now be 20 dB too low, although the Cat. No. 241 will otherwise do just what it used to do.

Cat. No. 441 Alignment Instructions from the CP65 Manual

## Cat. No. 441—Subwoofer Alignment

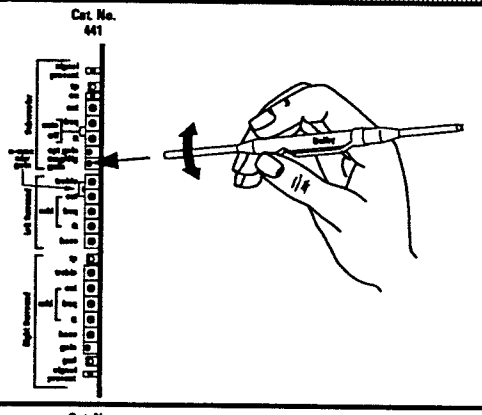
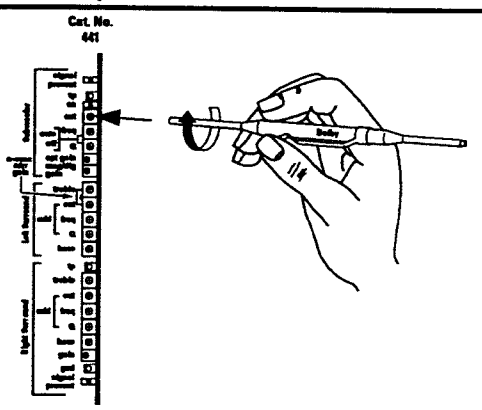
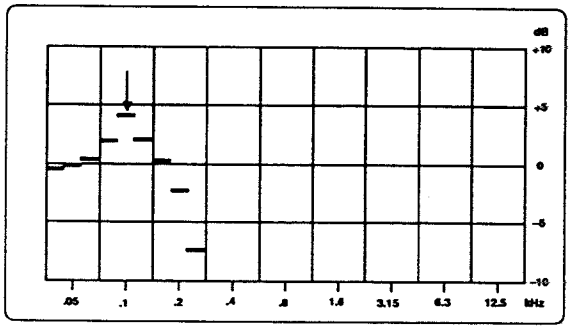
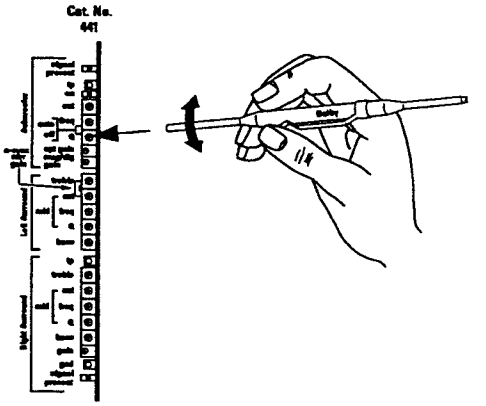
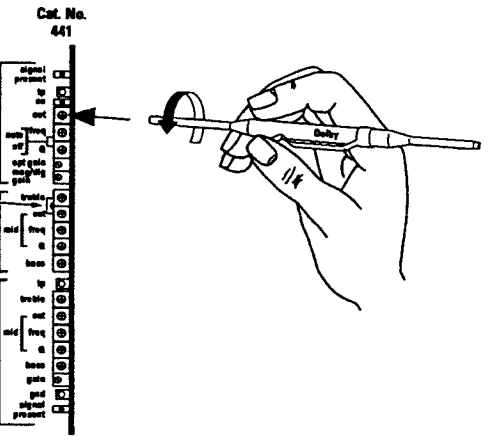
| Step No. | Action | Indication |
|---|---|---|
| 1 |  | |
| 2 |  | |
| 3 |  | |

**Cat. No. 441—Subwoofer Alignment**

| Notes |
| --- |
| The **Subwoofer auto/off** switch on the Cat. No. 441 card enables the subwoofer in formats other than Non-sync (format 60) , Mono (format 01) and magentic no NR (format 22). The switch must be in the **auto (up)** position at any time the subwoofer system is to function.<br><br>Confirm that the microphone is in the position shown.<br><br>All connections established in the room equalization procedure apply to the following steps. |
| The main front panel **FADER** should be active and set to **7**. If necessary, press the **select local/remote** switch. |
| Place the Le toggle switch on the Cat. No. 85C card in the ON (up or down) position and set the CP65 to format **10 Dolby Stereo Digital.** |

Cat. No. 441 Alignment Instructions from the CP65 Manual

## Cat. No. 441—Subwoofer Alignment

| Step No. | Action | Indication |
|---|---|---|
| 4 |  | 90 dBC → 85 dBC |
| 5 |  |  |
| 6 |  | |
| 7 |  | |

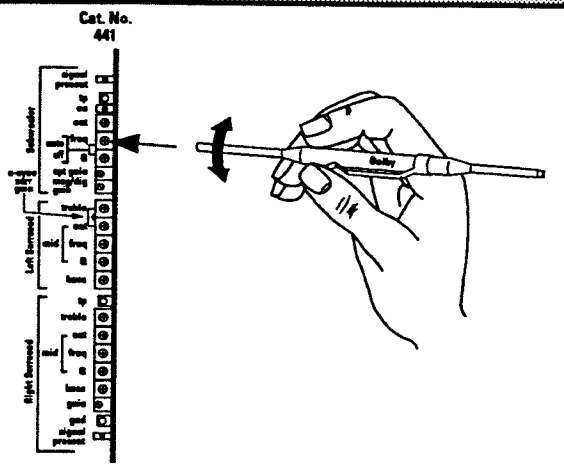
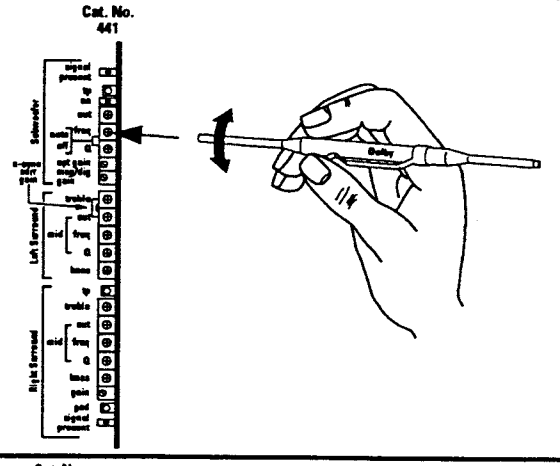
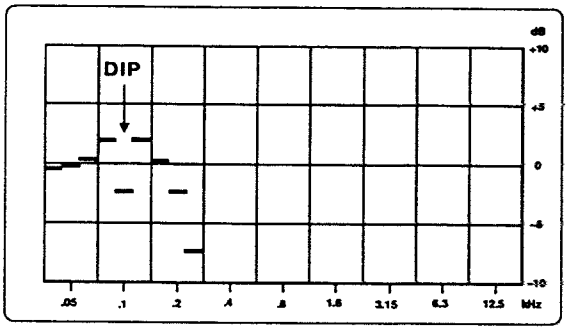
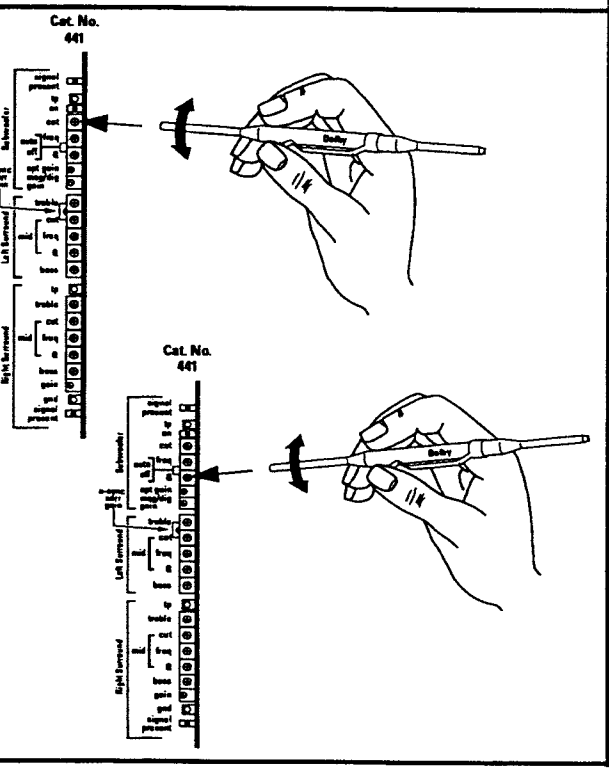
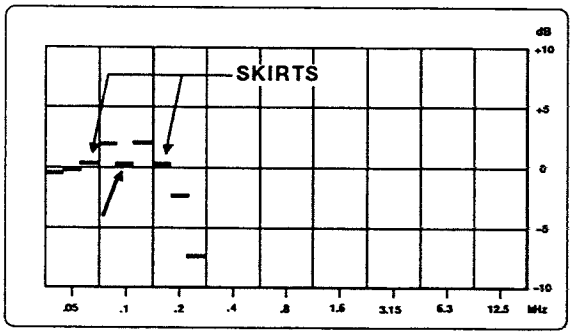
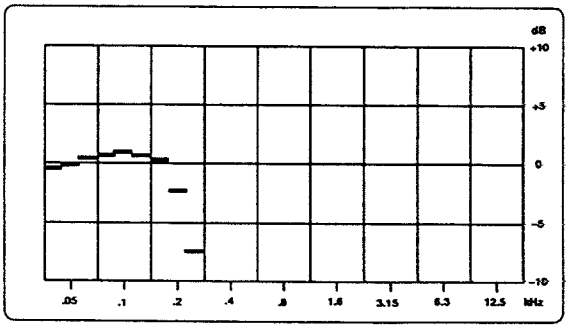
Cat. No. 441 Alignment Instructions from the CP65 Manual

**Cat. No. 441—Subwoofer Alignment**

| Notes |
| --- |
| Adjust the **mag/dig gain** control on the Cat. No. 441 card for a 90 dBC SPL (sound pressure level) in the theatre. (If this level cannot be obtained it may be necessary to change the **J2** jumper setting to increase or decrease the output.) When you have obtained this level turn the **mag/dig gain** control **down** for an 85 dBC SPL.<br><br>**Note**<br>*This level is only an approximation. Sound pressure level meters are not appropriate for setting accurate levels of narrow band signals. The correct final level will be set later in this procedure using an RTA.* |
| Turn the **cut** control at the top of the Cat. No. 441 card to the fully clockwise (CW) position for minimum cut. This disables the subwoofer equalizer circuit.<br><br>Note the frequency of the peak in the response. You will need this information in Step 9 following. |
| Turn the **Q** control on the Cat. No. 441 card to its mid point (for a moderately wide notch). |
| Turn the **cut** control back to the fully counterclockwise (CCW) position for full cut. |

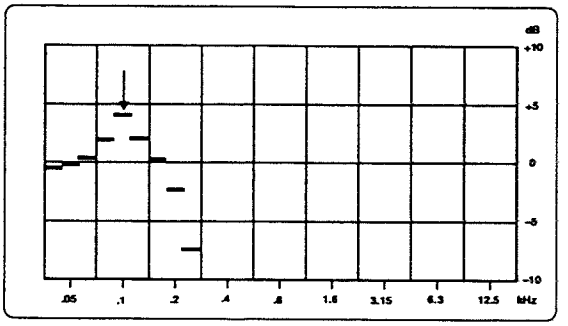
Cat. No. 441 Alignment Instructions from the CP65 Manual

## Cat. No. 441—Subwoofer Alignment

| Step No. | Action | Indication |
|---|---|---|
| 8 |   | |
| 9 |   |   |
| 10 |   |     |

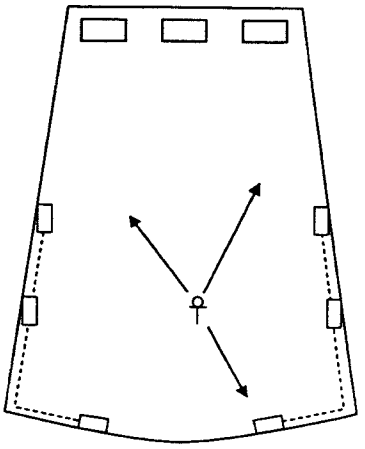
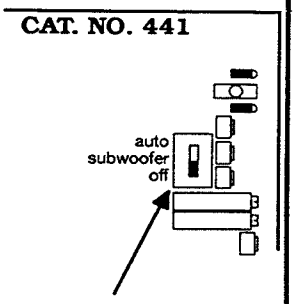
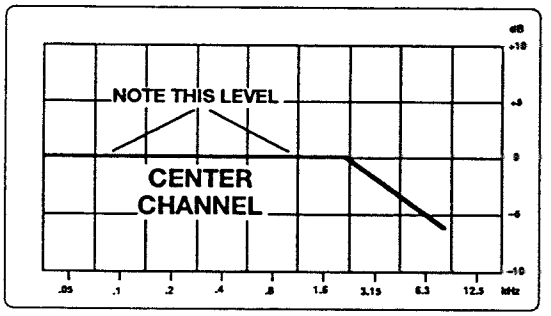
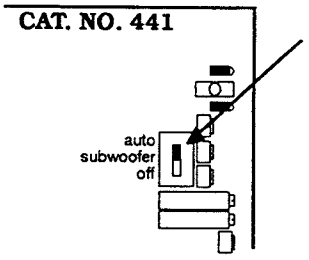
Cat. No. 441 Alignment Instructions from the CP65 Manual

**Cat. No. 441—Subwoofer Alignment**

| Notes |
| --- |
| Turn the **freq** control on the Cat. No. 441 card. A dip in the frequency response will move along the frequency axis of the RTA display. |
| Adjust the **freq** control so the center of the dip is in the same band as the highest peak in the unequalized subwoofer frequency response you were asked to take note of in Step 5.<br><br>**FROM 5:**<br><br>  <br> |
| Adjust the **cut** control so the center of the dip flattens. The center of the dip should be at the same level as the skirts.<br><br>Adjust the **Q** control for the flattest possible frequency response. |

Cat. No. 441 Alignment Instructions from the CP65 Manual

## Cat. No. 441—Subwoofer Alignment

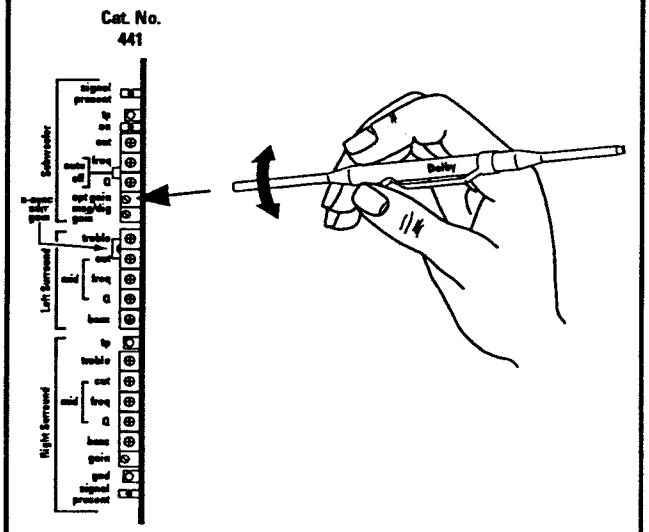
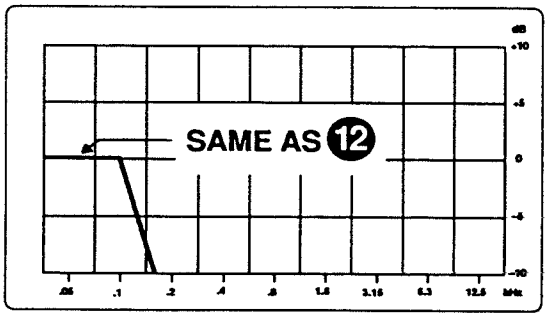
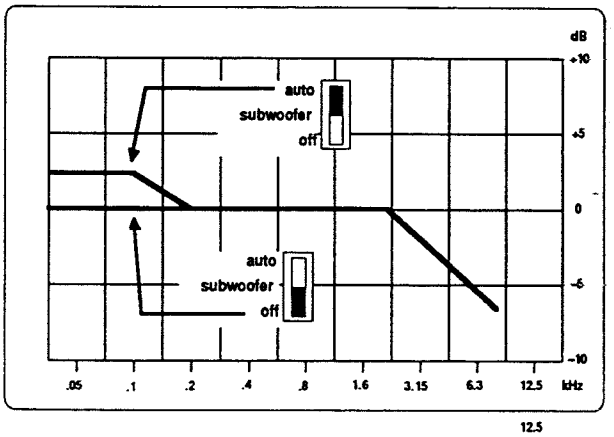
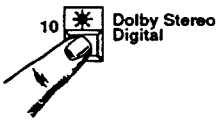
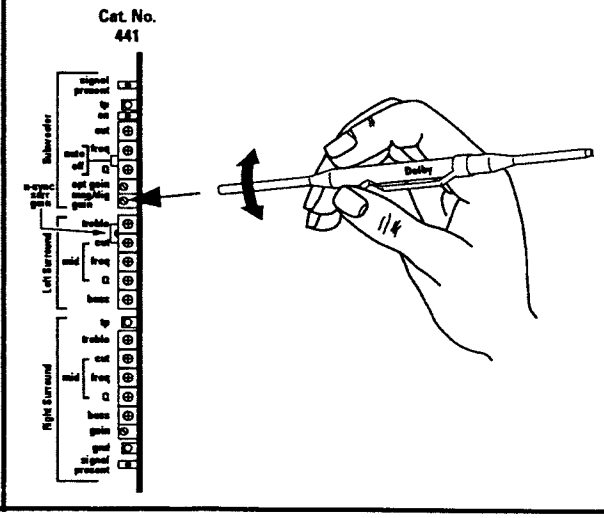
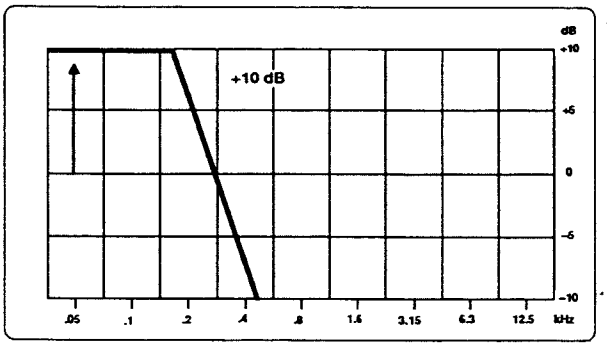
| Step No. | Action | Indication |
|---|---|---|
| 11 |  REPEAT 8 → 10 | |
| 12 |     |   |
| 13 |   | |

**Cat. No. 441—Subwoofer Alignment**

| Notes |
| --- |
| If using a single microphone, relocate the microphone to at least one other location in the theatre and check the audio spectrum on the RTA. Repeat the freq, cut, and Q adjustments to obtain a good average overall equalization at these locations of the microphone. |
| Select format **04 Dolby Stereo A-Type**.<br><br>Place the **Le** toggle switch on the Cat. No. 85C card in the **OFF** (center) position and place the **C** (center channel) toggle switch in the **ON** position.<br><br>Place the subwoofer switch on the Cat. No. 441 in the **OFF** position.<br><br>Note the average level of the third-octave bands between 100 Hz and 1 kHz. |
| Place the **C** toggle switch in the **OFF** (center) position and place the **Le** toggle switch in the **ON** (up or down) position.<br><br>Place the subwoofer switch on the Cat. No. 441 in the **auto** position. |

Cat. No. 441 Alignment Instructions from the CP65 Manual

## Cat. No. 441—Subwoofer Alignment

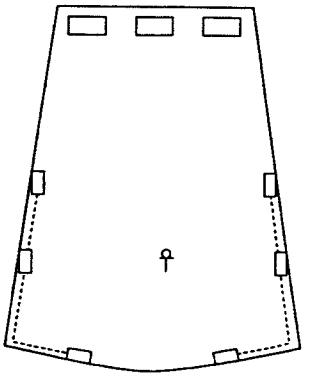
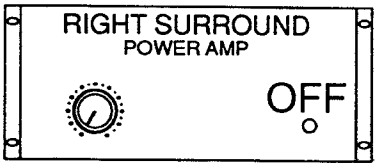
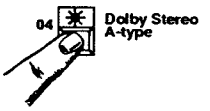
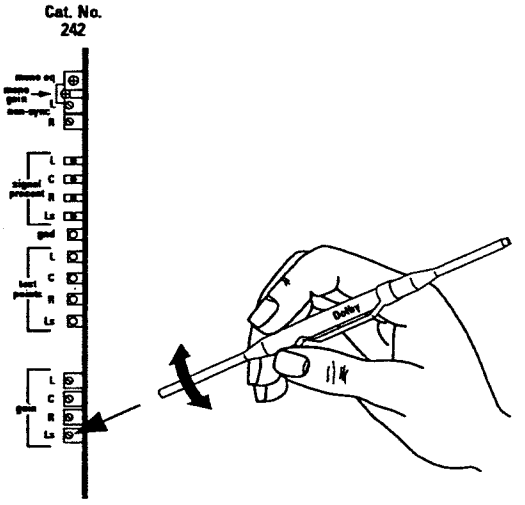
| Step No. | Action | Indication |
|---|---|---|
| 14 |  |  |
| 15 | |  12.5 |
| 16 |  <br>  |  |

## Cat. No. 441—Subwoofer Alignment

| Notes |
| --- |
| Adjust the **optical gain** control on the Cat. No. 441 card so that the average level of the bands from the subwoofer is at the same level on the analyzer screen as you noted for the center channel in the previous step. |
| Place the **Le** toggle switch on the Cat. No. 85C card in the **OFF** (center) position and place the **C** (center channel) toggle switch in the **ON** position.<br><br>Note the change in the average level of the bands from 20 Hz to 100 Hz when the subwoofer switch on the Cat. No. 441 is switched between **OFF** and **AUTO**. There should be a level **INCREASE** when it is switched to **AUTO**. The subwoofer is out of phase with the front channels if you do not see this level increase. Reverse the subwoofer(s) speaker connections. |
| Re-select Format 10.<br><br>Adjust the **mag/dig gain** on the Cat. No. 441 so that the level of the bands from the subwoofer increases 10 dB above the level in the previous step.<br><br>The subwoofer alignment is completed. |

