Film-Tech

The information contained in this Adobe Acrobat pdf file is provided at your own risk and good judgment.

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

If you are not a qualified technician, please make no adjustments to anything you may read about in these Adobe manual downloads.

www.film-tech.com

CINEMA SOUND PROCESSOR

MODEL CSP4200

INSTALLATION AND OPERATION MANUAL

CONTENTS

Thank you for purchasing this PANASTEREO Cinema Sound Processor.
This product has been carefully engineered using state of the art techniques and manufactured using the best available materials to ensure long and trouble free service. No compromises have been made in the design or performance of this processor. The CSP4200 system when fitted with the appropriate modules provides 100% compatibility with Dolby Stereo films and close compatibility with other Dolby-compatible formats such as Ultra Stereo.

The CSP4200 offers new innovations not available from any other brand of cinema sound equipment. Innovations such as total digital remote control of all processor functions including volume - all via a single control cable with any number of possible remote control panels all simultaneously operational. Separate remote volume controls for film, non-sync and monitor levels with remote digital level indication and computer controlled automatic fade up and down facilities. Simultaneous control access from automation and remote units allowing instant manual override of automation program and automatic return to automation program on the next event. The CSP4200 has the world's most advanced and flexible automation facilities and includes both parallel and serial automation interfaces.

The CSP4200 comprises a 4 unit high rack mounting mainframe with plug in euro cards. This fully modular construction allows each cinema to purchase a system precisely tailored to their needs with the additional benefit of easy expansion and/or updating as the need arises.

A wide range of cards is available and can be purchased separately at any time. Adding an extra card is as simple as inserting the card and switching the appropriate rear panel switch from "by-pass" to "normal"; no modifications to the motherboard are necessary.

And service has never been faster or more simple, with an overnight or sooner card replacement service should a failure occur, this service being FREE to anywhere in Australasia for a period of 3 years from date of purchase, provided the card is found to be faulty and the problem is not due to some external factor.

****

CSP4200 FEATURES

- High performance, super-balanced virtual earth input, optical pre-amplifiers with individual gain and high frequency equalisation, and where required, remote changeover facility. Changeover outputs to drive lamps and relays for simultaneous shutter changeover in non-automated installations.

- Four band A-type noise reduction decoding that is 100% compatible with Dolby A noise reduction encoded films (Dolby Stereo). Easy alignment using LED bargraph calibration meters on each card

- Optical stereo four channel matrix decoding that is possibly the fastest, most advanced system available, providing up to 60db separation between adjacent channels. Logic steering rear panel switchable for 2, 3 or 4 channel installations.

- High performance stereo surround digital delay line with separate delay adjustment for left and right surrounds. Modified B-type surround noise reduction that is 100% compatible with modified Dolby B surround noise reduction used for Dolby Stereo and Dolby Stereo SR soundtracks.

- Audio Control card with total digital remote control selection of inputs, format and volume adjustment. Separate remote volume controls for film, non-sync and monitor levels. No limit to the number of remote stations and all controls are simultaneously operational - no switching between volume pots! Inputs include two stereo (or mono) non-sync sources, one microphone and 6 track digital or 4 or 6 track magnetic. Automation control inputs are also included and can be used simultaneously with remote control stations. Unique automatic Non-Sync output routing sends each Non-sync input to it's own pre-selected combination of output channels. Academy roll-off filter with a corresponding 6db reduction in volume for optical mono sound-tracks is automatically inserted when Optical Mono is selected.

- Sub-bass Excavator card provides selective low frequency enhancement from a separate sub woofer output. Downward expander circuit reduces thumps and low frequency "noise" from sub-woofer channel. Fifteen selectable cross-over frequencies from 293Hz to 50Hz. Eight band 1/3 octave equaliser provides optimum adjustment of sub-woofer frequency response from 125Hz down to 25Hz.

- 30 band, third octave equaliser cards with ±12db adjustment for auditorium speaker equalisation, (±6db in THX versions). Stereo 10 band octave surround equaliser cards available for surround equalisation.

- Audio Output card provides ten fully floating balanced outputs each capable of driving a 600 ohm load to +20dbm. Emergency switch routes standby mono pre-amplifier outputs directly to left, centre and right output channels.

- Separate 6 track magnetic mainframe available with space for magnetic pre-amplifiers, and additional noise reduction and graphic equaliser cards, mounts above optical mainframe and connects directly via multi-pin cable. Space also for stereo surround decoder card.