Cat. No. 441 Alignment Instructions from the CP65 Manual

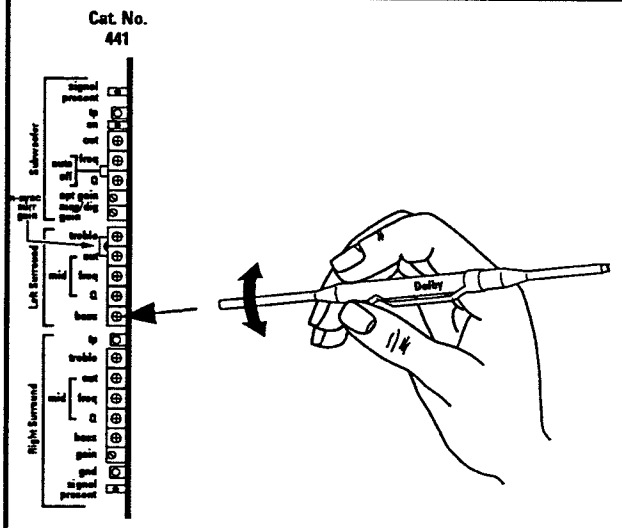
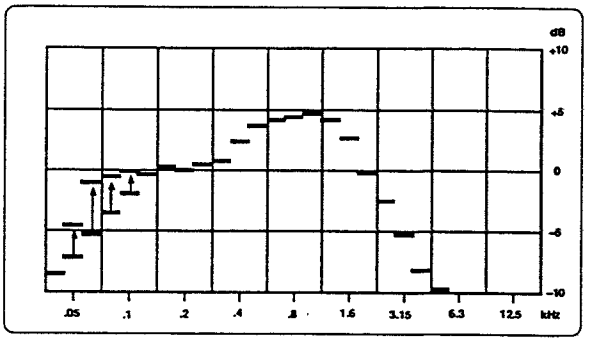
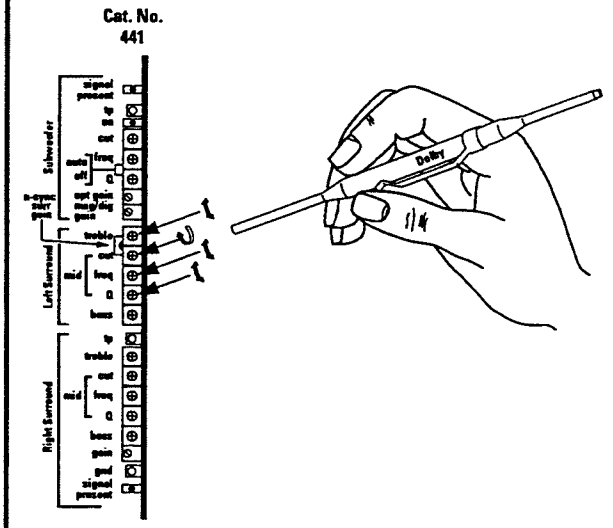
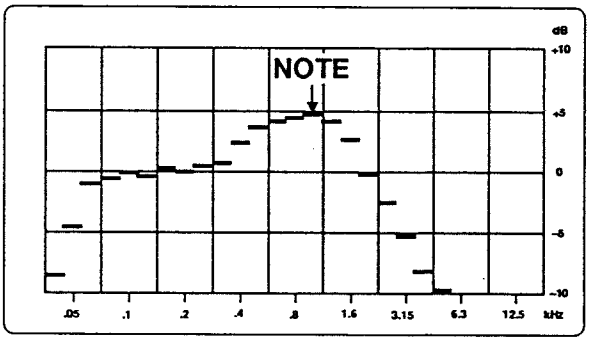
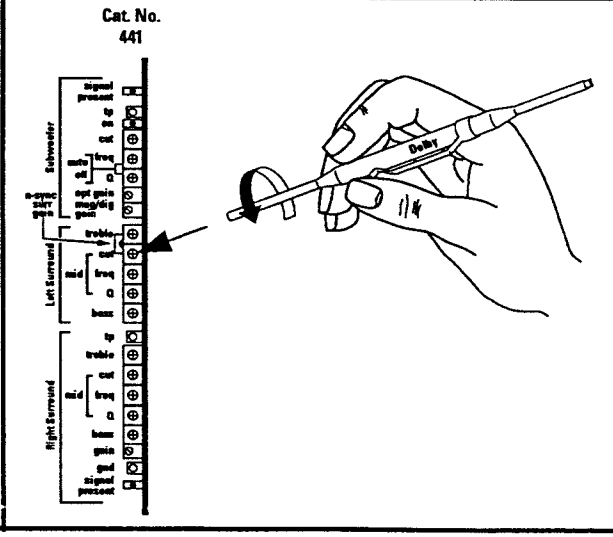
## Cat. No. 441—Surround Equalization Alignment

| Step No. | Action | Indication |
|---|---|---|
| 1 |  | |
| 2 |  | |
| 3 |  <br>  | **MONO SURROUND** 88 dBC<br>**STEREO SURROUND** 85 dBC |

## Cat. No. 441—Surround Equalization Alignment

| Notes |
| --- |
| The surround equalizer on the Cat. No. 441 card consists of:<br>• A parametric mid-band section with variable cut, bandwidth, and center frequency.<br>• Shelving type Bass and Treble controls.<br>All connections established in the previous procedure still apply to the surround equalization alignment. Confirm that the microphone is in the position defined earlier. Ensure that format 04 is selected.<br>**Note:** The Cat. No. 441 can be configured for either Mono or Stereo surround operation using link **J3**. If Mono operation is selected then an identical signal will be fed to both **Ls** and **Rs** outputs in all formats. If only one power amplifier is to be used for the surround channel then the **Ls** should be used. If more than one surround amplifier is to be used, both outputs may be used to feed, for example, balcony and ground floor. The separate level controls and equalizers may then be used to compensate for differences caused by the different acoustic environments of the two areas. If stereo operation is selected a stereo surround signal will be fed to the surround channels when format 10, Dolby Stereo SR•D is selected. |
| If the surround speakers are wired for stereo operation or both surround outputs are in use switch off (or disconnect the input to) the right surround amplifier or amplifiers. |
| Turn on the **S** switch on the Cat. No. 85C pink noise generator. Be sure that format 04 is selected.<br>Adjust the **Ls** ( left surround) **gain** control on the Cat. No. 242 B-Chain card for a sound pressure level of approximately 85 dBC in the theatre. If only one surround output is used set the level to 88 dBC. |

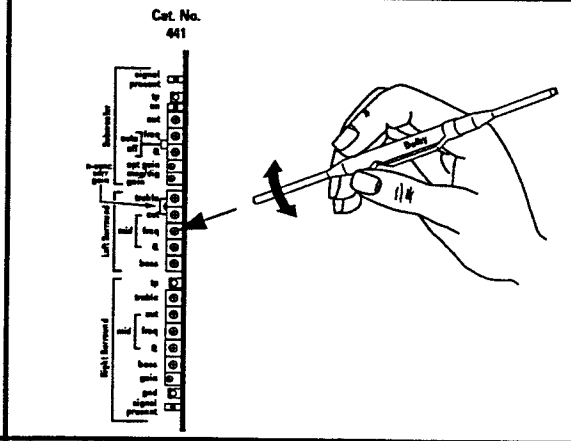
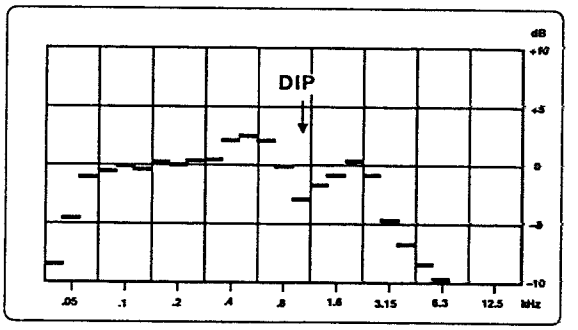
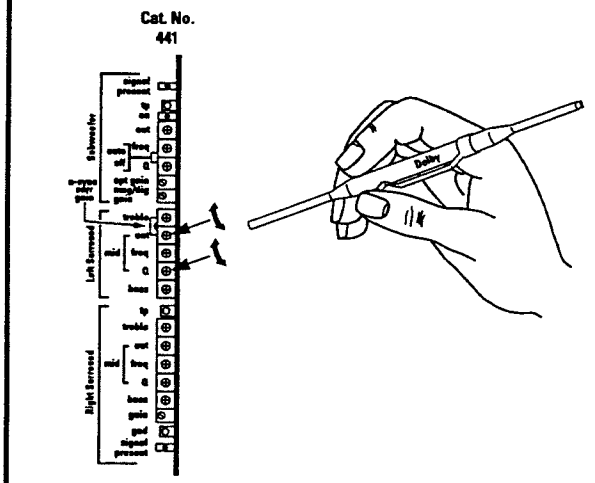
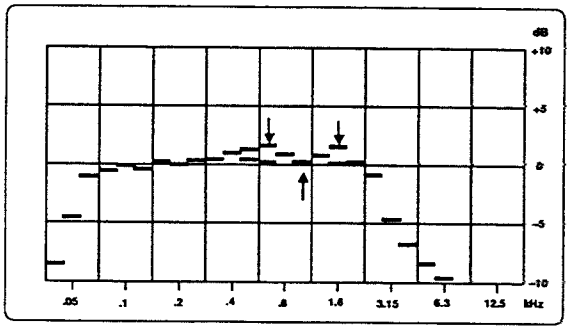
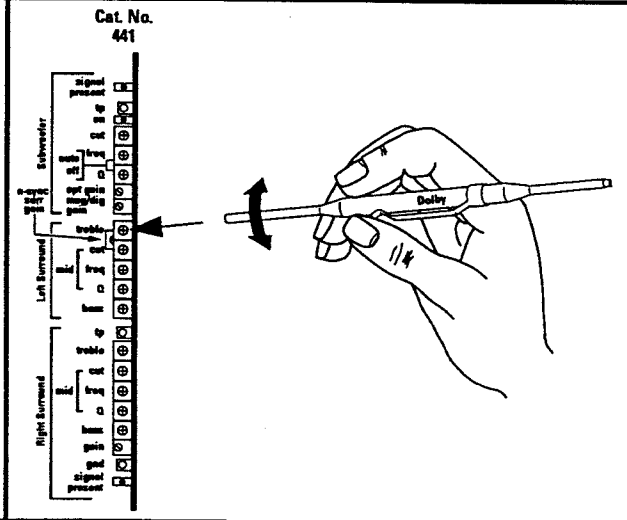
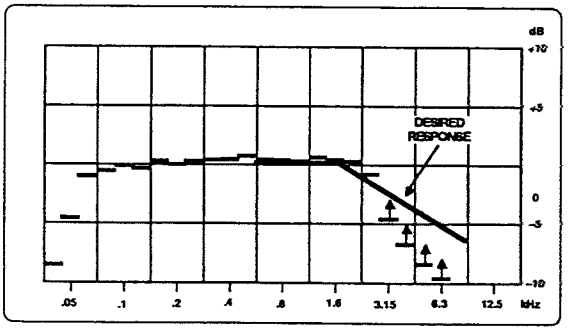
## Cat. No. 441—Surround Equalization Alignment

| Step No. | Action | Indication |
|---|---|---|
| 4 |  |  |
| 5 |  |  |
| 6 |  | |

**Cat. No. 441—Surround Equalization Alignment**

| Notes |
| --- |
| Adjust the **Left Surround bass control** on the Cat. No. 441 card for as flat as possible low frequency response on the RTA. Use caution when adjusting the bass control; many surround loudspeaker systems are deficient in their low frequency response. Attempts to boost the output of such system beyond their capabilities simply wastes amplifier power and can result in distortion and possibly damage to the surround loudspeakers. |
| Adjust the **Left Surround treble control** to its mid point, so that it provides neither cut nor boost.<br><br>Adjust the mid frequency controls as follows: Turn the **Cut** control fully clockwise (CW). Set the **Q** and **freq** controls to their mid positions.<br><br>Note the position of the center of the highest frequency peak in the 350 Hz to 3 kHz region on the analyzer screen. |
| Turn the **Cut** control fully counterclockwise and note the position of the notch produced by the equalizer. |

## Cat. No. 441—Surround Equalization Alignment

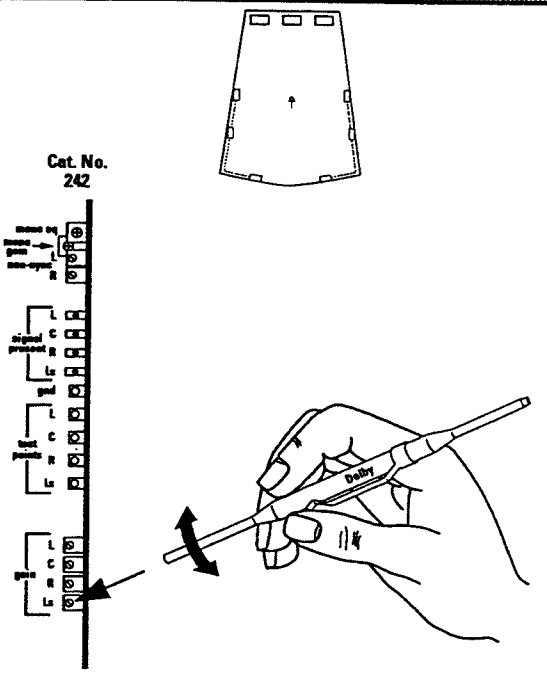
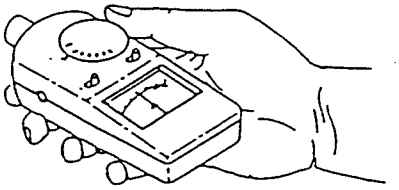
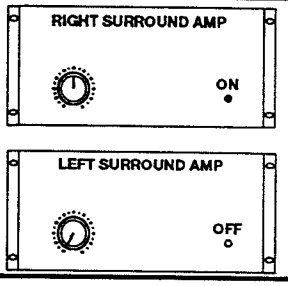
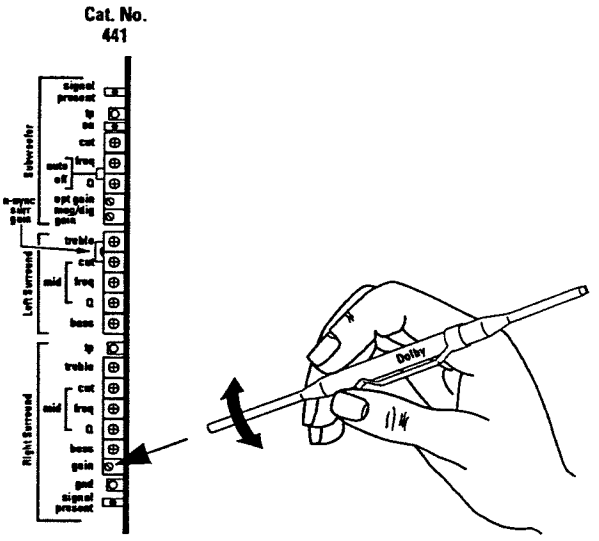
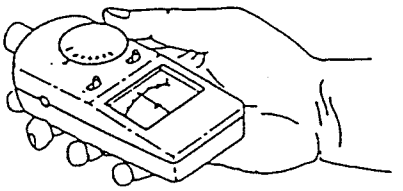
| Step No. | Action | Indication |
|---|---|---|
| 7 |  |  |
| 8 |  |  |
| 9 |  |  |
| 10 | REPEAT 7 → 9 | |

**Cat. No. 441—Surround Equalization Alignment**

| Notes |
| --- |
| Turn the **freq** control so that the notch is located over the peak noted in the previous step. |
| Adjust the **Cut** and **Q** controls for the flattest response in this part of the spectrum. |
| Adjust the **treble** control on the Cat. No. 441 card for the best approximation to the desired response shown. |
| The treble and mid equalizer controls interact. Repeat the adjustments until no further adjustment is required and you have attained the optimum frequency response. |

Cat. No. 441 Alignment Instructions from the CP65 Manual

## Cat. No. 441—Surround Equalization Alignment

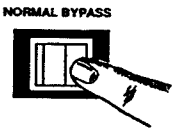
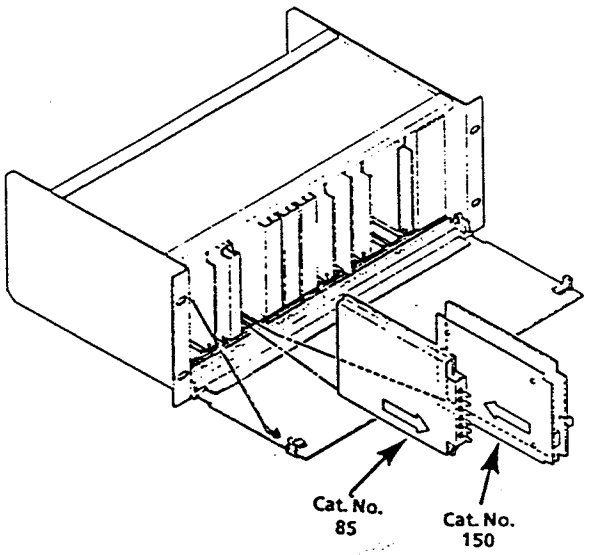
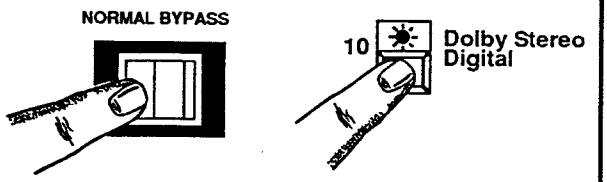
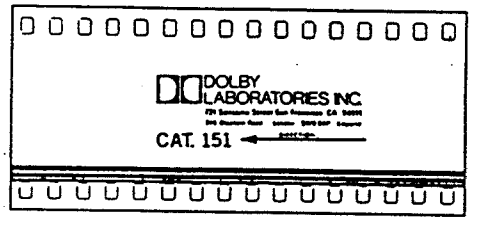
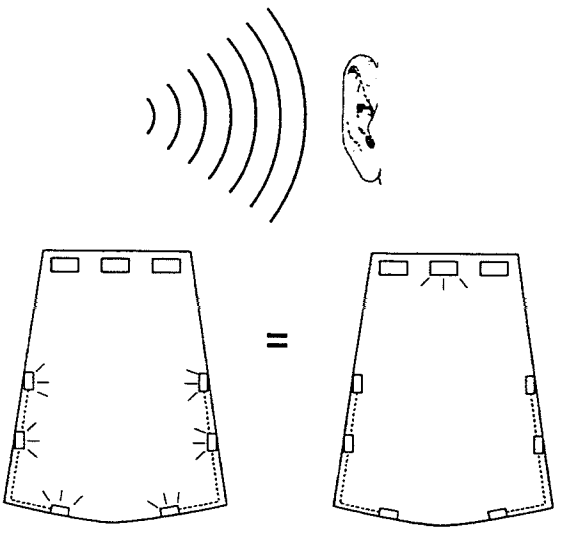
| Step No. | Action | Indication |
|---|---|---|
| 11 |  | MONO SURROUND 88 dBC<br>STEREO SURROUND 85 dBC<br>  |
| 12 |  | |
| 13 |  | 85 dBC<br>  |
| 14 | REPEAT 4 → 11 | |

**Cat. No. 441—Surround Equalization Alignment**

| Notes |
| --- |
| Adjust the **Ls** (Left surround) gain control on the Cat. No. 242 B-Chain card for a sound pressure level of 85 dBC (or 88 dBC if only one surround output is to be used). |
| If the surround speakers are wired for stereo operation or both surround outputs are in use, switch **on** ( or reconnect the input to) the **right surround** amplifier or amplifiers. Switch off (or disconnect the input to) the Left surround amplifier or amplifiers. |
| With the microphone still located at the center of the theatre, adjust the **Right Surround gain** control on the Cat. No. 441 surround and subwoofer card for a sound pressure level of 85 dBC. |
| Repeat Steps 4 through 11 using the **Right Surround** pots on the Cat. No. 441 card. NOTE: When you reach Step 11 remember that the right surround gain control is located on the Cat. No. 441 board. |

Cat. No. 441 Alignment Instructions from the CP65 Manual

## Cat. No. 441—Surround Equalization Alignment

| Step No. | Action | Indication |
|---|---|---|
| 15 |   | bypass (switch behind panel) |
| 16 |   | |
| 17 |   | |
| 18 |   Cat. No. 151 |   |

**Cat. No. 441—Surround Equalization Alignment**

| Notes |
| --- |
| Open the CP65 and place the **NORMAL/BYPASS** switch in the **BYPASS** position. |
| Remove the Cat. No. 85C card and re-install the Cat. No. 150 card. |
| Restore the BYPASS/**NORMAL** switch to the **NORMAL** position.<br><br>Confirm that format **04 Dolby Stereo A-Type** is selected. |
| Thread and play the Cat. No. 151 stereo optical surround level film. Check the sound by walking around the theatre. The surround and center channels should sound equally loud at most locations and left and right surround channels should sound equally loud and have similar frequency response in the center of the theatre. If necessary, readjust the left and right surround gains until you are satisfied with the surround-to-front center balance. A large change in the gain setting should be unnecessary. |

### 2.5.1.3 Sticker installation

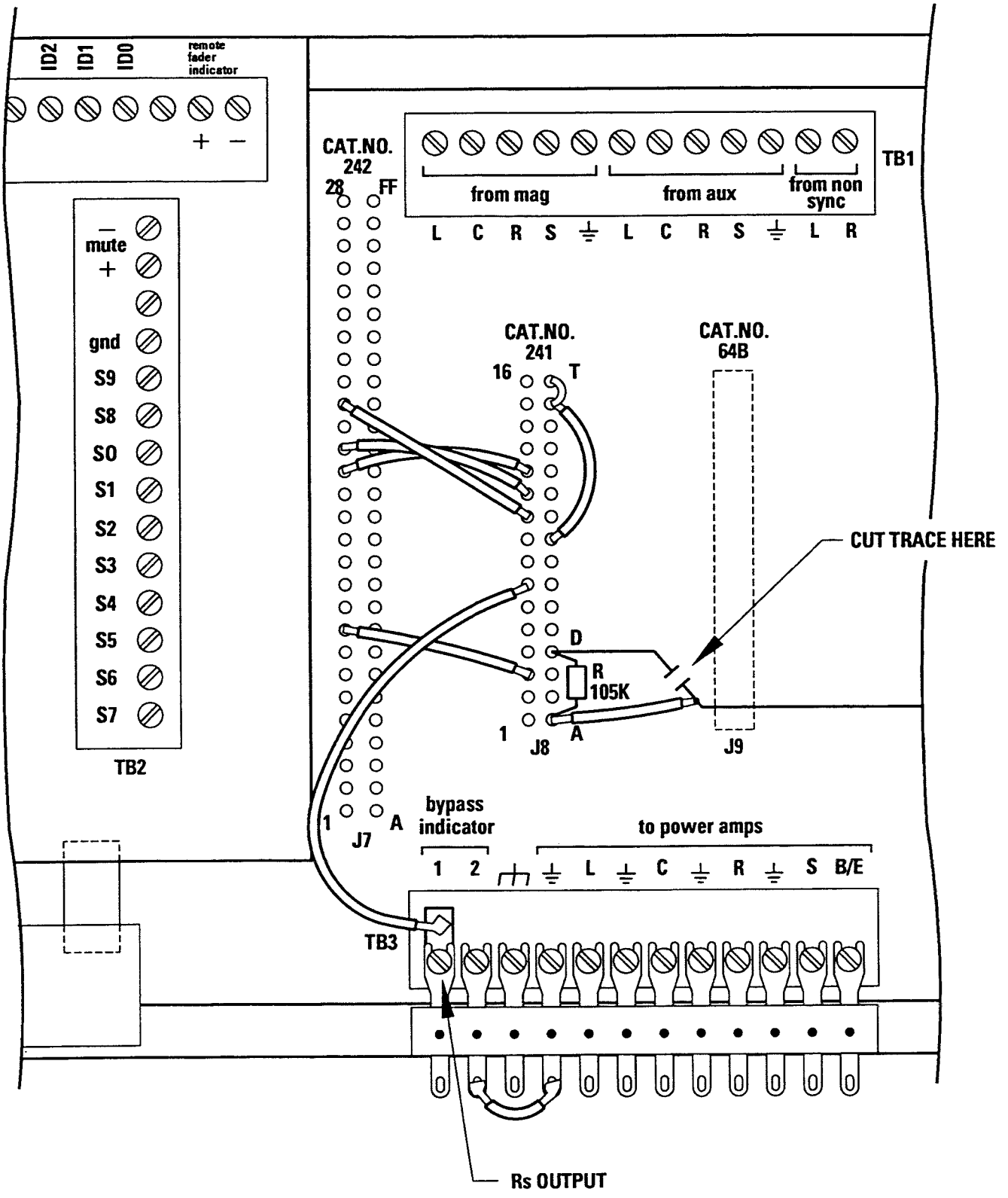
Two stickers are included in the CP55/SR·D installation kit.

Since the function of the front panel 03 button is now changed to format 05 and the aux button now selects SR·D, an adhesive label is included to re-label the front panel.

Clean the area of the front door around the format selection buttons with alcohol to remove any greasy film that may be present and would interfere with good adhesion of the label to the door. Before removing the backing material, position the format button sticker around the format buttons to see how it fits. Then remove the backing and carefully locate the sticker and press it onto the panel. Press it firmly over the entire area to ensure good adhesion.

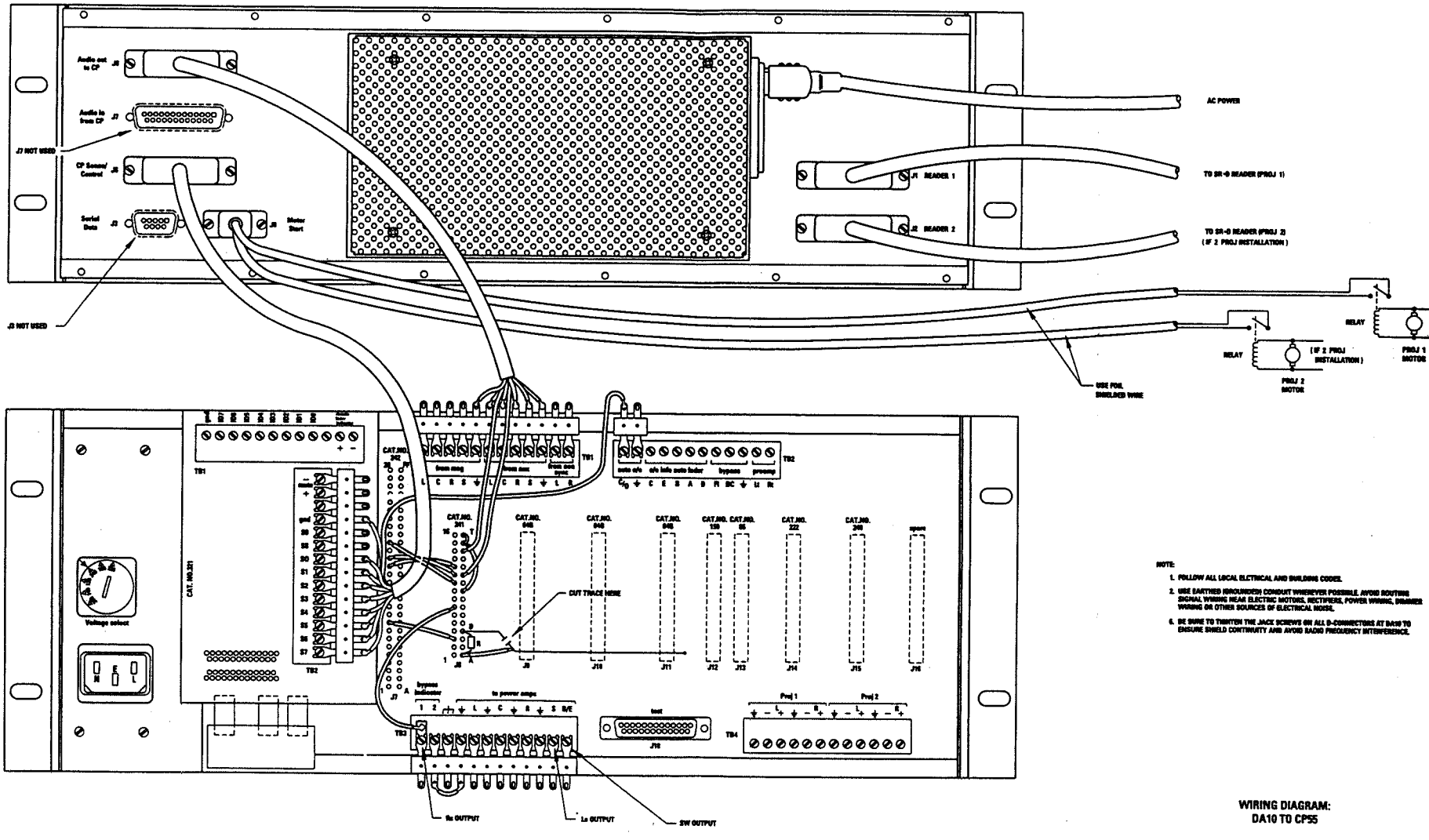
The controls on the Cat. No. 441 are different than those of the Cat. No. 241. To assist in alignment and prevent confusion, we have included a sticker that covers the Cat. No. 241 control identification drawing on the inside of the front panel and replaces it with an equivalent drawing showing the functions of the Cat. No. 441 controls.

Clean the area of the inside of the door where the Cat. No. 241 controls are described. Without removing the backing material, position the Cat. No. 441 sticker over the Cat. No. 241 description so that you see how it is designed to fit. Now remove the backing material and carefully locate the sticker and press it onto the panel. Press it firmly over the entire area to ensure good adhesion.


ID2
ID1
ID0
remote fader indicator
+ −
CAT.NO. 242
28 FF
TB1
from mag
from aux
from non sync
L C R S ⏚ L C R S ⏚ L R
mute
gnd
S9
S8
S0
S1
S2
S3
S4
S5
S6
S7
TB2
CAT.NO. 241
16 T
CAT.NO. 64B
D
R 105K
A
1
J8
J9
CUT TRACE HERE
1 A
J7
bypass indicator
1 2
to power amps
⏚ L ⏚ C ⏚ R ⏚ S B/E
TB3
Rs OUTPUT

## Audio from DA10 to CP55

| DA10<br>CP Audio Conn. J8<br>(DB25 Male)<br>Pinout | CP55 TB1 |
|---|---|
| 1 AGND | GND |
| 2 Rs out | CP55 backplane<br>Cat. No. 241 pin M |
| 3 AGND | |
| 4 AGND | |
| 5 AGND | |
| 6 AGND | |
| 7 AGND | |
| 8 AGND | |
| 9 AGND | |
| 10 AGND | |
| 11 AGND | |
| 12 AGND | |
| 13 AGND | |
| 14 L out | L from Aux |
| 15 Ls out | S from Aux |
| 16 Re out | |
| 17 R out | R from Aux |
| 18 Le out | |
| 19 n.c. | |
| 20 C out | C from Aux |
| 21 S out | |
| 22 n.c. | |
| 23 n.c. | |
| 24 SW out | CP55 Cat. No. 241<br>Pin R |
| 25 Spare out | |




NOTE:

1. FOLLOW ALL LOCAL ELECTRICAL AND BUILDING CODES.
2. USE EARTHED (GROUNDED) CONDUIT WHEREVER POSSIBLE. AVOID ROUTING SIGNAL WIRING NEAR ELECTRIC MOTORS, RECTIFIERS, POWER WIRING, DIMMER WIRING OR OTHER SOURCES OF ELECTRICAL NOISE.
3. BE SURE TO TIGHTEN THE JACK SCREWS ON ALL D-CONNECTORS AT DA10 TO ENSURE SHIELD CONTINUITY AND AVOID RADIO FREQUENCY INTERFERENCE.

**WIRING DIAGRAM:**
**DA10 TO CP55**

## CP55 to DA10 Sense/Control

Format sense and control are accomplished via connection of CP S0 through S7 lines, connected to DA10 CTRL0 through CTRL7. The DA10 monitors CTRL lines to see when format 10 is selected (CTRL7 and no other is low for greater than 80 ms). The DA10 switches to format 05 by holding CTRL1 low for 100 ms, and returns to format 10 by holding CTRL7 low for 100 ms. (The CP55 requires about 50 ms to switch formats).

| DA10 J6<br>DB25 Male<br>Pinout | CP55 Cat. No. 321<br>TB2<br>Fanning Strip |
|---|---|
| 1 Ctrl0 | S0 (01 - mono optical) |
| 2 Ctrl1 | S1 (05 - Dolby SR) |
| 3 Ctrl2 | S2 (04 - Dolby Stereo) |
| 4 Ctrl3 | S3 |
| 5 Ctrl4 | S4 (22 - mag) |
| 6 Ctrl5 | S5 |
| 7 Ctrl6 | S6 (60 - non-sync.) |
| 8 Ctrl7 | S7 (10 - Dolby SR·D) |
| 9 n.c | |
| 10 n.c | |
| 11 n.c | |
| 12 GND | GND |
| 13 n.c | |
| 14 Sense0 | |
| 15 Sense1 | |
| 16 Sense2 | |
| 17 Sense3 | |
| 18 Sense4 | |
| 19 Sense5 | |
| 20 Sense6 | |
| 21 Sense7 | |
| 22 n.c. | |
| 23 n.c. | |
| 24 n.c. | |
| 25 C/O Status | (CP55 backplane TB2)<br>Auto C/O |

## Section 2.5.2
## Installation of DA10 with CP65

Refer to the CP65 wiring diagram fold-out, Figure 2.5.2.1. Two cable assemblies are furnished in the CP65 kit. The ribbon cable with D-connectors on each end connects from J6 on the DA10 TO J18 on the CP65. The round cable plugs into J8 on the DA10 and the fanning strip on the other end connects to TB4 as shown.

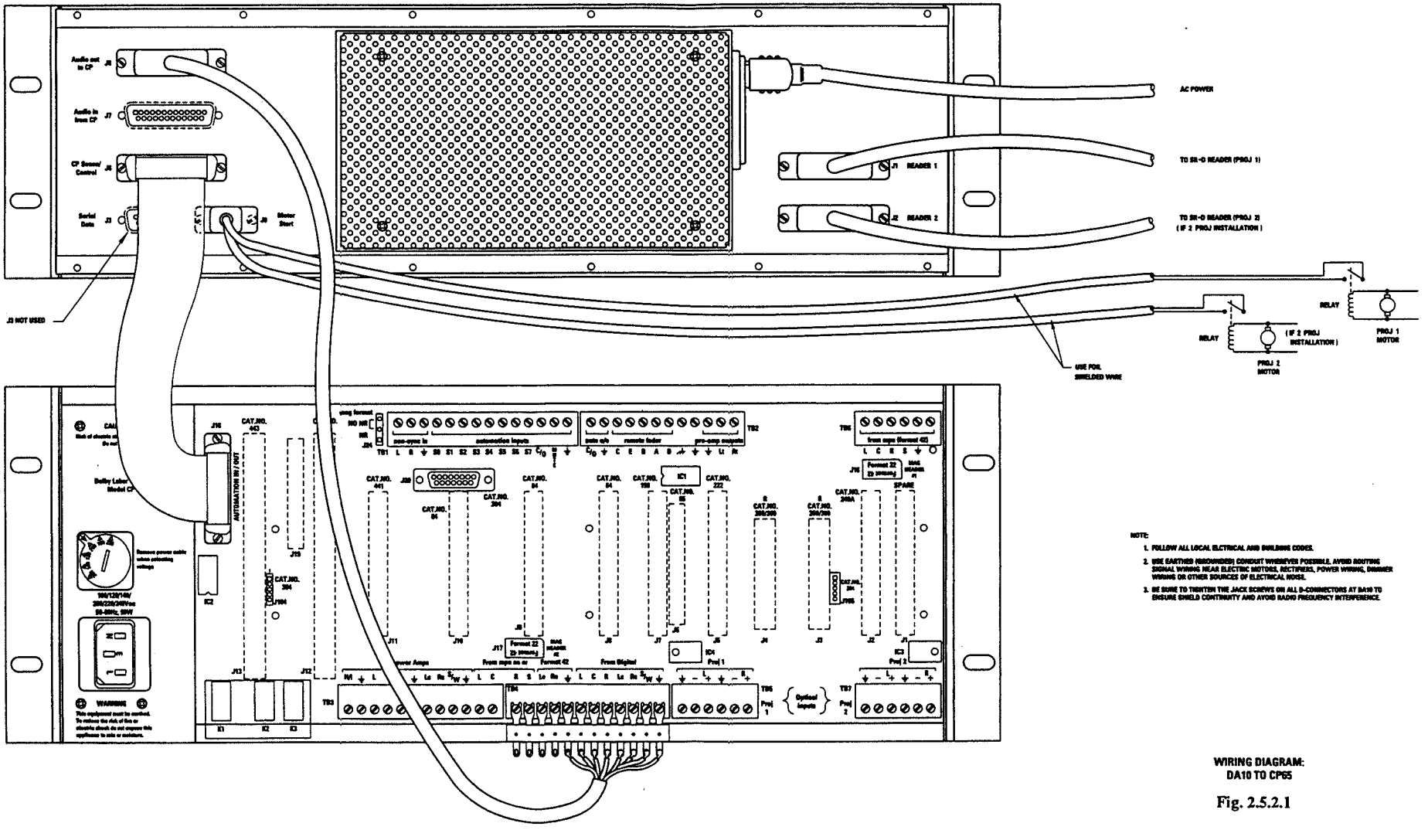
### Audio from DA10 to CP65

| DA10<br>CP Audio Conn. J8<br>(DB25 Male)<br>Pinout | CP65 TB4<br>From Digital |
|---|---|
| 1 AGND | GND |
| 2 Rs out | Rs |
| 3 AGND | |
| 4 AGND | |
| 5 AGND | |
| 6 AGND | |
| 7 AGND | |
| 8 AGND | |
| 9 AGND | |
| 10 AGND | |
| 11 AGND | |
| 12 AGND | |
| 13 AGND | |
| 14 L out | L |
| 15 Ls out | Ls |
| 16 Re out | |
| 17 R out | R |
| 18 Le out | |
| 19 n.c. | |
| 20 C out | C |
| 21 S out | |
| 22 n.c. | |
| 23 n.c. | |
| 24 SW out | S/W |
| 25 Spare out | |

## CP65 to DA10 Sense/Control

Format sense and control are accomplished via connection of CP S0 through S7 lines, connected to DA10 CTRL0 through CTRL7. The DA10 monitors CTRL lines to see when format 10 is selected (CTRL4 and no other is low for greater than 80 ms). The DA10 switches to format 05 by holding CTRL2 low for 100 ms, and returns to format 10 by holding CTRL4 low for 100 ms. (The CP65 takes about 50 ms to switch formats).

| DA10 J6<br>DB25 Male<br>Pinout | CP55 J18<br>DA25 Female<br>Pinout |
|---|---|
| 1 Ctrl0 | S0 (01 - mono optical) |
| 2 Ctrl1 | S1 (04 - Dolby Stereo) |
| 3 Ctrl2 | S2 (05 - Dolby SR) |
| 4 Ctrl3 | S3 |
| 5 Ctrl4 | S4 (10 - Dolby SR·D) |
| 6 Ctrl5 | S5 |
| 7 Ctrl6 | S6 |
| 8 Ctrl7 | S7 (20 - aux/mag.) |
| 9 n.c | |
| 10 n.c | |
| 11 n.c | -15V |
| 12 GND | GND |
| 13 n.c | +15V |
| 14 Sense0 | ID0 (status lines) |
| 15 Sense1 | ID1 |
| 16 Sense2 | ID2 |
| 17 Sense3 | ID2 |
| 18 Sense4 | ID4 |
| 19 Sense5 | ID5 |
| 20 Sense6 | ID6 |
| 21 Sense7 | ID7 |
| 22 n.c. | n.c |
| 23 n.c. | n.c |
| 24 n.c. | n.c |
| 25 C/O Status | Changeover Status |




NOTE:

1. FOLLOW ALL LOCAL ELECTRICAL AND BUILDING CODES.
2. USE EARTHED (GROUNDED) CONDUIT WHEREVER POSSIBLE. AVOID ROUTING SIGNAL WIRING NEAR ELECTRIC MOTORS, RECTIFIERS, POWER WIRING, DIMMER WIRING OR OTHER SOURCES OF ELECTRICAL NOISE.
3. BE SURE TO TIGHTEN THE JACK SCREWS ON ALL D-CONNECTORS AT DA10 TO ENSURE SHIELD CONTINUITY AND AVOID RADIO FREQUENCY INTERFERENCE.

**WIRING DIAGRAM: DA10 TO CP65**

**Fig. 2.5.2.1**

## Section 2.5.3
## Installation of DA10 with CP200

Refer to the CP200 wiring diagram fold-out, Figure 2.5.5. The lengths of cable in the wiring harnesses furnished assume that the DA10 will be mounted directly above the CP200 and associated MPU. It will be necessary to remove and set aside the ribbon jumper cable that goes from CP200 JM11 to JM21. **Note that removing this jumper interrupts the signal path for all channels except the subwoofer.** If the DA10 is subsequently removed for any reason, the D-connectors at the ends of the new cables that connect to JM11 and JM21 must be connected to each other.

In addition to the audio signal connections, the control logic must be connected between the units. These connections are shown on the diagram.

In order for the subwoofer to work with the DA10, a replacement for the °160 is required. This card is called the Cat. No. 560 and is based on the Cat. No. 441 subwoofer and surround card used in the CP65. In addition to subwoofer processing, is offers two channels of surround equalization.

To make full use of the available dynamic range of the SR·D format, the CP200 needs an improved output fader card. The Cat. No. 517 has been designed to fulfill this requirement and its installation in any CP200 used to play SR·D films is highly recommended.

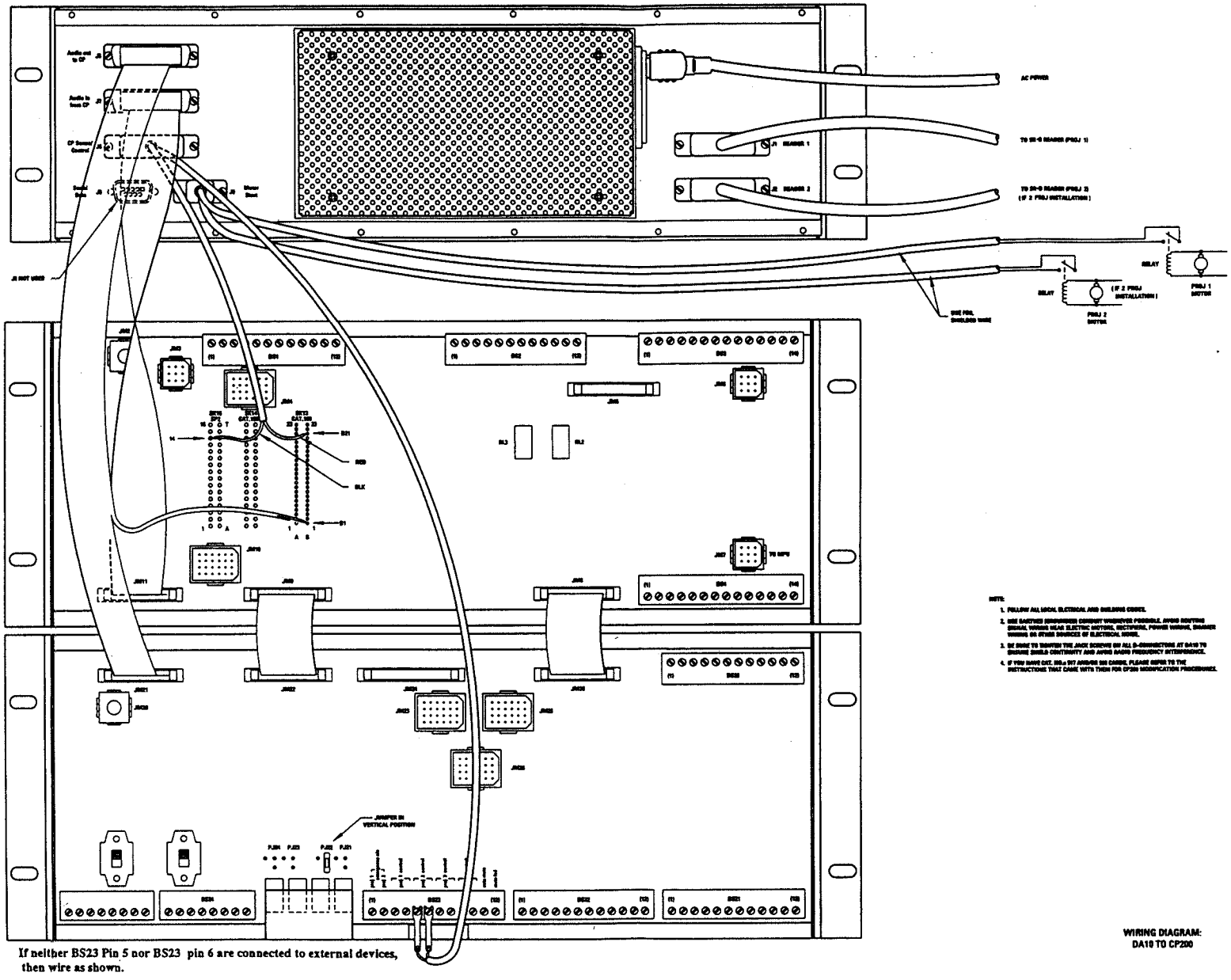
Backplane modifications for Cat. No. 560 and 517 are shown in figure 2.5.4.