- High quality construction. Precision engineered fully enclosed aluminium chassis with tinted 'acrylglas' hinged front panel. Professional grade, close tolerance, low drift components used throughout. All printed circuit boards are computer designed double-sided through hole plated (or multi-layer), manufactured to UL approval.

MAINFRAME DIMENSIONS

Both optical and magnetic mainframes:
177mm high (4 Unit).
482mm wide including rack mount flanges.
448mm wide case only.
245mm deep

Card size: 220mm x 144.5mm

INPUTS

Balanced stereo solar cell inputs for two projectors. Zero input impedance virtual earth.
Input sensitivity 1.2µA for 1.23 volt output, at maximum gain.

Input access to noise reduction cards for applications not requiring a preamplifier card etc.
Electronically balanced inputs 10k ohms.
Input sensitivity 1.23 volt (+4dbm) for 1.23 volt output (unity gain).

2 x stereo (or mono) non-sync inputs.
Unbalanced inputs 10k ohms.
Input sensitivity 100mV for 1.23 volt output (@ maximum 20db gain).

1 x microphone input.
Electronically balanced input for 200 ohm microphone.
Input sensitivity 1mV for 1.23 volt output (@ maximum 60db gain).

3 x six-channel line inputs to accept outputs from digital and/or magnetic processors (with CM446 audio control card).
1 x six-channel line input to accept output from a digital or magnetic processor (with CM446 audio control card).
Unbalanced inputs 10k ohms.
Input sensitivity .87 volt for 1.23 volt output.

OUTPUTS

Ten outputs, comprising - Left, Centre, Right, Surround left (or mono), Surround right, Sub-Bass, Aux left, Aux right, Monitor left and Monitor right. Electronically balanced and floating, 100 ohms.
Nominal output level 1.23 volts (+4dbm).
Maximum output level 9 volts (+20dbm).

FREQUENCY RESPONSE

Optical Preamplifier: Adjustable sine x/x slit loss compensation equalisation to facilitate flat response to beyond 16kHz with correctly aligned optics and appropriate size slit lens.

Audio processing signal path: 20Hz to 20kHz ±0.5db

Academy filter (in optical mono mode): within ±0.5db of Academy A-chain curve.

Surround channel delay line: 20Hz to 7kHz, -3db @ 7kHz.

Sub-bass excavator selectable crossover frequencies: 293Hz, 243Hz, 230Hz, 213Hz, 193Hz, 180Hz, 163Hz, 150Hz, 143Hz, 130Hz, 113Hz, 100Hz, 80Hz, 63Hz, 50Hz (@ 12db/octave, 24db/octave above 200Hz).

NOISE AND DISTORTION PERFORMANCE

Optical preamplifier:
S/N ratio >80db (unweighted)
>100db (A weighted)
THD <.01% @1kHz, +4dbm

Audio processing signal path:
S/N ratio >100db (unweighted)
THD <.01% @1kHz, +4dbm

Delay line:
S/N ratio >80db (unweighted, @ 50mS delay)
THD <0.1% @1kHz, +4dbm

CSP4200 BLOCK DIAGRAM

Error! Main Document Only..**1**

RC420 REMOTE CONTROL PANEL

All operator control functions associated with the CSP4200 Processor are performed using the remote control panel. There are no operator controls on the processor itself, except for the red "Emergency" button which is located on the Audio Output card.

THE REMOTE CONTROL PANEL

The RC420 remote control panel is divided into five main sections to enable easy identification of the various functional groups of push buttons.

1. TOP SECTION

PROJECTOR CHANGEOVER

There are two buttons marked "**PROJ 1**" and "**PROJ 2**". These are used to switch between projectors in a two-projector installation. The red LED above each button indicates which projector is on-line. If your installation has only one projector, pushing these buttons will have no effect.

MUTE

Pressing the **MUTE** button will cause an automatic fade to silence from any format which is currently selected. Pressing the button a second time will cause the previously selected format to be automatically faded back up again.
Alternatively, pressing any Film Format or Non-Sync Source button whilst MUTE is activated will defeat the mute function and the selected format will be faded up automatically.

EXTERNAL VOLUME

This button is used to select or defeat external control of the processor volume controls. It is equivalent in operation to the "Remote Fader" button in Dolby systems.