The Cat. No. 153 Optical Format Card in the CP200 must be modified to allow format 10 to select the SR·D film format. The programming of the optical format card assumes that a SRA5 is installed with the CP200 for proper reversion to the SR analog soundtrack.

Remove the Cat. No. 153 Optical Format Card from the CP200 Control Unit and install the diodes as follows:

| | |
|---|---|
| Format Bus lines | 1,4,13,17,26,31 |
| Diode locations | 128,125,116,112,103,98 |

Use a low wattage soldering iron and ensure that there are no solder bridges when finished. Inspect the installed diodes for correct polarity. Reinstall the Cat. No. 153 in the CP200.



If neither BS23 Pin 5 nor BS23 pin 6 are connected to external devices, then wire as shown.

If either Pin 5 or Pin 6 is grounded, then connect the red wire to the un-grounded pin and do not connect the black wire.

**WIRING DIAGRAM: DA10 TO CP200**

## Section 2.5.3.1

# Cat. Nos. 517, 137L, and 560 Installation and Operation Instructions (CP200)

### INTRODUCTION

The Cat. Nos. 517 and 560 are designed to replace the Cat. Nos. 117 and 160, respectively. Their primary purpose is to upgrade the CP200 cinema processor to handle the wider dynamic range, lower distortion signals now available from Dolby SR·D. They offer improved performance even if simply plugged in place of the older cards, and additional features are available if a few wires are added to the CP200 backplane. Block diagrams of both cards are included with this set of instructions. Note that the installation procedure in a CP200 varies depending upon whether or not the system is equipped with an accessory unit with Cat. No. 64 equalizers in P and Q channels.

### FEATURES OF THE NEW CARDS

The Cat. No. 517 VCA and line amp card offers reduced distortion and a considerable headroom increase over the Cat. No. 117. The increase in headroom is particularly useful when the cards are installed in a system using Altec A-series loudspeakers or modern loudspeakers with passive crossovers. This is because the large treble boost required for the screen channels can be selected in the output stage of the Cat. No. 517 rather than in the Cat. No. 64 1/3-octave equalizers. When this feature is used, the Cat. No. 64s must of course be re-aligned.

The Cat. No. 517 is equipped with four signal presence LEDs located at the input to the card. The LED circuit is the same as that used on various cards in the CP55 and CP65. The LEDs will illuminate if the signal level is 15 dB below Dolby level or higher.

The Cat. No. 137L is a link card that replaces the Cat. No. 137. The Cat. No. 137L **must** be used in conjunction with Cat. No. 517s, or incorrect gains and high noise levels will result.

The Cat. No. 560 surround/subwoofer SR D card replaces the Cat. No. 160 and provides an additional subwoofer channel input for use with Dolby SR·D films and jumper selectable low-pass frequencies for optical and magnetic subwoofer. Used with Cat. No. 517s as part of the SR·D upgrade package, it provides parametric equalization for the P (Left surround) and Q (Right surround) channels.

## INSTALLATION INSTRUCTIONS

### A) CAT. NO. 517 JUMPER SETTINGS

Each Cat. No. 517 has five programming jumpers and three switches:

- **S1** through **S3** select a fixed treble boost (9 dB at 5 kHz, 14 dB at 10 kHz) designed to approximate the large treble equalization required with many screen speakers. Up is on, down is off. Note that this boost (called treble compensation to distinguish it from other kinds of eq) is available only for screen channels. Neither P (Left surround) nor Q (Right surround) channels have this boost feature, and this circuit is disabled in the left slot of the CP200 for the S channel.

- **J1** through **J4** select high or low output gain ranges for the four channels on the card. The HIGH/LOW selectors on the CP200 BACKPLANE must be left in the HIGH position at all times for best performance and the gain range jumpers on the cards used instead.

The CP200 output section actually has three signal paths for surround channel signals-S, P (Left surround), and Q (Right surround). In a normal monaural surround installation, only the S output is used. In installations configured to play 70mm split surround films (format 43), the P (Left surround) and Q (Right surround) outputs are normally used and the S output ignored.

In some theaters the S output is used to feed rear wall speakers or balcony speakers so as to have three separate zones with separate level controls. In a split surround system, it is best to re-allocate these speakers to the P (Left surround) and Q (Right surround) channels as appropriate. However, in the DA10 a mono surround output (created by summing the left and right surround signals) is provided and is routed to this channel in the CP200.

### B) Cat. No. 560 settings

- The Cat. No. 560 has six programming jumpers and one switch on it:

- **J1** selects high or low output level range for the CP50 variable Right surround output.

- **J2** selects high or low output level range for the subwoofer channel.

- **J3** selects the surround logic mode. In the CP200 position, the Left surround input feeds Left surround output and the Right surround input feeds the Right surround output. In the CP50 position, the Right surround input feeds both Right surround and Left surround outputs except when in the SR·D format. In this format, the two channels are independent.

- **J4** selects either a 50 or 100 Hz low-pass filter for the subwoofer when in analog optical formats. The 50 Hz setting is intended for use with JBL, E-V or other modern screen loudspeakers having good response and power handling down to that frequency. By using this filter position, overlap between subwoofer and screen

speakers is avoided. The 100 Hz setting is intended for use with Altec A-series and other older screen speakers lacking in power handling ability at low frequencies. In these cases, the screen speaker equalization should not have boost applied below 100 Hz so as to avoid a peak in the system frequency response caused by overlapping outputs from the subwoofer and screen speaker.

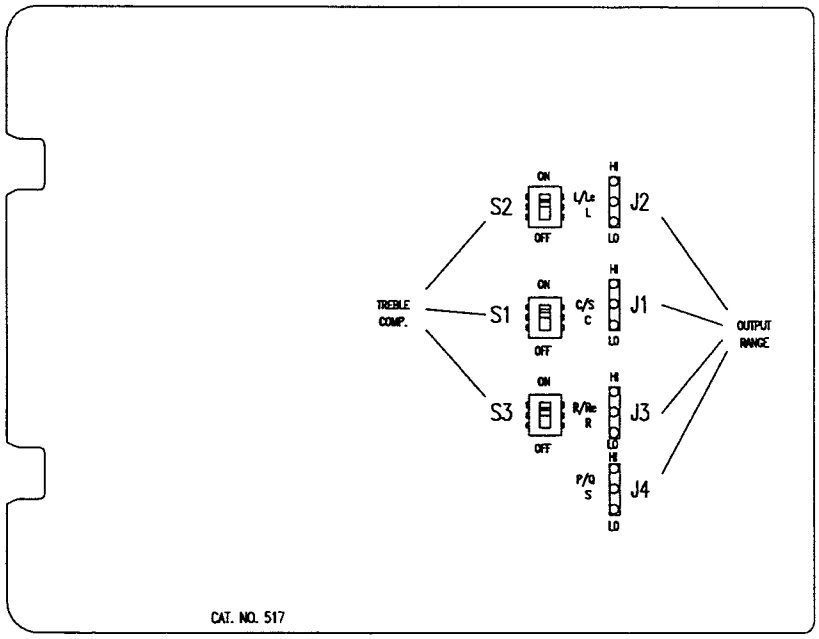
- **J5** selects either a 100 or 180 Hz low pass filter for the subwoofer when in magnetic sound formats. The 180 Hz position is intended for installations with no Le or Re speakers, where the subwoofer carries all bass track information. The 100 Hz position is intended for installations using the Le and Re speakers to carry the bass track information in conjunction with a subwoofer. The Le and Re screen speakers are rolled off below 100 Hz by the Cat. No. 142. The subwoofer provides the mid- and low-bass information.

- **J6** disables the CP200 subwoofer output in CP50 installations.

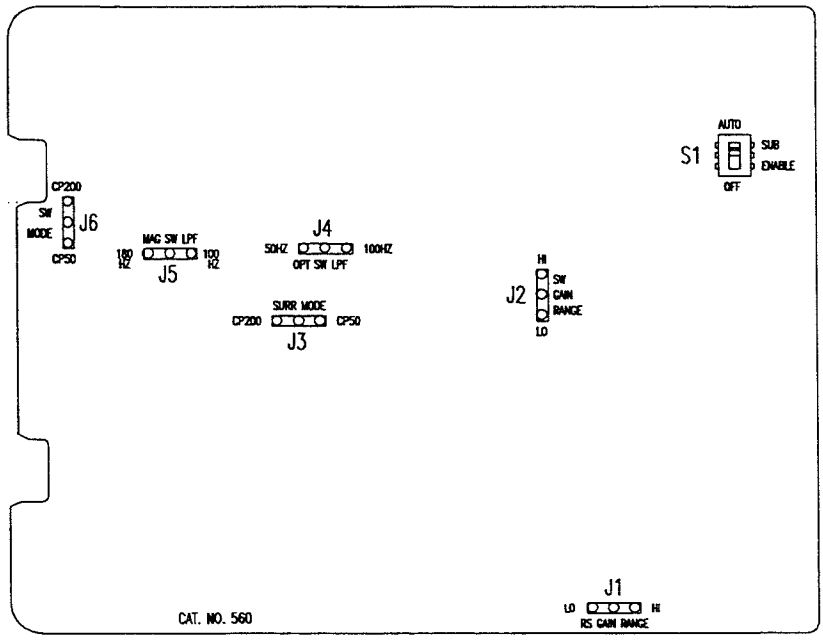
- **S1** enables or disables the subwoofer. The lower position corresponds to the OFF setting on Cat. No. 160 and the upper setting to the AUTO setting.

The Cat. No. 560 provides a single band parametric equalizer and variable turnover bass and treble controls for P and Q surround channels and a single band parametric equalizer for the subwoofer. The equalizer control functions and locations of the Cat. No. 560 are similar to those on the Cat. No. 441 card used in the CP65.

# CAT. NO. 517 SET-UP




# CAT. NO. 560 SET-UP



## Section 2.5.3.2 Installation of Cat. Nos. 517, 137L, and 560 in CP200 With NO Accessory Unit

Install the wiring shown in the wiring pictorial diagram (Figure 2.5.3.2). The S output channel will not be equalized in any format as only two equalizers are provided on the Cat. No. 560 and they are used for Left surround and Right surround.

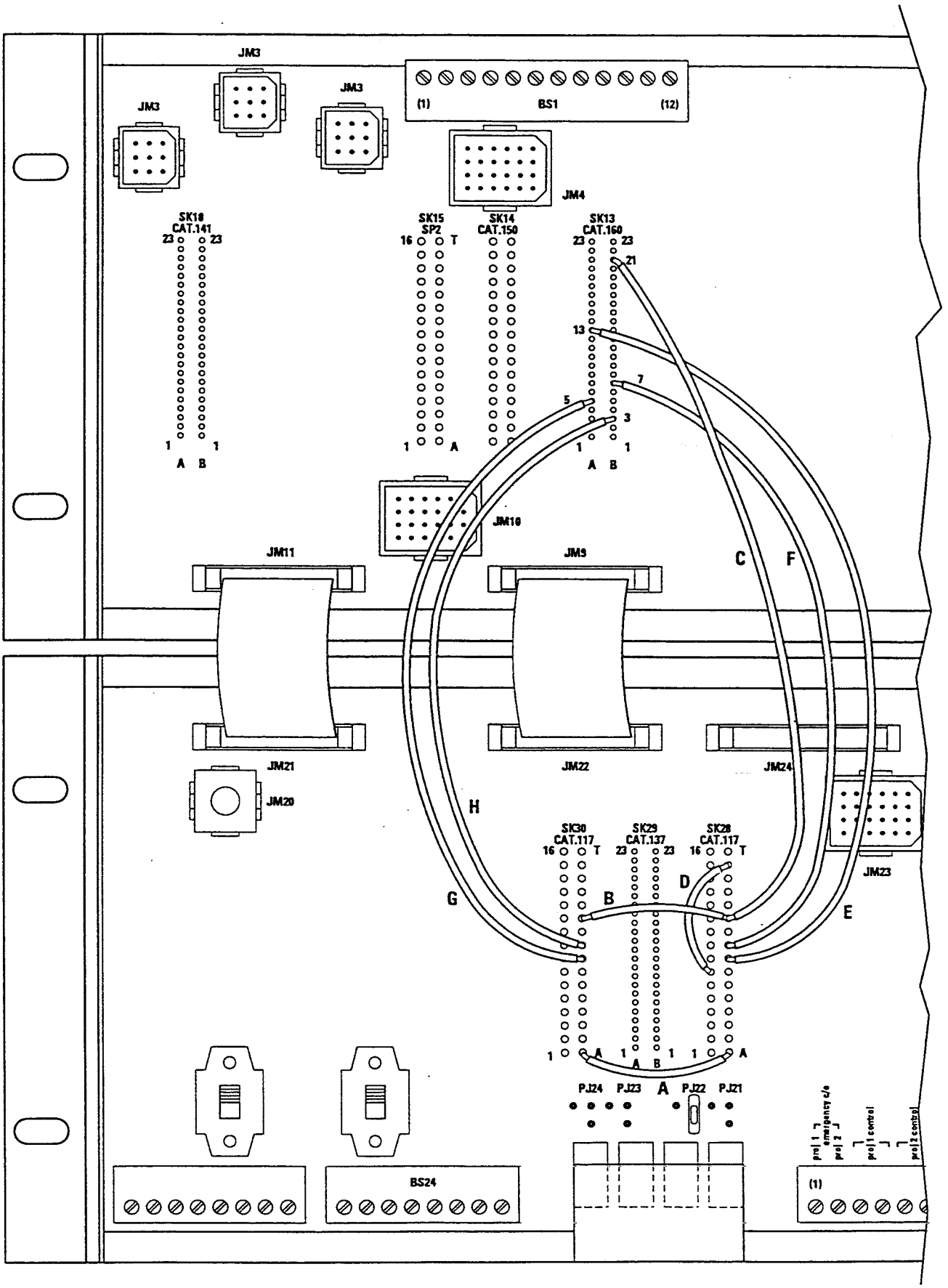
When the backplane wiring is done as shown in the figure, the operation of the Cat. No. 517s for the S, P (left surround), and Q (right surround) channels is as follows. The optical surround trim (the upper pot on the left-hand Cat. No. 517) now functions as a surround trim governing all three surround outputs at once when an analog optical format with surround (formats 04 or 05) is selected. A range of ± 10 dB around the nominal setting is provided. In all other formats, this pot is disabled.

When no accessory unit is installed the surround EQ sections of the Cat. No. 560 are used to equalize these two channels. Refer to the CP65 installation manual, section E of the B-chain Alignment Procedures on page 5-33. This section explains the alignment of the Cat. No. 441 card however, the Cat. No. 560 EQ section is identical and the instructions are applicable. Select format 40 (70mm mag no NR). Remove the Cat. No. 141 from slot 37 of the CP200 processor unit (first slot in from the right), insert the Cat. No. 85 in its place. Be sure to mute the processor when removing or inserting a card. The Center switch on the Cat. No. 85 will send pink noise to P (left surround) and the Surround switch will send it to Q (right surround). Use a calibrated microphone and a real time analyzer (RTA) to equalize the surround channels according to the instructions.

After completing this step, reinstall the Cat. No. 141 into slot 37 and proceed to Section 2.5.3.4, Equalization of the Subwoofer Channel.

**Description of backplane wiring (no accessory unit):**

| FROM | TO | FUNCTION | FIGURE REF. |
|---|---|---|---|
| SK30 pin A (Cat. No. 517) | SK28 pin A (Cat. No. 517) | optical surround trim VCA signal | A |
| SK30 pin M | SK28 pin M (Cat. No. 517) | SR·D valid logic signal from DA10 (low = valid) | B |
| SK28 pin M | SK13 pin B21 (Cat. No. 560) | SR·D valid logic signal from DA10 (low = valid) | C |
| SK 28 pin S | SK28 pin 7 (Cat. No. 517) | Grounds pin S to indicate card is in left slot, disabling C/S channel treble compensation and enabling surround trim pot to control P (Left surround) and Q (Right surround) channels. | D |
| SK 28 pin J | SK13 pin A13 (Cat. No. 560) | output to P (Left surround) EQ (not used with Cat. No. 64 surround EQ) | E |
| SK 28 pin K | SK13 pin B7 | return from P (Left surround) EQ (not used with Cat. No. 64 surround EQ) | F |
| SK 30 pin J | SK13 pin A5 | output to Q (Right surround) EQ (not used with Cat. No. 64 surround EQ) | G |
| SK 30 pin K | SK13 pin B3 | return from Q (Right surround) EQ (not used with Cat. No. 64 surround EQ) | H |




**CP200 Backplane Wiring (no accessory unit)**

Fig. 2.5.3.2

**Section 2.5.3.3 Installation of Cat. Nos. 517, 137L, and 560 in a CP200 WITH an accessory unit fitted with Cat. No. 64 equalizers for P (Left Surround) and Q (Right Surround) channels.**

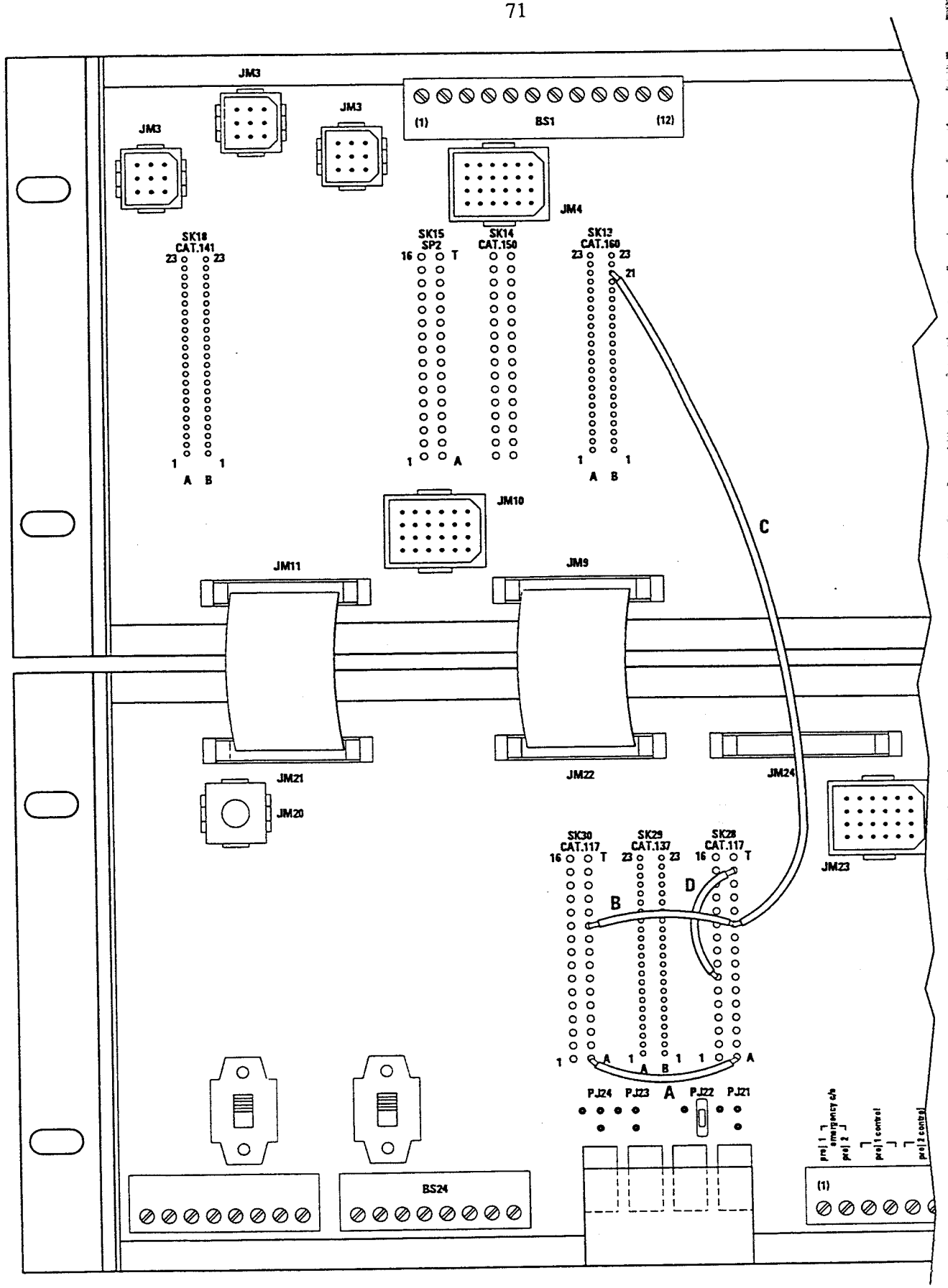
Install the wiring shown in the wiring pictorial diagram for installations with Cat. No. 64 surround equalization (Figure 2.5.3.3). Note that the surround equalization sections of the Cat. No. 560 are not used in these installations since 1/3-octave equalization is used instead.

When the backplane wiring is done as shown in the figure, the operation of the Cat. No. 517s for the S, P (Left surround) and Q (Right surround) channels is as follows. The optical surround trim (the upper pot on the left-hand Cat. No. 517) now functions as a surround trim governing all three surround channels at once when an analog optical format with surround (formats 04 or 05) is selected. A range of ± 10 dB around the nominal setting is provided. In other formats, this pot is disabled.

If Cat. No. 64 EQ cards are being installed in the accessory unit at this time, the surrounds must be equalized. Refer to the CP200 Installation Manual, page 47.