RESET VOLUME

This button instantly sets the Film, Non-Sync and Monitor volume controls to a pre-set level. The pre-set level for each control can be easily programmed, however if no levels have been programmed, all volume levels will be set to the standard reference level of "**70**".
To program the pre-set levels, set the three volume controls to the levels that you want to store. Then press the **PROG** button to enter programming mode. Now press the **RESET VOLUME** button to store the current volume settings and then press the **PROG** button again to exit programming mode.
This procedure will store the three volume levels that so that each time you press **RESET VOLUME**, the volume controls will change to the pre-set levels. The pre-set levels can be changed at any time by repeating the above procedure.

2. LEFT MID SECTION

FILM FORMAT SELECTION

There are six Film Format buttons which are used to select the current Film type. These buttons are interlocked with the Non-Sync Source Selection buttons, so that pressing any Film Format button whilst in any Non-Sync mode will instigate an automatic cross-fade to the selected Film Format.
Below the format buttons is the film volume control together with a two digit display for visual indication of the current film volume setting. Level "**70**" on the display represents the standard level of 85db and is equivalent to fader level "**7**" in Dolby systems.

Each of the six Film formats has it's own separate volume level which is displayed (and can be adjusted using the Film volume control) whenever that format is selected. It is also possible to check or alter the volume of any format before you actually select it. This "preview" mode is accessed by first pressing the **SELECT** button, which is located in the middle of the bottom row of push-buttons. If any Film format button is then pressed within 5 seconds, the LED above the button will start to flash and the film volume display will change to show the current volume setting for that format. You can change the volume by turning the volume control. You can then either return to normal mode by pressing the **SELECT** button again, or you can leave the system in preview mode and then when you are ready, press the previewed format button a second time to select the new format.

All three rotary volume controls incorporate a unique "dual speed" feature which allows both coarse and fine adjustment of volume levels. If the controls are turned slowly the volume changes in small increments, allowing very fine adjustment of levels (changing from zero to maximum volume takes approximately four full turns of the control). If the controls are turned more quickly, they operate like a conventional volume control, changing from zero to maximum in less than one turn.

There is an intentional limit to how fast you can turn the controls - if you attempt to spin them there will be little or no change in volume. This is to prevent a sudden large change in volume if the controls are bumped accidentally.

3. CENTRE MID SECTION

NON-SYNC INPUT SELECTION

There are three buttons for selecting one of the three Non-Sync inputs. The Non-Sync buttons are marked "**MUSIC**", "**SLIDE**" and "**MIC**". You can switch between these sources at any time. Each of the inputs will be automatically sent to a pre-determined combination of speakers in the Auditorium, depending upon the way that the Non-Sync "DIP" switches have been programmed on the Control Logic card in the processor.

The Non-Sync Input Selection buttons are interlocked with the Film Format buttons so that if a Non-Sync source is selected whilst in a Film mode, the system will automatically cross-fade to the Non-Sync input. You can also use the **MUTE** button to automatically fade down any Non-Sync input.

When switching from one Non-Sync input to another, the system will fade down the current input and then fade up the new one. This action is referred to as *auto-dip* rather than *auto-crossfade.* (See the section on Function Programming for details of how to change the Auto-dip fade times).

Below the input select buttons is the volume control for the Non-Sync inputs, plus a two digit display which indicates the current setting of the Non-Sync volume.

(The pre-set level trimpots on the audio control card should ideally be adjusted on installation so that a volume level "**70**" on the Non-Sync level display corresponds to the average normal listening level in the Auditorium for each of the Non-Sync inputs).

Each of the three Non-Sync inputs has it's own volume level which is displayed (and can be adjusted using the Non-Sync volume control) whenever that input is selected. The volume preview facility described in the previous Film Format section also applies to the Non-Sync input buttons, and works in the same way by first pressing the **SELECT** button and then any of the Non-Sync input buttons.

4. RIGHT MID SECTION

MONITOR CONTROL

There are six push buttons which provide a means of selectively monitoring each of the five main output channels as well as the usual mix of the three front channels (**MIX** button). Below these buttons is the monitor volume control together with a two digit display to indicate the current monitor volume setting. The monitor amplifier should be adjusted so that the average normal monitor level corresponds to a display level of "**70**".

5. BOTTOM SECTION

SHOW PROGRAMMING

OVERVIEW

The "Show Programming" feature is designed to provide complete automation of sound control functions. Using "Show Programming", it is possible to store a large number of different panel set-ups for automatic recall in a pre-determined order. This recall can be accomplished either manually by pushing the "Next Event" button on the control panel, or automatically by a pulse from an external automation system or from a foil sensor on the projector. All control panel settings, including the three volume control settings, can be stored with each "Event" for later recall.