**Description of backplane wiring (with accessory unit and EQ for P, Q channels)**

| FROM | TO | FUNCTION | FIGURE REF. |
|---|---|---|---|
| SK30 pin A (Cat. No. 517) | SK28 pin A (Cat. No. 517) | optical surround trim VCA signal | A |
| SK30 pin M | SK28 pin M (Cat. No. 517) | SR·D valid logic signal from DA10 (low = valid) | B |
| SK28 pin M | SK13 pin B21 (Cat. No. 560) | SR·D valid logic signal from DA10 (low = valid) | C |
| SK 28 pin S | SK28 pin 7 (Cat. No. 517) | Grounds pin S to indicate card is in left slot, disabling C/S channel treble compensation and enabling surround trim pot to control P (Left surround) and Q (Right surround) channels. | D |




CP200 Backplane Wiring (with accessory unit and EQ for P< Q channels)

Fig. 2.5.3.3

### Section 2.5.3.4 Equalization of the Subwoofer Channel

Refer to the CP65 Installation Instructions; the section B-chain alignment on page 5-23 explains the equalization of the subwoofer. Remove the Cat. No. 141 from slot 23 (fourth slot in from the left), insert the Cat. No. 85 in its place. If Le and Re speakers are also installed, remove the Cat. No. 141 from slot 35 (third slot in from the right). Select **format 42** (Dolby Stereo 70mm). Select **Le** on the Cat. No. 85 to send pink noise to the subwoofer. Use a calibrated microphone and a RTA to EQ the subwoofer channel according to the instructions. After completing this step, reinstall the two Cat. No. 141s into slots 23 and 35.

### Section 2.5.3.5 Output level adjustments of Cat. Nos. 517 and 560 in CP200

1. Adjustment of P and Q channels

   Select **format 40** (70mm mag no NR). Note: If only the S (mono surround output) is used proceed to step 2.

   Remove the Cat. No. 141 from slot 37 of the CP200 processor unit (first slot in from the right), insert the Cat. No. 85 pink noise generator in its place. Be sure to mute the processor when removing or inserting a card. The Center switch on the Cat. No. 85 will send pink noise to P (left surround) and the Surround switch will send it to Q (right surround). Using a SPL meter set to dBC slow, adjust the P and Q controls on the Cat. No. 517 to obtain 82 dBC on each channel. Switch on pink noise to both P and Q together and verify that 85 dBC SPL is reached. After completing this step, reinstall the Cat. No. 141 into slot 37.

2. Adjustment of Left, Center, Right and Le, Re channels

   Remove the Cat. No. 141 from slot 35 (third slot in from the right), insert the Cat. No. 85 in its place. Adjust the left, center, right and if installed, left extra and right extra channels to 85 dBC. Select **format 01** (optical mono). Select Center on the Cat. No. 85 and adjust the mono level control on the right Cat. No. 517 to obtain 79 dBC.

3. Adjustment of optical surround and mono surround

   Reselect **format 40**, select Surround on the Cat. No. 85. If the mono surround (S) output is used set the **Mag S** level control on the left Cat. No. 517 to 85 dBC. Select **format 04** (Dolby Stereo optical) and adjust the **Opt S** level control to read 88 dBC on the SPL meter. Note: This control trims the level of all three surround outputs (P, Q and S) previously set and therefore will affect which ever set of outputs (P and Q or S) is used. After completing this step, reinstall the Cat. No. 141 into slot 35.

   Thread up and play a loop of Cat. No. 151B surround level test film. While in the most commonly used seating area of the auditorium, listen and

check that the level of the surrounds is the same as the front channels. If needed, readjust the **Opt** surround level control on the left hand Cat. No. 517 to obtain the correct balance.

4. Adjustment of optical subwoofer level

Remove the Cat. No. 141 from slot 23 (fourth slot in from the left), insert the Cat. No. 85 in its place. Shut off **S1** (subwoofer enable) on the Cat. No. 560 to mute the subwoofer output. Select **L**eft and **R**ight on the Cat. No. 85; the pink noise will be decoded to the center channel speaker. Using a RTA, observe the level of the pink noise from the center channel, note the amplitude on the display. Turn on **S1** on the Cat. No. 560. Remove the Cat. No. 141 switch card from slot 35 (third slot in from the right) to disable the other stage speakers. While observing the RTA, adjust the **Opt** subwoofer level control on the Cat. No. 560 so that the subwoofer inband level is the same as the center channel midrange level that was previously observed. After completing this step, reinstall the Cat. No. 141 into slot 35.

5. Adjustment of magnetic/digital subwoofer level

**a**). Systems with subwoofers but no Le or Re speakers

Select **format 42** (Dolby Stereo 70mm). Select **C**enter on the Cat. No. 85, using a RTA observe the level of the pink noise from the center channel, note the amplitude on the display. Note: This is not the same level as observed in step 4. Shut off **C**enter on the Cat. No. 85 and select **Le**. While observing the RTA, adjust the **Mag/Dig** subwoofer level control on the Cat. No. 560 so that the subwoofer inband level is 10 dB higher than the center channel midrange level that was previously observed. After completing this step, proceed to step 6.

**b**). Systems with subwoofers and Le Re speakers

Select **format 42** (Dolby Stereo 70mm). Select **C**enter on the Cat. No. 85, using a RTA observe the level of the pink noise from the center channel, note the amplitude on the display. Note: This is not the same level as observed in step 4. Shut off **S1** (subwoofer enable) on the Cat. No. 560 to mute the subwoofer output. Shut off **C**enter on the Cat. No. 85 and select **Le**. While observing the RTA, adjust the **Mag** level control on the Cat. No. 142 so that the Le inband level is 10 dB higher than the midrange level of the center channel that was previously observed. Turn on **S1** on the Cat. No. 560 card. Remove the Cat. No. 141 switch card from slot 35 (third slot in from the right) to disable the other stage speakers. While observing the RTA, adjust the **Mag/Dig** subwoofer level control on the Cat. No. 560 so that the subwoofer inband level is 10 dB higher than the center channel midrange level that was previously

observed. **Note:** The Le and Re speakers are only used in mag formats with the Cat. No. 560 and the **Opt** control on the Cat. No. 142 is not used.

6. Remove the Cat. No. 85 and reinstall all Cat. No. 141 cards. The B-chain adjustments of the new cards are completed.

## Audio from DA10 to CP200

| DA10<br>CP Audio<br>Conn. J8<br>(DB25 Male)<br>Pinout | CP200<br>JM21 (IDC 20 pin)<br>Pinout |
|---|---|
| 1 AGND | 1 GND |
| 2 Rs out | 2 Q |
| 3 AGND | 3 blank |
| 4 AGND | 4 blank |
| 5 AGND | 5 blank |
| 6 AGND | 6 blank |
| 7 AGND | 7 blank |
| 8 AGND | 8 blank |
| 9 AGND | 9 blank |
| 10 AGND | 10 blank |
| 11 AGND | not connected |
| 12 AGND | not connected, cut short |
| 13 AGND | not connected, cut short |
| 14 L out | 11 L |
| 15 Ls out | 12 P |
| 16 Re out | 13 Re |
| 17 R out | 14 R |
| 18 Le out | 15 Le |
| 19 n.c. | 16 blank |
| 20 C out | 17 C |
| 21 S out | 18 S |
| 22 n.c. | 19 blank |
| 23 n.c. | 20 blank |
| 24 SW out | not connected to JM21, but soldered to pin B1 of SK13 |
| 25 Spare out | not connected, cut short |

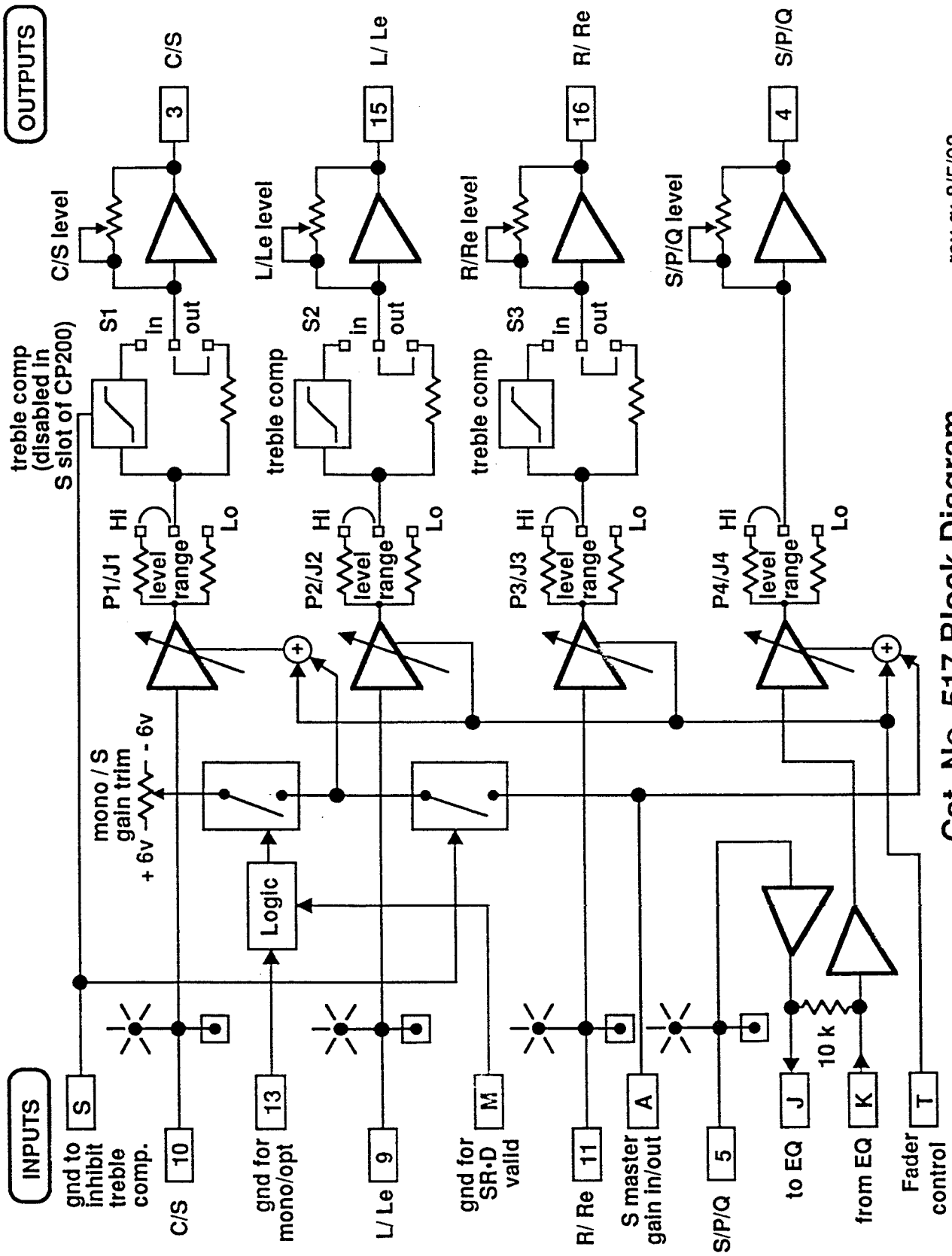
## Audio from CP200 to DA10

| DA10<br>CP Audio<br>Conn. J7<br>DB25 Female<br>Pinout | CP200<br>JM11 (IDC 20 pin)<br>Pinout |
|---|---|
| 1 AGND | 1 GND |
| 2 Rs in | 2 Q |
| 3 AGND | 3 blank |
| 4 AGND | 4 blank |
| 5 AGND | 5 blank |
| 6 AGND | 6 blank |
| 7 AGND | 7 blank |
| 8 AGND | 8 blank |
| 9 AGND | 9 blank |
| 10 AGND | 10 blank |
| 11 AGND | not connected, cut short |
| 12 AGND | not connected, cut short |
| 13 AGND | not connected, cut short |
| 14 L in | 11 L |
| 15 Ls in | 12 P |
| 16 Re in | 13 Re |
| 17 R in | 14 R |
| 18 Le in | 15 Le |
| 19 n.c. | 16 blank |
| 20 C in | 17 C |
| 21 n.c | 18 S |
| 22 n.c. | 19 blank |
| 23 n.c. | 20 blank |
| 24 n.c. | not connected, cut short |
| 25 Spare in | not connected, cut short |

## CP200 to DA10 Sense/Control

The DA10 monitors the CP200 Future 8 / external Format Bus Line via the DA10 SENSE0 line. A low state on this line indicates format 10 is selected.
The CTRL1 through 7 lines are not used. The CTRL0 line (pin 1, DA10 J6) is held low and the audio relays on the Cat. No. 611 card in slot 18 of the DA10 are pulled in when the DA10 is reproducing SR·D digital. The CTRL0 line is used by CP200 to switch to the Digital SW channel from the DA10 instead of from optical. The DA10 switches to analog by returning the audio relays to analog audio and letting CTRL0 go high to switch to optical subwoofer.

| DA10 J6 DB25 Male Pinout | CP200 Backplane |
|---|---|
| 1 Ctrl0 | B21 of SK13, CN160 in processor unit (soldered) |
| 2 Ctrl1 | nc |
| 3 Ctrl2 | nc |
| 4 Ctrl3 | nc |
| 5 Ctrl4 | nc |
| 6 Ctrl5 | nc |
| 7 Ctrl6 | nc |
| 8 Ctrl7 | nc |
| 9 n.c | nc |
| 10 n.c | nc |
| 11 n.c | nc |
| 12 GND | BS23 pin 5 |
| 13 n.c | nc |
| 14 Sense0 | pin 14 of SK15, SP2 in processor unit (soldered) |
| 15 Sense1 | nc |
| 16 Sense2 | nc |
| 17 Sense3 | nc |
| 18 Sense4 | nc |
| 19 Sense5 | nc |
| 20 Sense6 | nc |
| 21 Sense7 | nc |
| 22 n.c. | nc |
| 23 n.c. | nc |
| 24 n.c. | nc |
| 25 C/O Status | BS23 pin 6 |




Cat. No. 517 Block Diagram

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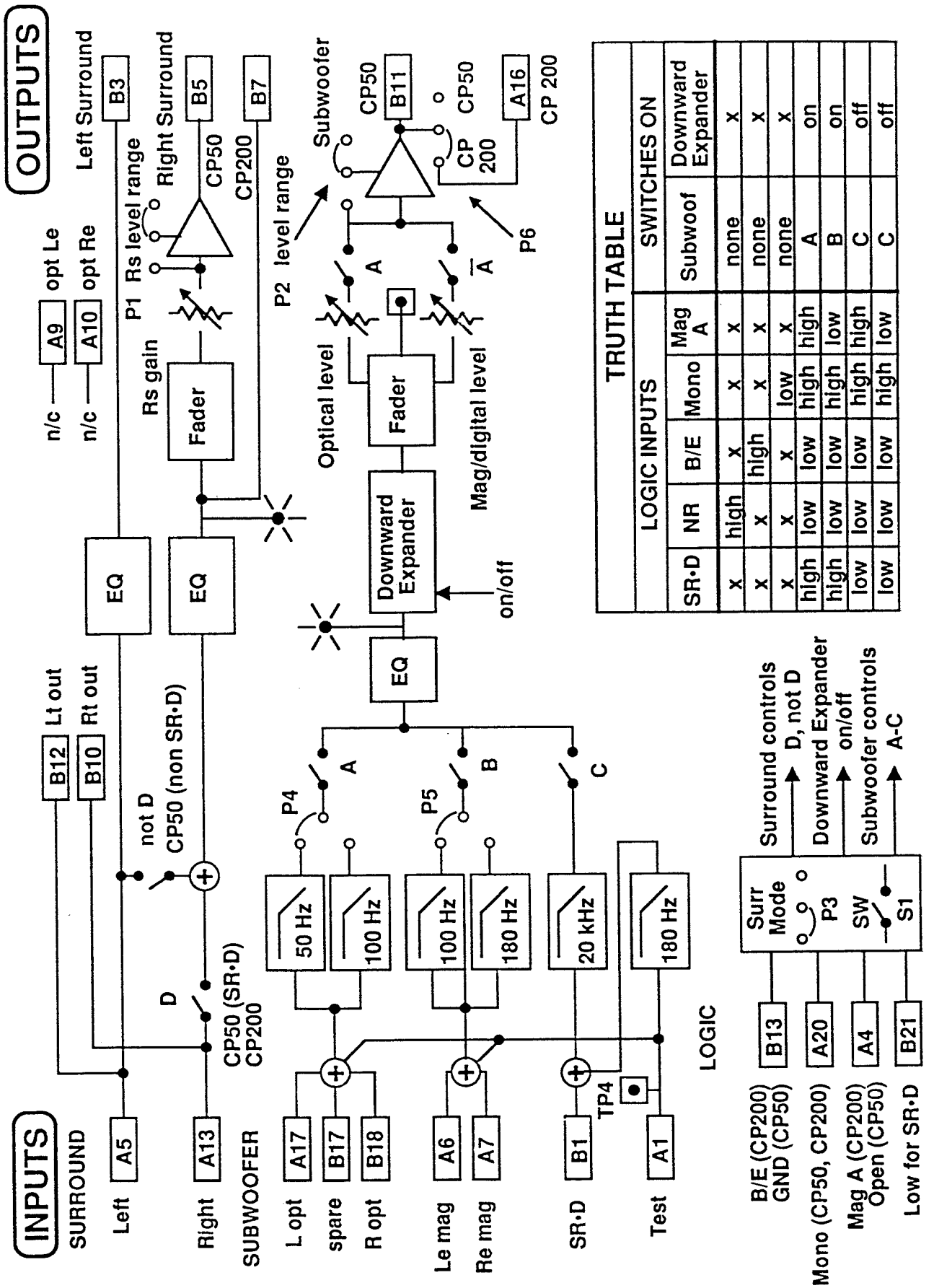



TRUTH TABLE

| LOGIC INPUTS | | | | | SWITCHES ON | |
|---|---|---|---|---|---|---|
| SR•D | NR | B/E | Mono | Mag A | Subwoof | Downward Expander |
| x | high | x | x | x | none | x |
| x | x | high | x | x | none | x |
| x | x | x | low | x | none | x |
| high | low | low | high | high | A | on |
| high | low | low | high | low | B | on |
| low | low | low | high | high | C | off |
| low | low | low | high | low | C | off |

# SECTION 3
# CAT. NO. 699 DIGITAL SOUNDHEAD ALIGNMENT



## Section 3.1
## Cat. No. 699 Digital Soundhead Alignment

Mechanical alignment of the Cat. No. 699 Digital Soundhead consists of making sure the film path through the digital soundhead is aligned with the path through the rest of the projector. Thread a length of film from supply reel through the digital soundhead (refer to the threading diagram on the soundhead), and on through the projector as you would any film. Apply tension to the film and inspect for equal tension on both edges of the film. Check for uneven forces on the rollers, or twisting of the film. When the path is aligned, tighten the soundhead mounting bolts and reel arm.

## Section 3.2
## Exciter Lamp Level Setting, Test Film Alignment and Focus

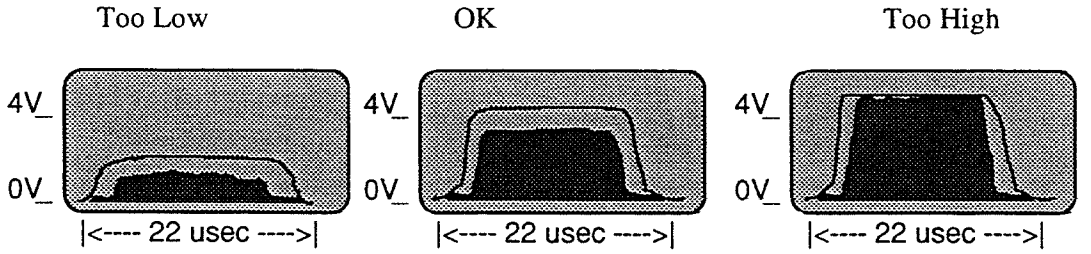
1) Make sure power to the Cat. No. 630 exciter lamp power supply is provided. Remove the DA10 front panel (see Section 8). Connect a probe from Channel 1 of a 20MHz or greater bandwidth oscilloscope to the VIDEO Test Point (TP5) on the Cat. No. 605 Video Acquisition Card in slot 2 of the DA10, with the ground lead attached to VGND (TP10, just above TP5). Connect a second probe from the scope's Channel 2 input to the CLAMP signal test point (TP4) to trigger the scope. Connect the second probe's ground wire to AGND (TP8). Set the trigger source on the scope to Ch 2. Adjust the Ch 2 vertical trace position to move the trace off the screen. It is not needed.

Cat. No. 605 Video Board (DA10 slot 2) Test Points:

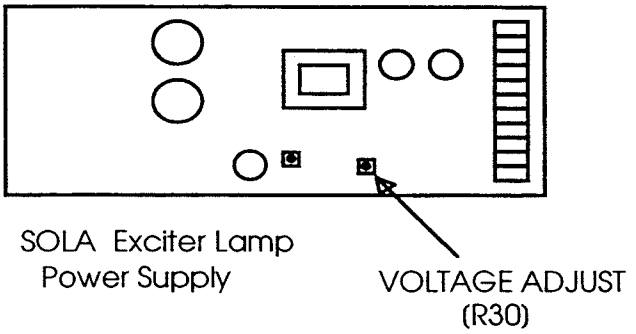
- VGND TP10 Ground reference for Video signal
- VIDEO TP5 The CCD video signal
- CLAMP TP4 Horizontal Sync. to view Video scan.
- VREF TP6 Should follow peak of video signal
- TRK TP7 Perforation rate - check for 96Hz
- AGND TP8 Ground reference for CLAMP, VREF, TRK

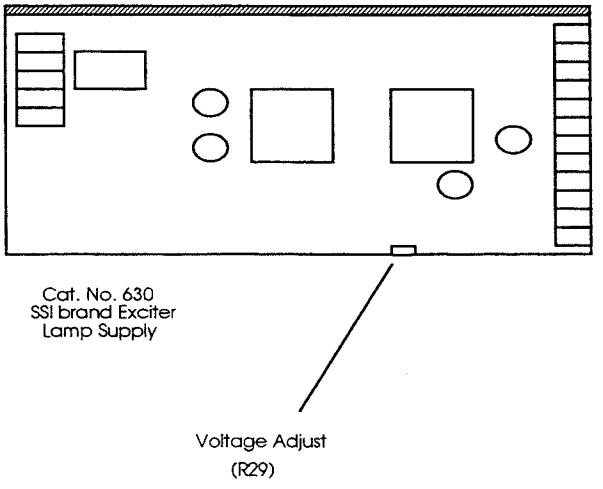
Adjust the scope for 1 horizontal trace across the screen, and adequate vertical gain (approx. 2 usec/div. horizontal, 1 V/div. vertical). With SR·D film threaded and running in the projector, observe the video waveform, and adjust the Voltage Adjust control on the Cat. No. 630 Exciter Lamp Power Supply to produce a light level such that the AGC circuit is not clipped (adjust lamp voltage from around 10 to 11 V dc until clipping of the perforation is observed in the scope trace at about 5 V, then back off to 4 V peak.)

Video Display should look like this:

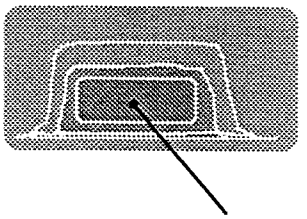



If the top of the video waveform is not reasonably flat (+/- 1 division), check for dirt, dust, or other obstruction to the light path, and clean (see section 7).



2) Focus
Cat. No. 699 Digital Soundheads are factory adjusted and should not require adjustment upon installation. If the soundhead has become misadjusted, focusing may be performed. Using the setup as above, adjust the objective lens in the reader head by loosening the screw which holds the lens in place, and moving the lens back and forth, looking for a scope pattern which has minimum light in the center of the trace. There will always be some light here; one is looking for the most focused looking display, with minimum brightness inside the envelope. This should correlate with minimum error rate. Re tighten the lens holding screw.



Adjust for minimum brightness in center of image.

3) Verification of sync finding
The Cat. No. 602 cards in slots 4 and 7 are responsible for resampling and locating sync patterns in the digital data. These cards display sync found on their LEDs. The 8 LEDs from top to bottom display sync found as follows:

O Upper Left found first pass
O Upper Right found first pass
O Lower Left found first pass
O Lower Right found first pass
O Upper Left found at all
O Upper Right found at all
O Lower Left found at all
O Lower Right found at all

If any of these LEDs are constantly unlit, this may indicate improper positioning of the film. Adjustment to the horizontal placement of the film may be made by adjusting the screw on the lateral guide roller just above the digital sound drum.

Proper adjustment of position, intensity and focus will be verified by observing no error light flashing on the Cat. No. 607 Error correction board (slot 9) and minimum error rate as displayed on the Cat. No. 600 FIFO card (slot 12). See Section 8.

# SECTION 4
# MODEL DA10 ALIGNMENT



## Section 4.1
## Cinema Processor Type Adjustment

A rotary switch (SW5) on the Cat No. 611 Cinema Processor Interface card selects cinema processor type. This allows the 611 to sense and select format for each processor type. Processor type should be selected as in the following table:

0 = CP50
1= CP55
2= CP65
3= CP200
4= Play digital or mute (for test purposes)
5= Transfer Sense Port to Control Port [test only]
6-F = Invalid (flashes LEDs)

## Section 4.2
## Digital Soundhead Delay Adjustment

On an SR·D print, the digital data is located 6 frames in advance of the analog soundtrack, and 26 frames in advance of the picture. When the digital soundhead is mounted above the analog soundhead (as with the Cat. No. 699) a delay is necessary to synchronize the digital soundtrack with the analog track and the picture. In the DA10, this delay is set by adjusting three rotary switches on the Cat. No. 611 Cinema Processor Interface Card (located between the SR·D analog LED and the proj.1 LED of the C.P. Status slot in the front panel of the DA10. SW1 (upper), SW2 (middle), and SW3 (lower) select perforations of delay from 016 to 528 perfs. SW1 selects hundreds of perfs, and has the largest effect on delay, SW2 sets tens of perfs, and SW3 single perfs. Maximum delay is 528 perfs (about 5.33 seconds). Minimum delay is 16 perfs (about 170 ms) and is set by propagation delays within the DA10 decoding process.

Soundhead delay may be adjusted in either of two ways:

**STATIC**

1) Thread a length of Cat. No. 1010 Digital Soundhead alignment test film such that the "bullet" frame (perf 106) is located in the picture gate, and perf number 26 is located at the analog soundhead.

2) With the length threaded through the Cat. No. 699 digital soundhead, read the number of the perforation present in the light path of the digital soundhead. Dial this number into the Cat. No. 611 CP interface card switches SW1, SW2, and SW3.

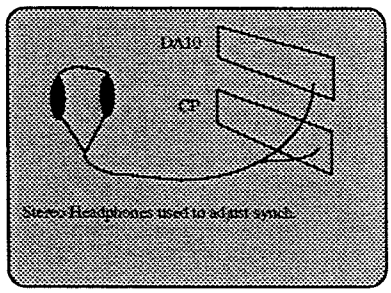
3) Verify accuracy of setting by running a loop of Cat. No. 1010 test film and observing that the flash on the screen happens when you hear the pip in the sound.

**DYNAMIC**

1) Thread a loop of Cat. No. 1010 through the projector, analog soundhead, and digital soundhead. Run the projector.

2) Locate SW5, the top rotary switch on the Cat. No. 611 Cinema Processor Interface Card located between the S analog signal presence LED and the SR-D digital LED of the C.P. Status slot in the front panel of the DA10. Set SW5 to position 4.

3) Monitor audio from the Center channel of the DA10 while simultaneously monitoring audio from the analog tracks through the Cinema Processor. This may be accomplished by setting the cinema processor to format 05 (SR) and monitoring the analog audio normally, while listening to digital audio from the DA10 on a separate monitor circuit. Headphones may be connected to J8 pin 20 (Center channel) and J8 pin 1 (signal ground) by means of an adapter to monitor the digital audio - consult Dolby Laboratories for additional information.




4) Adjust SW1,2 and 3 for minimum delay between the analog track and the digital track.

5) Return SW5 to the correct Cinema Processor position (see section 4.1)

## Section 4.3
## Digital Surround Delay Adjustment

Surround delay is adjusted by threading a loop of Cat. No. 1010 Digital Sync. alignment test film as above, and monitoring all channels the audio. Rotary switch SW5 on the Cat. No. 611 C.P. Interface Card in slot 19 has 16 positions, (0-F) where each position adds 10ms of delay to the surround channels. The following tables show approximate delay values (in milliseconds) based on theater width and length, but because theater geometry affects the amount of surround delay required, setting of surround delay should be verified by listening at various locations in the theater. **Note :** This is not the same delay as used on the Cat. No. 150.

| delay (ms) | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SW5 setting | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F |

**Width (in feet)**

| Length (in feet) | **20** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **110** | **120** | **130** | **140** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **20** | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| **30** | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| **40** | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| **50** | 30 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| **60** | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| **70** | 40 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| **80** | 50 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| **90** | 50 | 50 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| **100** | 60 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| **110** | 70 | 60 | 60 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| **120** | 70 | 70 | 60 | 60 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| **130** | 80 | 80 | 70 | 70 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| **140** | 90 | 80 | 80 | 70 | 70 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| **150** | 90 | 90 | 80 | 80 | 80 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 |
| **160** | 100 | 100 | 90 | 90 | 80 | 80 | 70 | 70 | 70 | 70 | 70 | 70 | 70 |
| **170** | 110 | 100 | 100 | 90 | 90 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 |
| **180** | 110 | 110 | 100 | 100 | 100 | 90 | 90 | 80 | 80 | 80 | 80 | 80 | 80 |
| **190** | 120 | 120 | 110 | 110 | 100 | 100 | 90 | 90 | 90 | 90 | 90 | 90 | 90 |
| **200** | 130 | 120 | 120 | 110 | 110 | 100 | 100 | 100 | 90 | 90 | 90 | 90 | 90 |

| Length (in metres) \ Width (in metres) | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 |
|---|---|---|---|---|---|---|---|---|---|
| **10** | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| **15** | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| **20** | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| **25** | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| **30** | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| **35** | 60 | 60 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| **40** | 80 | 70 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| **45** | 90 | 80 | 70 | 70 | 70 | 70 | 70 | 70 | 70 |
| **50** | 100 | 90 | 80 | 80 | 80 | 80 | 80 | 80 | 80 |
| **55** | 110 | 100 | 90 | 90 | 80 | 80 | 80 | 80 | 80 |
| **60** | 120 | 110 | 110 | 100 | 90 | 90 | 90 | 90 | 90 |
| **65** | 130 | 120 | 120 | 110 | 100 | 100 | 100 | 100 | 100 |
| **70** | 140 | 140 | 130 | 120 | 110 | 110 | 110 | 110 | 110 |
| **75** | 150 | 150 | 140 | 130 | 120 | 120 | 110 | 110 | 110 |

# SECTION 5
# CIRCUIT DESCRIPTION, DIAGRAMS AND SCHEMATICS

## Section 5.1
## DA10 Circuit Description

The basic functions of the DA10 are:

- -Video Acquisition
- -Sync Finding
- -Thresholding and Bit Packing
- -Error Correction and De-interleaving
- -FIFO buffering and DAC clock generation
- -Soundhead Delay
- -AC3 Transform decoding
- -D/A conversion
- -Cinema Processor Interface

Introduction

SR·D Digital data is printed in the "interperf" area, between sprocket holes, adjacent to the normal analog tracks of standard 35mm release print motion picture film. Blocks of 76 X 76 "fixels" or film elements contain the audio data, along with synchronization, error correction, and auxiliary data. The film is passed through a mechanical transport, generally mounted on top of the projector, where the motion of the film is stabilized, and the interperf area is illuminated with white light. A CCD (charge coupled device) optical line scanner produces an electrical signal representing a video image of each interperf area due to the horizontal scanning of the CCD and the vertical motion of the film with respect to the CCD. This signal contains the information necessary to reconstruct the 6 audio channels.

Extensive Digital Signal Processing (DSP) techniques are applied to the video signal described above, using a variety of specific hardware and general purpose DSP cards, connected in a Pipeline architecture, with each card performing part of the overall task, and passing the results to the next card over a 16-bit data path.

Video Acquisition

The analog video signal from the CCD is digitized by an A/D converter at a rate which tracks the film speed. The converted samples are written into a bank of RAM to form an image of the interperf area in RAM. Alternate interperf images are transferred to either of two RAM cards, where they may be accessed by the following DSP.

Sync Finding

Each bank of RAM is searched by the associated DSP card for synchronization patterns in the four corners of the image. When sync. is found, the locations of the bits within the image are calculated, and the values at those locations are obtained. An array of these samples is then passed on to the next DSP card.

### Thresholding and Bit Packing

Each of the two DSP cards responsible for Thresholding receives a block of 5776 8-bit values representing the center of each bit on the film, for each interperf area. Based on the statistics of light and dark bits, a threshold value is derived, above which a fixel is determined to be clear, representing a digital "1", and below which the fixel is determined to be a "0". Having reduced each 8-bit sample value to a single bit, the DSP packs groups of 8 bits into bytes and passes a block of 722 bytes to the next stage.

### Error Correction and De-interleaving

The Error Correction Card accepts blocks of data alternately from each of the Thresholding DSPs, recombining the separately processed alternate perf data streams into a single AC3 Transform coded data stream. Reed-Solomon Error correction decoding is performed, using check bytes encoded during the film recording process to correct errors in the data due to dirt, scratches, misalignment, or illumination non-uniformity. The data, having been interleaved within a perf to reduce the effect of block errors (dirt, etc.) is now deinterleaved, returning the data to the format used by the AC3 decoder.

### FIFO buffering and DAC clock generation

The data leaving the Error Correction Card comes in bursts of 256 words approximately every 10 milliseconds, depending on film speed. The DSP card used as a FIFO (First-In-First-Out) buffer smoothes out the bursts of data from the Error Correction Card into a steady stream of data to the Transform Decoder section, while reconciling any difference in average data rates between the incoming data and the output sample rate of the audio. Using fullness of the buffer as the controlling parameter, the FIFO card slowly adjusts the frequency of the output sample clock until equilibrium is reached.

### Soundhead Delay

A delay is required in the DA10 to compensate for the time between when the data is read (at the digital soundhead) and when the audio is to be reproduced in sync. with the picture. SR·D digital data is recorded 6 frames in advance of the analog sound track, which is itself placed 20 frames in advance of the picture gate. If the SR·D data is read 40 frames above the picture gate, for instance, the data must be delayed by 40+20+6 = 66 frames, or 264 perforations, or about 2 1/2 seconds. This delay is accomplished by storing incoming data in RAM and sending it out at a later time, determined by the delay setting.

AC3 Transform decoding

The Delayed data is now passed to a set of DSP cards which perform Dolby AC3 transform decoding. A full explanation of this process is beyond the scope of this writing, but it may briefly be described as a method of low bit rate coding of audio data using frequency-domain information as the transmitted data, rather than conventional time-domain PCM coding. Two of the 5 DSP cards which implement the decoding take the composite data stream and separate it into three sets of two-channel data. Each of the channel pairs is then fully decoded into PCM audio by one of the remaining three DSP cards. The PCM audio from each two channel decoder DSP is sent serially to the DAC Card.

D/A conversion

The three two-channel PCM audio serial data streams are converted to six analog audio channels by the DAC card. Oversampling of the data is performed to simplify the requirements of the reconstruction filters following the DACs. Sample rate of the DACs is determined by a frequency synthesizer controlled by the FIFO card, as described above. Sixteen, eighteen, or future twenty-bit DACs may be supported by the DA10, as the transform decoded data is accurate to around 20 bit resolution.

Cinema Processor Interface

The six audio signals from the DAC card are sent to the Cinema Processor Interface Card, where they are buffered, metered, and sent to the associated Dolby Cinema Processor (CP55, CP65, CP200). This card is also responsible for format control, changeover timing, and status indication.

Discussion of Changeover technique

Projector changeover sensing is provided through 9 way female DB connector J9 on the DA10 rear panel. In single projector applications, all terminals may be left unconnected, and the DA10 will assume projector 1. If reversion to analog tracks is desired, the motor start signal must be provided, otherwise the DA10 will not revert to analog, as without a motor running, the DA10 assumes no analog track is playing. The motor start signals are used to signal the DA10 in advance of a changeover in order that the video front end can switch to video from the incoming reel prior to the actual picture changeover. The changeover to the incoming projector CCD signal will be made at a time after the Motor Start signal equal to (7 seconds minus the fixed delay value.) Removal of the Motor Start signal prior to video changeover resets the changeover timing, allowing the operator to "jockey" the placement of film in the projector for between 1.5 and 7 seconds, depending on delay setting, without initiating a changeover. Verification of changeover is confirmed by the Changeover signal at the actual instant of changeover. If no Motor Start signal is asserted, the video input follows the changeover signal.

**Format control**

The DA10 is controlled by means of the Cinema Processor's format selection controls. The ID0-ID7 lines from the Cinema Processor are monitored by the DA10, which senses format changes by detecting changes in the state of these lines. When Format 10 (SR·D) is selected by the cinema processor, the audio output of the DA10 will be decoded digital audio when valid digital data is being read by the soundhead. When this is not possible (as when playing an analog only print) the DA10-CPXX system will play analog audio in format 05 (SR).
Should the digital data be corrupted through perforation damage, concealment techniques will be applied for up to 4 perforations (40 ms), after which time the DA10 will revert to passing analog audio. Corrected digital data must remain valid for a period of time before switching back to the digital track.

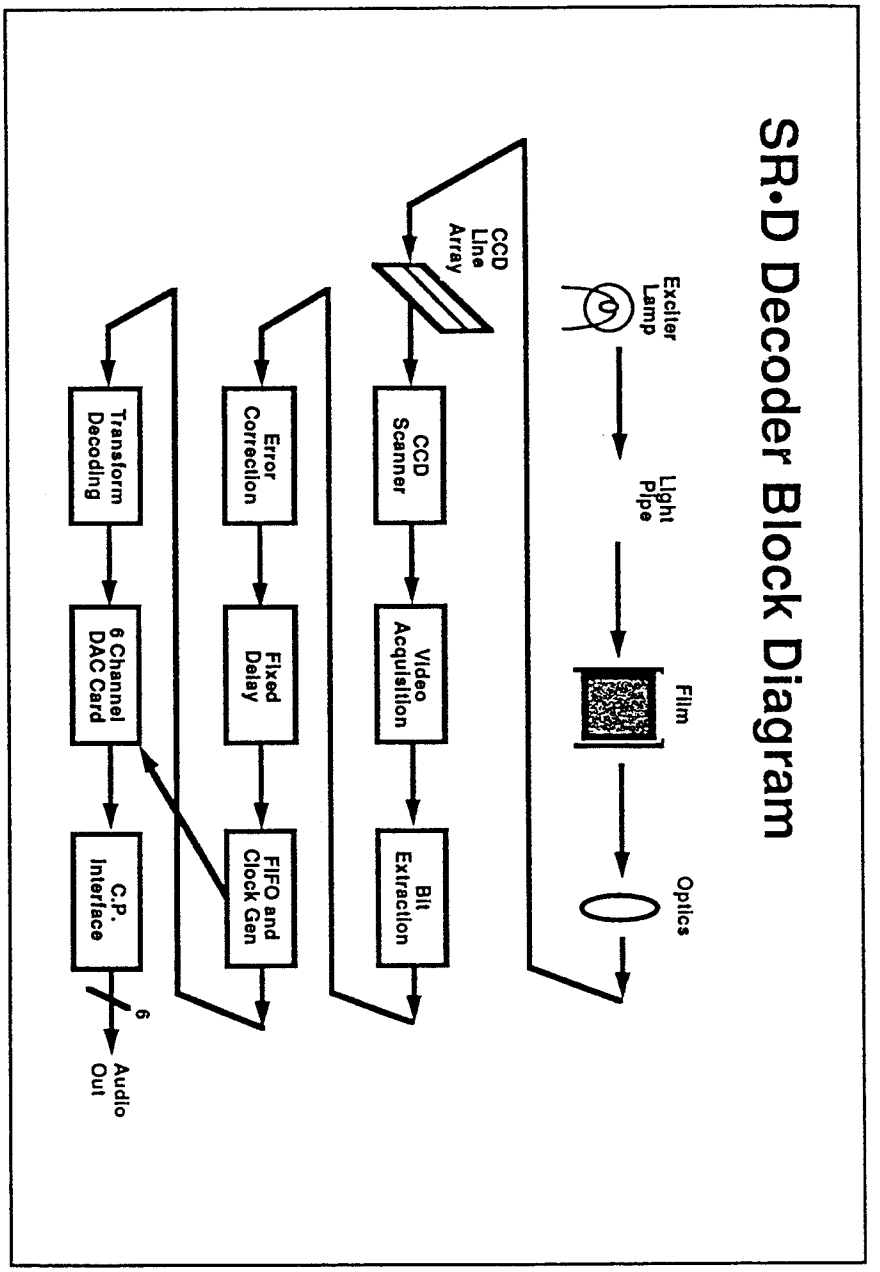
CP200 only: When a format other than Format 10 is selected at the Cinema Processor, the DA10 will allow analog audio signal to pass through in whatever format is currently selected, despite the presence or absence of digital data.

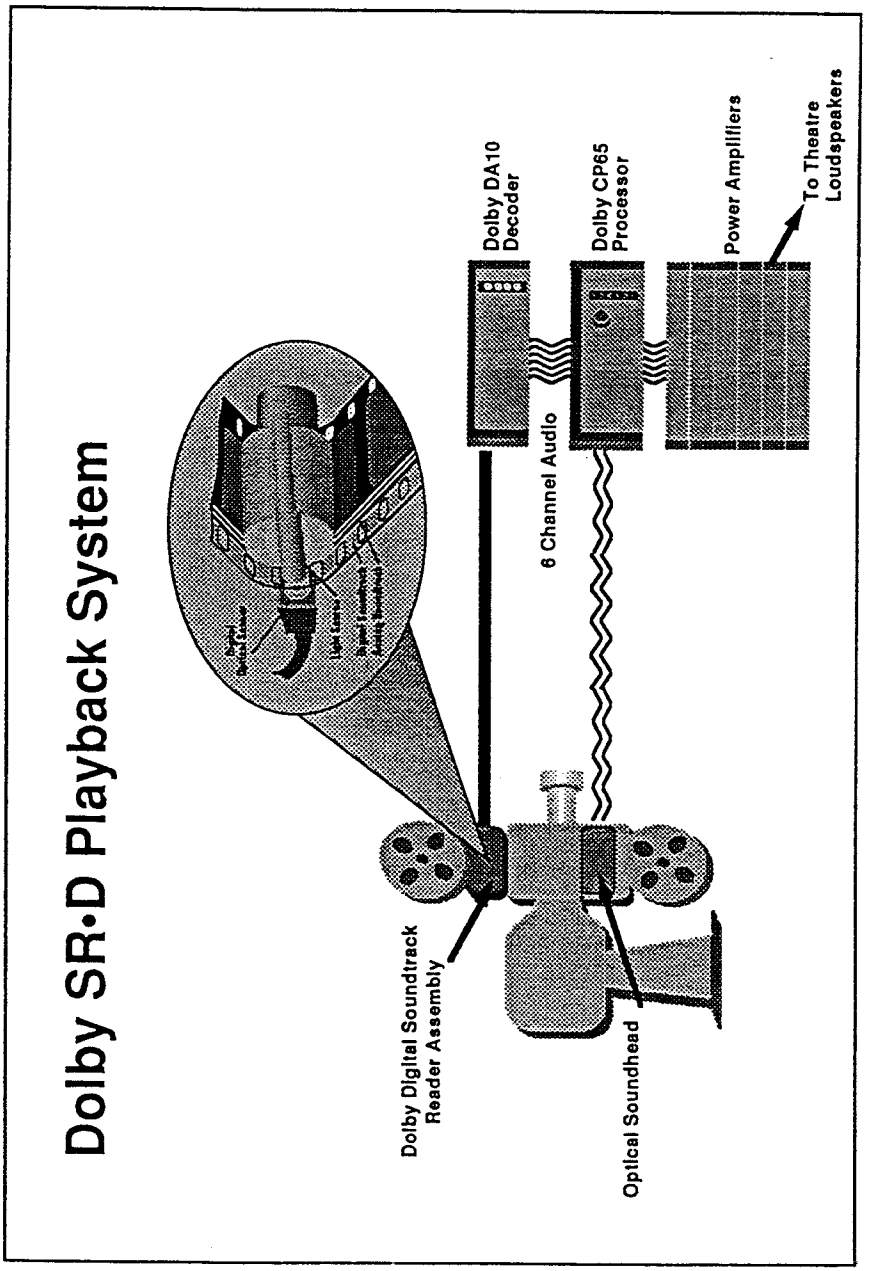
CP65: In the event that the DA10 detects failure of the Digital decoding, the DA10 will assert S2 (Format 5) and audio from the input pins will be passed through to the outputs. On restoration of valid digital data, the DA10 will reassert S4 (Format 10), and present decoded digital audio to the Cinema Processor. External selection of any format other than 10 disables DA10 control of format.

CP55: In the event that the DA10 detects failure of the Digital decoding, the DA10 will assert S1 (Format 5) and audio from the input pins will be passed through to the outputs. On restoration of valid digital data, the DA10 will reassert S7 (Format 10), and present decoded digital audio to the Cinema Processor. External selection of any format other than 10 disables DA10 control of format.

**Auxiliary Data channel**

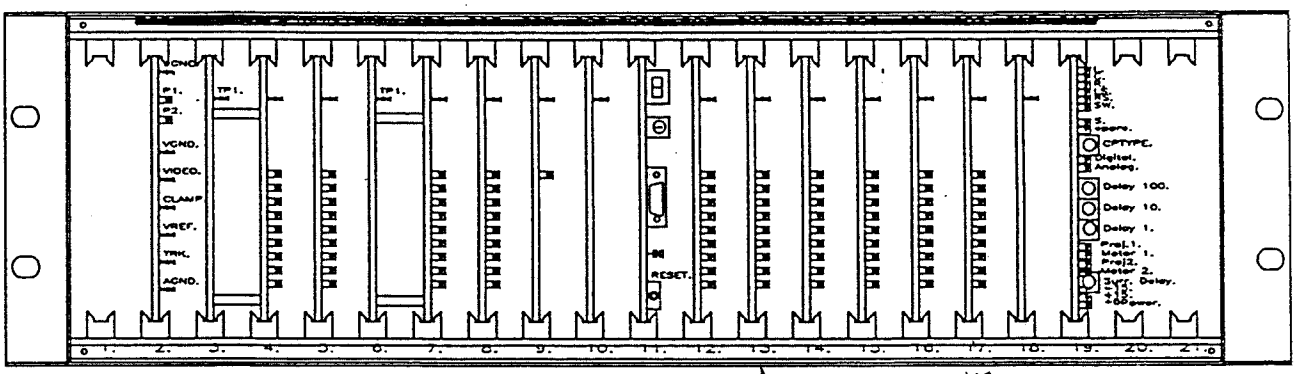
The Auxiliary data channel may be monitored using an RS-232 compatible device. The data format is RS-232 standard 38400 bits/second, 8 bit data, no parity, 1 start bit, 1 stop bit. Connection to the 9600 Baud Data channel is provided through J3, a DB-9 Female connector on the rear panel, or J2, the DB9 connector on the System Services Board, Cat. No. 609, slot 11. The data channel supports RS-232C signal levels. No handshaking is provided; the connector is wired as DCE with TXD on pin 2 and signal common on pin 7. Pins 4 and 6 are shorted, as are pins 7 and 8, to allow direct connection to a standard PC serial port. The connector case is wired to chassis ground.


SR•D Decoder Block Diagram
Exciter Lamp
Light Pipe
Film
Optics
CCD Line Array
CCD Scanner
Video Acquisition
Bit Extraction
Error Correction
Fixed Delay
FIFO and Clock Gen
Transform Decoding
6 Channel DAC Card
C.P. Interface
6
Audio Out


Dolby SR•D Playback System
Dolby Digital Soundtrack Reader Assembly
Optical Soundhead
6 Channel Audio
Dolby DA10 Decoder
Dolby CP65 Processor
Power Amplifiers
To Theatre Loudspeakers

# DA10 CIRCUIT BOARD DESCRIPTIONS

Cat. No's:
605A 606 602 600 606 602 600 607A 608A 609B 600 601 601 601 600 601 610A 611



13 14 15 17

## DA10 SR•D Digital Sound Processor slot numbers:
(left to right, facing the front panel)

1 Empty
2 Cat. No. 605A Video Front End Board
3 Cat. No. 606A Shared Memory Board
4 Cat. No. 602 DSP Board (resample and find synch)
5 Cat. No. 600 DSP Board (threshold and pack)
6 Cat. No. 606A Shared Memory Board
7 Cat. No. 602 DSP Board (resample and find synch)
8 Cat. No. 600 DSP Board (threshold and pack)
9 Cat. No. 607 Error Detection and Correction Board
10 Cat. No. 608A Fixed Delay Board
11 Cat. No. 609B System Services Board
12 Cat. No. 600 DSP Board (FIFO)
13 Cat. No. 601 DSP Board (first distributor)
14 Cat. No. 601 DSP Board (second distributor)
15 Cat. No. 601 DSP Board (Transform Decoder L,R)
16 Cat. No. 600 DSP Board (Transform Decoder LS,RS)
17 Cat. No. 601 DSP Board (Transform Decoder C,SW)
18 Cat. No. 610A DAC Board
19 Cat. No. 611 CP Interface Board
20 Empty
21 Empty

* THIS CARD IS REPLACED APPROX EVERY 4-6 MONTHS RLB

NO REASONABLE EXPLANATION FOR FAILURE

#13 ★ REPLACE 9/23/97
#14
#15 - OK
#17

## Chassis boards:

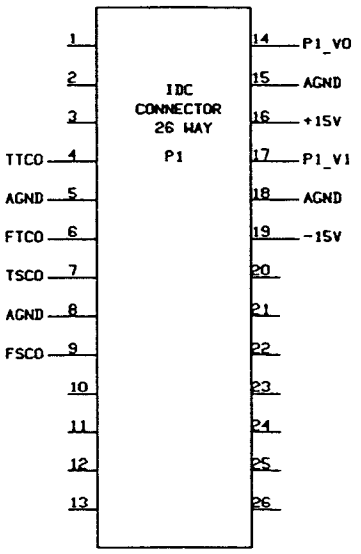
Cat. No. 640 Motherboard
Cat. No. 650 Audio/IO EMI board
Cat. No. 652 Video EMI board

## In the Cat. 699 Digital Soundhead:

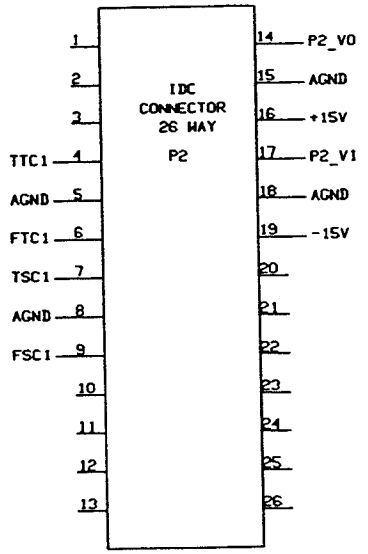
Cat. No. 604 CCD (Charge Coupled Device) board

AIC4379 REV 1
© DOLBY LABORATORIES INC 1991
POWER PINS
SCHEMATIC: CAT.NO.640,
MOTHERBRD, DA10

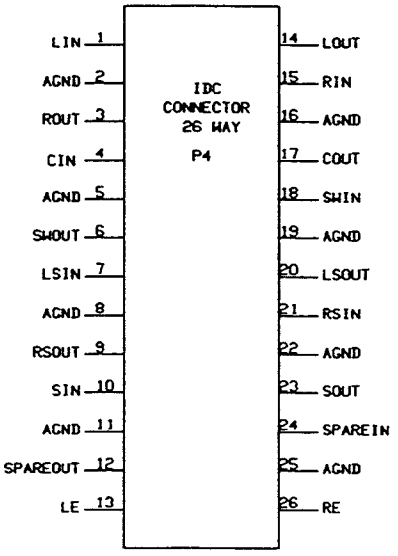
CCD1



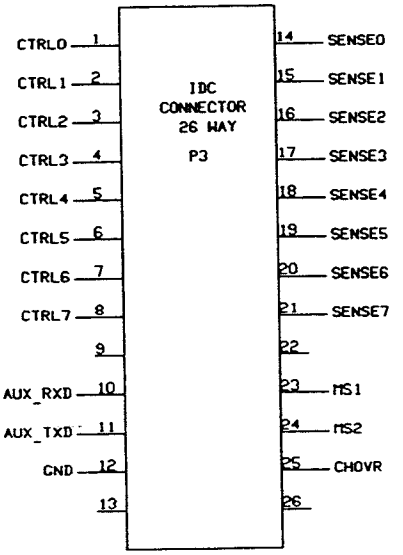

CCD2



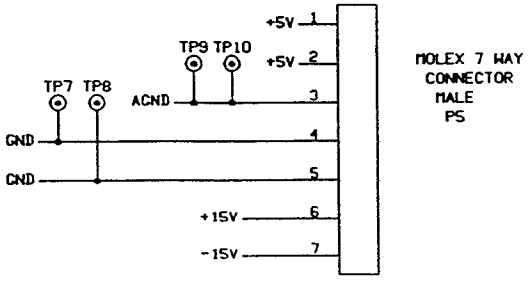

AUDIO IN/OUT




CINEMA PROCESSOR
LOGIC/SERIAL PORT




DC POWER SUPPLY




| | |
|---|---|
| TITLE<br>SCHEMATIC : CAT.NO.640,<br>MOTHERBRD, DA10 | |
| SHEET 2 OF 2 A1 C4379 | |

**Note**: These are internal IDC connectors on the motherboard. They are not rear panel connectors.

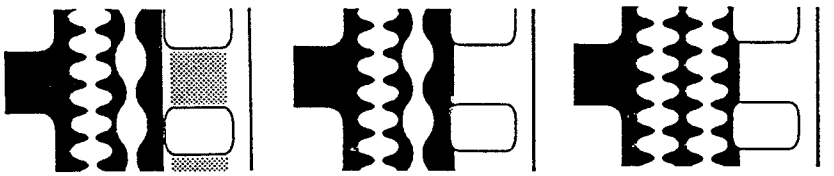
# SECTION 6
# OPERATING INSTRUCTIONS



## Section 6.1
## Normal Operation

### 6.1.1 How to tell an SR·D Print from an Analog only Print

A Dolby Stereo SR·D print should be identified as such both on the film can and the leader. If neither are available when the film must be run, close inspection of the film will distinguish the SR·D print. SR·D data blocks are printed between the perforations on the side of the film next to the analog (Dolby Stereo SR) track.



| Dolby SR·D Print | Analog Dolby Stereo Print | Mono Print |
|---|---|---|
| The digital data is clearly visible between perforations next to the analog track. The analog track will be Dolby SR. | Clear differences between channels will be seen in places along the track. | Both tracks are the same. |

FIGURE 6.1

### 6.1.2 Film Threading

The Cat. No. 699 Digital Soundhead is similar in many ways to a conventional analog soundhead, having a lightweight flywheel, toothed sprocket, two pad rollers, and two dashpot-damped tension arms. The pad rollers on the toothed sprocket are coupled to allow easy film threading. A spring loaded roller arm damps variations in input film tension. Bypass rollers are provided to bypass the soundhead with either 35 or 70mm film. Figure 1.1 shows Digital Soundhead film path threading. Care must be taken to thread the film the same way every time, so that the distance from the optical pickup point to the film gate is constant from show to show. Circuitry in the DA10 processor delays the signal read at the optical pickup by an amount set during installation. The threading must match this delay, or improper synchronization will result.

### 6.1.3 Displays

The DA10 has seven slots in the front panel to allow sets of LEDs to be visible, indicating the activity of various circuits. Six of the slots show **digital audio signal level**, and the seventh shows **Cinema Processor Status**. Each area will be discussed below.

**Digital Signal Level Display**

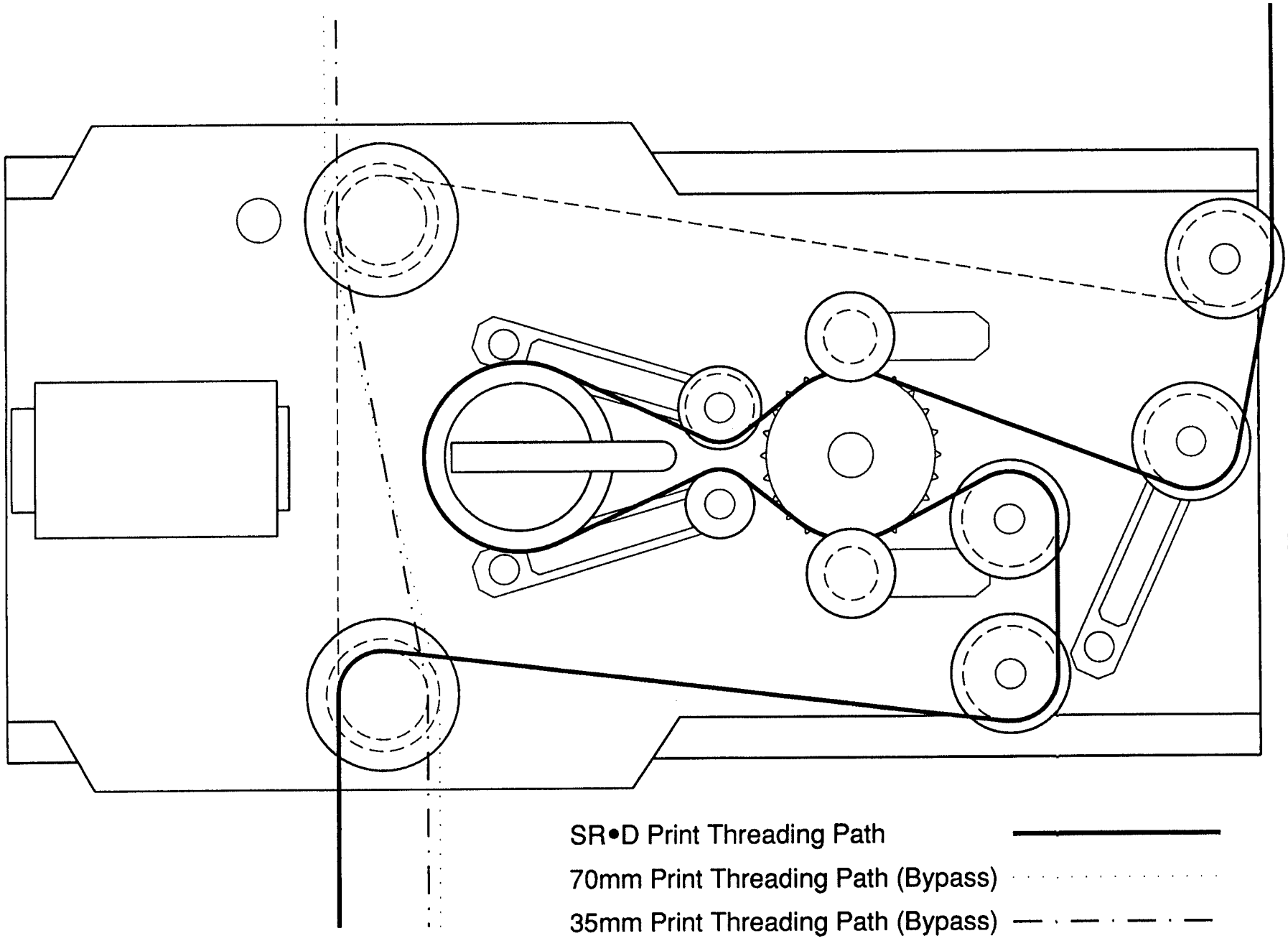
Digital audio signal levels are displayed for channels **Left, Right, Left Surround, Right Surround, Center and Subwoofer** using four LEDs for each channel. The bottom LED in each set shows audio activity less than –40dB below Dolby Digital level. Equal brightness of the center two LEDs indicates "Dolby Digital level", corresponding to 85dB SPL in the theater. The top LED indicates activity greater than +10dB above Dolby level when lit. These LEDs show that digital audio from an SR·D print is being decoded.

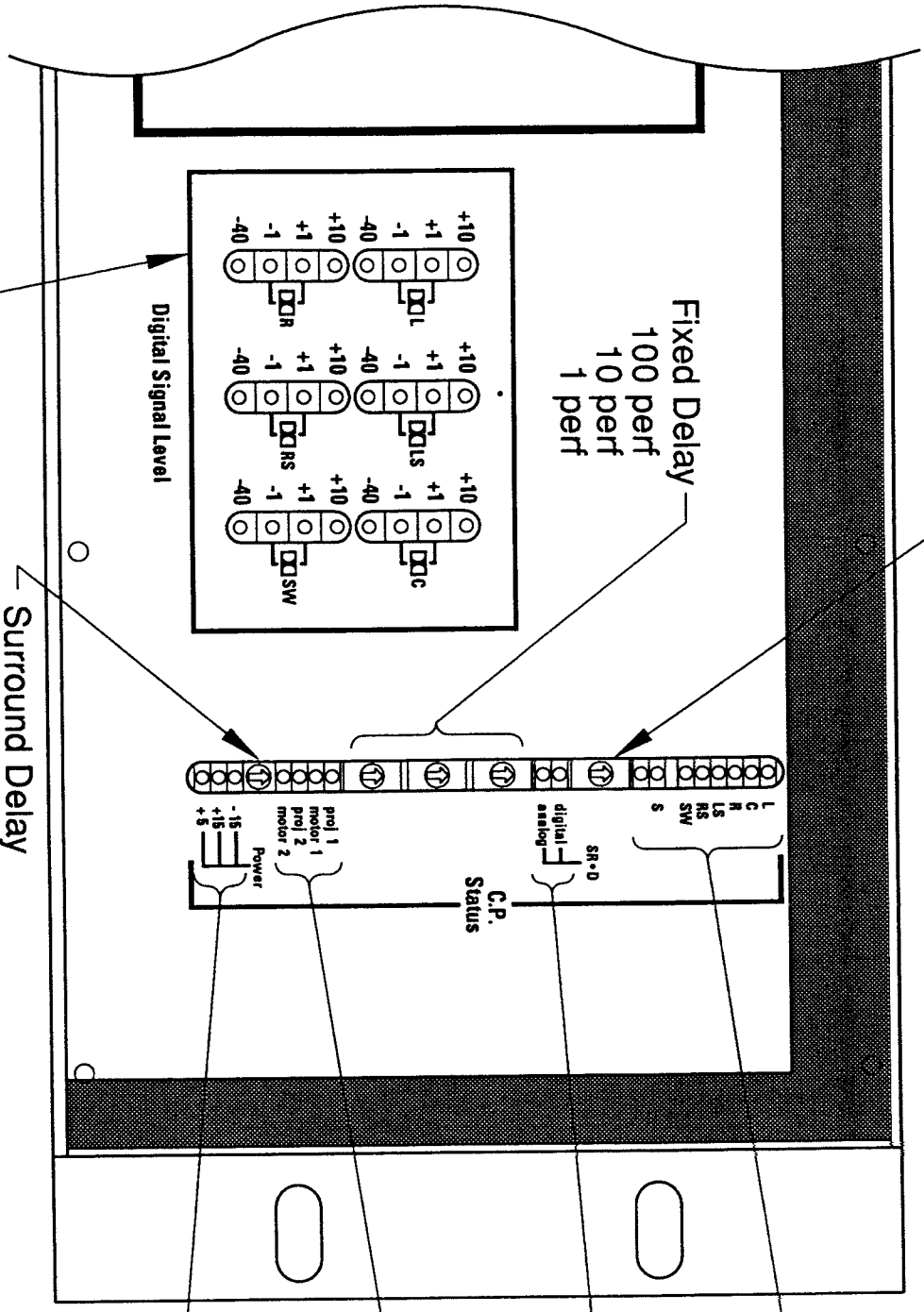
**Signal Present Indicators**

**Signal Present** Indicators are active when the signal level is approximately –40dB or above (with respect to Dolby Digital Level). The LED brightness corresponds directly to signal level. These Indicators represent the analog signal level present at the output of the DA10. In a system using a CP200 Cinema Processor, analog audio from the cinema processor is routed through the DA10 to allow switching between the analog and the digital tracks. The LEDS indicate the decoded digital signal level when the **SR·D status Indicators** show that **digital track** is selected, and the analog signal level when **analog track** is indicated (See SR·D status below). In a system using a CP65 or CP55, audio switching between analog and digital is performed within the Cinema Processor, and the LEDs will reflect only decoded digital signal level.

**SR·D Status Indicators**

These LEDs indicate the format of the audio coming from the DA10. When the upper **(green) LED** is on, Format 10 has been selected, and the DA10 is producing decoded **digital** audio. When the lower **(red) LED** is on, Format 10 has been selected but the DA10 is unable to decode digital information from the film (either the film is not an SR·D print, or the data is unreadable) and has switched to the **analog** track. When neither LED is on, a format other than 10 has been selected, and the SR·D digital audio track is not being reproduced.


SR•D Print Threading Path
70mm Print Threading Path (Bypass)
35mm Print Threading Path (Bypass)
Alternate Threading Path


Digital Signal Level Indicators
Surround Delay X 10ms
Digital Signal Level
Fixed Delay 100 perf 10 perf 1 perf
Cinema Processor Type
0 = CP50
1 = CP55
2 = CP65
3 = CP200
Output Signal Present Indicators
SR•D Status Indicators
Proj C/O and Motor Running Indicators
Power Rail Indicators

**Projector Changeover and Motor Running Indicators**

The **Projector1** and **Projector2** LEDs indicate the status of the changeover line from the Cinema Processor. **Motor1** and **Motor2** LEDs indicate which projector motor(s) are running. The motor running signals are used in the timing of changeovers in a two projector system.

**Power Rail Indicators**

These LEDs indicate the presence of the three power supply rails in the DA10. All three should be lit when power is applied to the DA10.

**Front Panel Switches**

The five rotary switches shown on the DA10 front panel are for use by technicians when the DA10 is first installed and adjusted. Changing the delay switches requires the use of special test equipment. Do not arbitrarily adjust these switches.

### 6.1.4 Format Control

The DA10 is controlled by means of the Cinema Processor's format selection controls on the cinema processor.

When Format 10 Dolby Stereo Digital (SR·D) is selected, the audio output terminals of the DA10 will be decoded digital audio when valid digital data is being read by the soundhead. When this is not possible (for example, playing an analog only print) the output of the DA10 will be analog audio in format 05 (SR).
The DA10 uses very sophisticated error correction techniques to allow the data to be read perfectly, even in the presence of heavy scratching and dirt. As with any digital system, the performance is perfect up to the limits of error correction, and then degrades very rapidly. Should the digital data become corrupted beyond correction through perforation damage, concealment techniques are applied for up to 4 perforations (40 ms), after which time the DA10 switches to passing analog audio. Corrected digital data must remain valid for a period of time before switching to the digital track.

#### CP200

When Format 10 is selected at the CP200 Cinema Processor, the DA10 will produce digital audio when digital data is present on the film, or switch to the analog track when no digital data is present. The digital or analog status is indicated on the CP Status LEDs on the front panel of the DA10.

#### CP65, CP55

In the event that the DA10 detects failure of the digital decoding, the DA10 will automatically select Format 05 Dolby SR. On restoration of valid digital data, the DA10 will reselect Format 10 Dolby Stereo Digital, and send decoded digital audio to the Cinema Processor.

### 6.1.5 Auxiliary Data Channel

An auxiliary data channel is available on the DA10 rear panel (J9) and requires an RS-232 compatible device. Refer Section 5 for technical data on this feature.

## Section 6.2
## Two Projector Changeover Operation

The DA10 "changes over" between Cat. No. 699 Digital Soundheads by switching between digital data signals at a time in advance of the actual picture changeover. The data on the film is read by the Digital Soundhead ahead of the picture gate by typically 1-1/2 seconds. A delay circuit in the DA10, set during installation, compensates for this "early" reading of data. In order for a changeover to be seamless, the switchover to the incoming digital data must happen "early" as well. The Motor Start signal (a contact which closes when power is applied to the projector) is used to initiate the digital changeover. Digital changeover occurs at eight seconds minus the amount of delay set at installation. Eight seconds is the time between the motor start cue at the end of a reel and the last picture frame on that reel. If the digital soundhead were located at the analog soundhead position, no fixed delay would be required, and the digital changeover would happen simultaneously with the picture changeover. Any amount of delay added to the digital signal to compensate for "early reading" (ahead of the analog soundhead) must be subtracted from the 8 seconds to get the time that the digital signal must be switched after the motor start.

## Section 6.3
## Operation With an Automation System

The DA10 may be used in conjunction with any standard automation system, but the following guidelines must be followed:

- When used with a CP55 or CP65, the automation system must use momentary Cinema Processor format select lines. The DA10 senses and controls these lines to switch between digital and analog as required. If format lines are held continuously, incorrect operation will result, and this situation will need to be corrected.

- When used with a CP200, the automation system controls the Cinema Processor, which sends a signal to the DA10 indicating that digital sound is desired. The DA10 responds with a signal indicating that digital audio has been decoded and is present on its output lines, or that such decoding is not possible. No direct connection between the automation system and the DA10 is used.

# SECTION 7
# MAINTENANCE AND ADJUSTMENTS



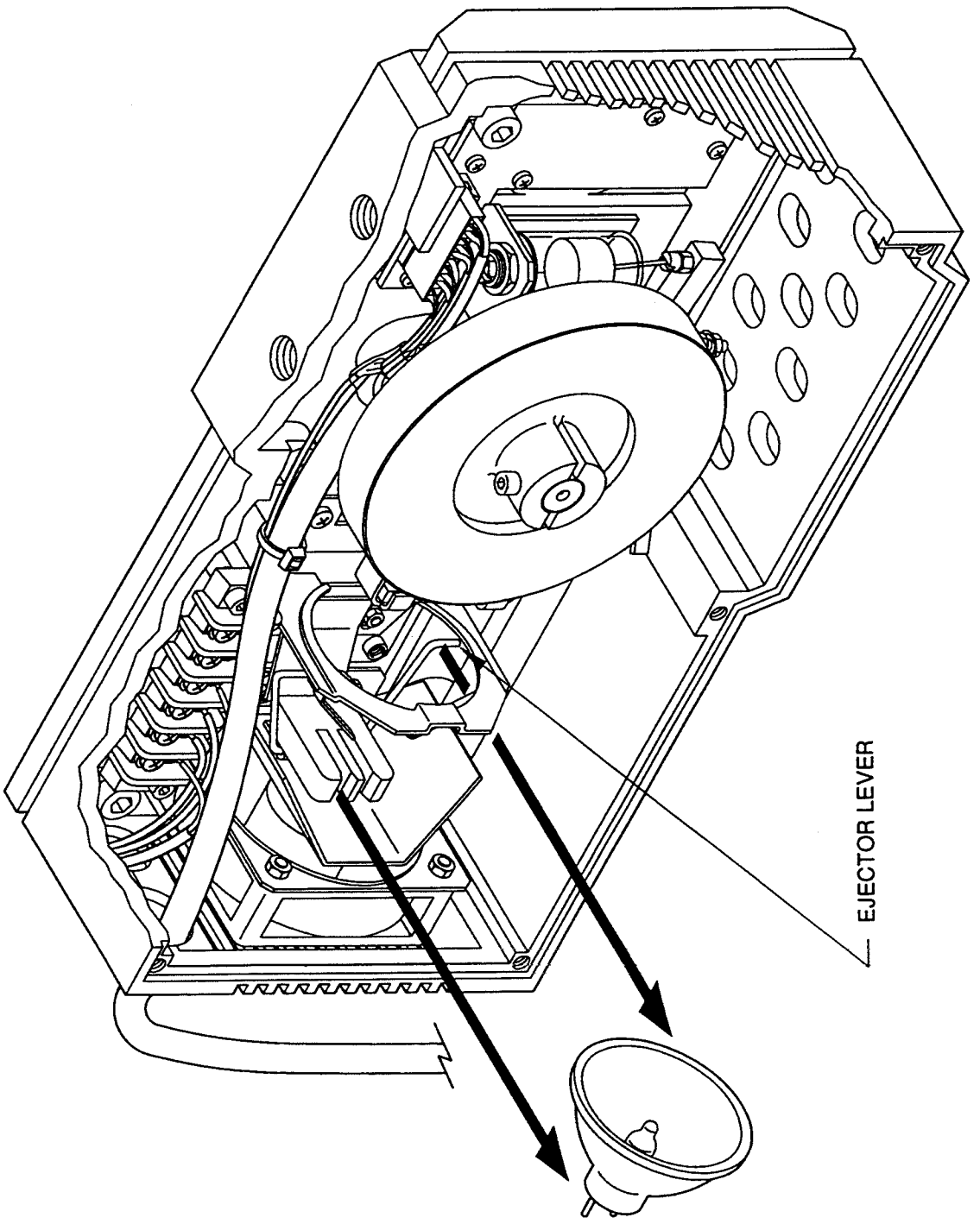
## Section 7.1
## Digital Soundhead Maintenance

The Cat. No. 699 Digital Soundhead should be kept clean and free of dust and dirt for best performance, just as your analog soundhead. Wiping the external surfaces with a clean cloth on a regular basis will keep the head looking new. The optical path should be inspected regularly and kept clean with a photographer's lens cleaning kit (available from most camera stores). Use care not to scratch the lens. The film path (rollers and drum) should be cleaned regularly, as you would on the projector. No acetone, carbon tetrachloride, or other dangerous cleaners should be used.

**Replacing the Exciter Lamp**

The exciter lamp in your Cat. No. 699 Digital Soundhead has been designed for long life and should provide over 2000 hours of reliable use under normal circumstances. This is similar to the life of an exciter lamp in an analog soundhead. Routine replacement will depend on your theater's hours of operation. To replace the exciter lamp, carefully remove the six screws holding the rear cover of the Digital Soundhead and place the cover and screws in a safe place. Allow the lamp to cool. When the lamp is cool, use the ejector lever to remove the failed lamp. Carefully remove a new lamp from the protective box, and using gloves or a clean, lint-free cloth, install in the lamp socket. Be careful not to touch the bulb or inner surface of the reflector in the lamp. Replace the cover and tighten the six screws.

Replacement lamp: Gilway L6408 12Vdc 75W, Dolby Part No. 34008


EJECTOR LEVER

## Section 7.2
## Print Cleanliness

As with any soundtrack, keeping the print clean will give best performance. The SR·D print format has robust error correction information encoded along with the audio data, and the DA10 uses a powerful digital error correction technique, allowing the data to be read perfectly, even if scratches and dirt are present. However, best performance will be obtained if the print is kept clean. Standard film cleaners will provide good results.

The sound quality of the digital track has properties unlike those of an analog track with regard to print wear. In analog reproduction, print wear will degrade the quality of the soundtrack in a more or less linear fashion; the more wear, the lower the quality of the sound. In digital reproduction, there is a much sharper curve. Wear will have no audible effect over the useable life of the print, until such time as the picture quality is degraded beyond use. When print wear exceeds the error correction capabilities of the decoder, the digital audio can no longer be decoded, and switching to the analog track will occur.

## Section 7.3
## Adjustments

Routine adjustments are not required on the DA10 under normal use. Adjustments for cinema processor type, soundhead delay, surround delay, focus, and film path alignment are made during installation, and should not be attempted by the operator. Small adjustments may not affect the sound under most circumstances, and no changes will be heard, but improper adjustment may reduce the safe operating area within which all errors can be corrected. Proper test equipment is required. Refer to the DA10 Installation manual for further information.

**Caution: There are no user serviceable parts inside the DA10. To avoid electric shock, do not attempt any repairs. Refer all servicing to qualified personnel.**

# SECTION 8
# UNIT SERVICING / IN CASE OF DIFFICULTY

## Section 8.1
## Troubleshooting During the Show

Your theater sound system consists of a number of critical audio components in addition to the Dolby DA10 system. Thus, the first step when something goes wrong with the sound is to find the source of the problem. Your User's or Operator's guide for the Cinema Processor contains a Troubleshooting chart which can be helpful.

If the Troubleshooting section of your Cinema Processor manual is not sufficient for finding and solving the problem right away, and indications are that the fault lies in the DA10, the procedures in the following paragraphs should be helpful.

If you are unable to solve the problem using the information which follows, call your service engineer. If he or she is unavailable, you may also call Dolby Laboratories' 24 hour emergency number in San Francisco for expert advice: (415) 558-0200. You will be asked to leave your name and number, and a Dolby Engineer will call you back promptly.

### 1. If Digital Sound is Lost

- Switching to the analog track will occur if the Digital Soundhead is playing film which is not in SR-D format, or if the digital blocks have become unreadable due to an obscured optical path or print damage. If frequent switching occurs, check for print and optical path cleanliness.

- Check to make sure power is supplied to the DA10 processor chassis and the Digital Soundhead exciter lamp.

- If power is present at the Digital Soundhead (e.g., the fan is running), but the exciter lamp is not lit, the lamp needs to be replaced. Refer to page 2-1 for information on replacing the exciter lamp.

- If you are sure that power is applied to the DA10, but no LEDs on the front panel are on, check the fuse in the power entry module on the rear of the DA10. If it appears blown, replace with a spare fuse of the type and value specified on the rear panel of the DA10.

- Check the video cable(s) from the Digital Soundhead to the DA10 and make sure it is properly attached at both ends.

## 2. If One Channel Fails or is Distorted

This is unlikely to be a fault of the DA10. Check for analog audio path continuity. If the problem is isolated to the DA10, contact your authorized Service Engineer.

## 3. If Switching to Analog Does Not Restore Sound

If switching to analog occurs when in Format 10 (indicated by the red **Analog SR·D** LED on the DA10 front panel), but no analog sound is heard, FIRST select Format 05 (SR) by means of the Cinema Processor format selector switches. If this doesn't work, remove power to the DA10 and reselect Format 10.

## 4. If Difficulty with Changeover is Experienced

Correct changeover operation relies on installation of two relays which close sets of contacts when each projector motor is running. The normally open (closed when projector is running) contacts on these relays must be attached to connector J9 on the rear panel of the DA10. (Refer to Installation manual for further information.) In addition, a changeover signal from the Cinema Processor must be present and connected to the DA10. Correct operation of these signals may be observed by monitoring the **Proj 1, Motor 1, Proj 2,** and **Motor 2** LEDs on the front panel of the DA10.

## 5. If Synchronization is Lost

Synchronization of the digital soundtrack with the picture requires that the film path from the Soundhead to the picture gate be the same every time the projector is threaded. If two projectors are used, the path lengths must be identical. Digital Soundhead delay is set by switches on the Cinema Processor Interface Card (Cat. No. 611). If synchronization becomes incorrect during a show, play the rest of the show in SR Analog, and when time permits, run a loop of Cat. No. 1010 Digital Soundhead Test Film and adjust the delay as described in Section 3.

If none of the above techniques solves your problem, make sure the Cinema Processor is **not** in format 10, and try cycling the power to the DA10. This will reset the DA10 and may cure a transitory problem.

## Section 8.2
## Problem Identification

Some problems with the model DA10 may be isolated by viewing the LEDs visible through the front panel. Refer to Section 6 for information on normal front panel displays. Other problems will be revealed by removing the front panel, allowing other displays to be seen. Problems associated with a particular block of circuitry may be traced by identifying the relevant card on the block diagram and measuring signals and supplies in the vicinity of the problem. Faulty boards may then be swapped out, and components may then be identified and replaced.

Table 8.2 shows circuit board location within the DA10:

**Table 8.2 (Left to right, facing front of DA10)**

| Slot Number | Cat. No. | Description |
|---|---|---|
| 1 | | EMPTY |
| 2 | 605A | Video Front End Board |
| 3 | 606A | Shared Memory Board |
| 4 | 602 | DSP Board (resample and find sync) |
| 5 | 600 | DSP Board (threshold and pack) |
| 6 | 606A | Shared Memory Board |
| 7 | 602 | DSP Board (resample and find sync) |
| 8 | 600 | DSP Board (threshold and pack) |
| 9 | 607A | Error Detection and Correction Board |
| 10 | 608A | Fixed Delay Board |
| 11 | 609B | System Services Board |
| 12 | 600 | DSP Board (FIFO) |
| 13 | 601 | DSP Board (first distributor) |
| 14 | 601 | DSP Board (second distributor) |
| 15 | 601 | Transform Decoder (L,R) |
| 16 | 600 | Transform Decoder (LS,RS) |
| 17 | 601 | Transform Decoder (C,SW) |
| 18 | 610A | DAC Board |
| 19 | 611 | CP Interface Board |
| 20 | | EMPTY |
| 21 | | EMPTY |

NOTE: The DA10 front panel must be in place and held by all 12 screws during normal operation to comply with FCC regulations. For troubleshooting ONLY, remove the 12 screws and the front panel and place in a safe place. After troubleshooting and repair, all 12 screws and the front panel MUST be replaced and tightened securely.

All cards must be present in the DA10 for normal operation; a link on each card passes a signal [LINK] to the system services card which allows normal operation. A similar signal [FAULT] may be asserted by a malfunctioning DSP card. A 7 segment LED display DS1 on the Cat. No. 609B System Services card (slot 11) displays system status.
The following table shows possible states of this display:

0- Load OK (normal state]
1- LINK not present - transitory
2- FAULT - transitory
A - No LINK in or FAULT - static
B - Setting DAC clock synthesizer, performing checksum on Flash RAM
C- Normal Load
D - Flash ROM checksum fault, loading from default ROM
E - Erasing Flash ROM

A normal power up sequence will display A-B-C-0 with the A and B states transitioning very quickly, the C state taking a few seconds, and a successful load being indicated by the 0 display.

**Displays**
**Front Panel Displays:**
The DA10 has four sets of LEDs visible through the front panel, indicating the activity of various circuits. Cat. No. 600 DSP boards in slots 15 and 17 and Cat. No. 601 board in slot 16 display digital audio signal level for pairs of channels: L,R / Ls,Rs / C,SW using 4 LEDs for each indication. The bottom LED of the level LEDs shows audio activity less than -40dB below Dolby Digital level. Equal brightness on the center LEDs indicates "Dolby Digital Level", and the top LED indicates activity above +10dB above Dolby Level. Lights indicating +10 and -40 are lit simultaneously when digital data is muted.

| | | |
|---|---|---|
| L +10 | Ls +10 | C +10 |
| +1 | +1 | +1 |
| -1 | -1 | -1 |
| -40 | -40 | -40 |
| R +10 | Rs +10 | SW+10 |
| +1 | +1 | +1 |
| -1 | -1 | -1 |
| -40 | -40 | -40 |

The Cat. No. 611 C.P. Interface card in slot 19 has 17 LEDs as shown in the following table:

O L
O C
O R
O Ls
O Rs
O SW

Signal Presence Indicators (active above -40dB re Dolby Digital Level)
(also display analog signal level when using CP200)

O S (Mono surround)
O Spare

O Digital - DA10 is producing decoded digital Audio
O Analog - SR·D film audio is from analog track

O Proj. 1 Changeover status
O Motor Start 1

O Proj. 2 Changeover status
O Motor Start 2

O -15V Power indicates power to the DA10
O+15V
O+5V

**Internal Displays:**
The Cat. No. 602 cards responsible for resampling and sync finding (slots 4 and 7) display sync found on their LEDs. The 8 LEDs from top to bottom display sync found as follows:

O Upper Left found first pass
O Upper Right found first pass
O Lower Left found first pass
O Lower Right found first pass
O Upper Left found at all
O Upper Right found at all
O Lower Left found at all
O Lower Right found at all

Cat. No. 600 DSP cards in slots 5 and 8 display processor activity for factory use only.

The Cat. No. 607 Error Detection and Correction card in slot 9 has a single LED which will light whenever an uncorrectable block is processed.

Relative byte error rate is displayed on the DSP card in slot 12. (FIFO). Error rate is indicative of relative film wear and alignment. Rates of 1 E-1 are still correctable by the error correction circuitry. Up is more, down is less, less is better, mid-range is typical. Uncorrectable data will cause all 8 LEDs to be lit.

| | | |
|---|---|---|
| O 1 | E-1 | 1 in 10 |
| 5.6 | E-2 | 1 in 18 |
| O 3.2 | E-2 | 1 in 31 |
| 1.8 | E-2 | 1 in 55 |
| O 1 | E-2 | 1 in 100 |
| 5.6 | E-3 | 1 in 178 |
| O 3.2 | E-3 | 1 in 132 |
| 1.8 | E-3 | 1 in 555 |
| O 1 | E-3 | 1 in 1000 |
| 5.6 | E-4 | 1 in 1785 |
| O 3.2 | E-4 | 1 in 3125 |
| 1.8 | E-4 | 1 in 5555 |
| O 1 | E-4 | 1 in 10000 |
| 5.6 | E-5 | 1 in 17857 |
| O 3.2 | E-5 | 1 in 31250 |

The LEDs of the DSP card in slots 13 and 14 indicate operation of the decoder as shown:

Slot 13

O Sync not found
O Error correction failure
O Dummy perf
O Bad checksum
O Non-sequential block number
O
O
O Incompatible data revision - if lit, other LEDs show rev. received.

Slot 14

O \
O | Rev. Number of coder
O |
O /
O \
O | Audio block counter
O |
O /

## Section 8.3
## Test Mode Operation

The System Services Card (Cat. No. 609B) in slot 11 has a rotary switch (SW1) which allows the DA10 to be loaded with diagnostic code via the serial port (J11) when set to position 4. Contact the factory for further information. Normal operation (load from EPROM IC2 on the System Services board) is restored by returning SW1 to position 0.

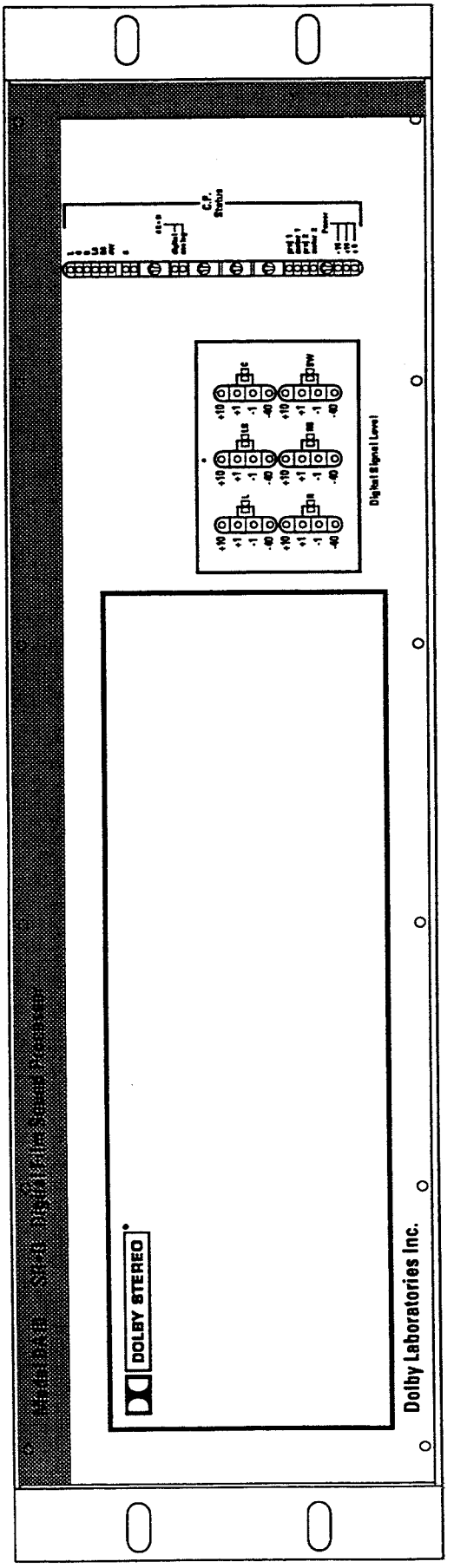
All cards must be present in the DA10 for normal operation; a link on each card passes a signal [LINK] to the system services card which allows normal operation. A similar signal [FAULT] may be asserted by a malfunctioning DSP card. A 7 segment LED display DS1 on the Cat. No. 609B System Services card (slot 11) displays system status.
The following table shows possible states of this display:

0- Load OK (normal state]
1- LINK not present - transitory
2- FAULT - transitory
A - No LINK in or FAULT - static
B - Setting DAC clock synthesizer, performing checksum on Flash RAM
C- Normal Load
D - Flash ROM checksum fault, loading from default ROM
E - Erasing Flash ROM

A normal power up sequence will display A-B-C-0 with the A and B states transitioning very quickly, the C state taking a few seconds, and a successful load being indicated by the 0 display.

## Section 8.4
## DSP Board Troubleshooting

LEDs DS1 through DS8 on each Cat. No. 600, 601 or 602 DSP Card serve as programmable indicators for the DSP boards. Briefly on powerup, or when the System Services Reset Switch is held in, each DSP card will display the address of the slot into which it is placed. Failure to do so may indicate a faulty board. The top (Red) LED of each DSP card is driven by a watchdog timer, and under normal operation, should be off. If abnormal behavior is observed, look for a DSP card with the red Watchdog LED lit. Try resetting the system (reset on Cat 609B System Services Card in slot 11), or swapping out the card in question.


DOLBY STEREO
Dolby Laboratories Inc.