The Show Programming feature is divided into six shows, each with up to nine events. A "Show" is a normal movie session where one or two main features are screened, along with the usual trailers, background music and slide presentation etc.

For example, the first event might be background music and the second event, a slide presentation. For each of these events, the format selection and the relevant volume which are stored during programming, are recalled as the event occurs. If the Show is to be "triggered" manually, successively pressing the "Next Event" button will recall each Event in the order that they were programmed. If the Show is to be triggered automatically, a pulse from an automation system or a foil sensor on the projector will cause each successive event to be recalled.

It is also possible to run more than one show in succession, so Show 1 could be followed

automatically by Show 4 and then Show 3. It is therefore possible to have up to six successive sessions run automatically. Also, if more than nine events are required for a particular show, two shows can be run together to provide up to eighteen events.

PROGRAMMING METHOD

STEP 1. SELECT PROGRAMMING MODE

To program a show, first press the **PROG** button. The three volume numeric displays will change and the left hand (Film Volume) display window will show "**Pr**". This indicates that you have entered programming mode. If you do not wish to proceed, press **PROG** again, and the displays will return to normal.

STEP 2. SELECT THE SHOW THAT YOU WISH TO PROGRAM

The middle (Non-Sync Volume) display window will show "**Sh**". This indicates that you are in show programming mode. To select the Show that you wish to program, press the appropriate **SHOW #** button and the LED above that button will begin to flash.

STEP 3. STORING CONTROL PANEL SETTINGS AS EVENTS

The right hand (Monitor Volume) display window will show a flashing "**01**". This indicates that Event 1 of the selected show is ready for programming. If the selected event has been previously programmed, the control panel will change to show the previously stored set-up for that event. The stored volume settings will be displayed for two seconds then the display will return to the programming display.

If you wish to program Event 1, set the control panel the way you want for this event. If you want to set a volume control, slightly turn the appropriate volume control knob and all three displays will change to show the volume so that the volume can then be set. Two seconds after you finish turning the volume controls, the display will return to programming mode. When you are satisfied with the control panel setting, press **STORE**, and the right hand display will stop flashing, indicating that the current control panel setting has been stored for that event.

Now, press **NEXT EVENT**. The right display window will now show a flashing "**02**". This indicates that Event 2 is ready for programming. Proceed as for Event 1 and continue for as many Events as required. If you wish to skip an event that has previously been programmed, press **NEXT EVENT** again and the right display will change to the next event.

STEP 4. DELETING AN EVENT

If you wish to delete an event that was previously programmed, press **NEXT EVENT** repeatedly, until the number of the event that you wish to delete appears in the right hand display window. Then press **DELETE EVENT**. The numbers of all events above that of the deleted event will then be moved down by one. For example, if you have nine events and you delete Event 5, Event 6 will now become Event 5, Event 7 will now become Event 6 and so on, so there will now be a total of only eight events.

STEP 5. ADDING A NEW EVENT BETWEEN EXISTING EVENTS

If you wish to add a new event in between existing events, press **NEXT EVENT** until the right display window shows the number of the event below that of the new event. Now press **SELECT** and the event number will increase by one. Set the control panel to the way you want for this new event and then press **STORE**. If there are already nine events for the show that you are programming, you will not be able to add any additional events, so the right display will not change.

STEP 6. EXIT FROM PROGRAMMING MODE

You can exit from programming mode at any time by pressing **PROG**.

OPERATING METHOD

a. RUNNING A SINGLE SHOW

To run a pre-programmed Show, simply press the appropriate **SHOW #** button. The LED above the **SHOW #** button will then begin to flash and the control panel will immediately change to the set-up stored for Event 1 of that show. The panel will change to Event 2 when one of two things happen - either an automation "Next Event" pulse is

received, or the **NEXT EVENT** button on the control panel is pressed. When the last event in the Show is reached, the following "Next Event" pulse will return the control panel to Event 1 and the Show will cycle through again. If the **SHOW #** button is pressed at any time, the Show will be terminated and the control panel will return to the way it was before the Show commenced.

b. RUNNING MULTIPLE SHOWS

To run more than one show consecutively, press the **SHOW #** buttons of the shows you wish to run, in the order that you wish to run them. For example, if you wish to run Show 2, followed by Show 6 and then followed by Show 1, press the **SHOW #** buttons in that order. The **SHOW #2** LED will flash whereas the **SHOW #6** and **SHOW #1** LED's will show a steady illumination until each show is activated at which time it's LED will begin to flash. The Shows will cycle through repeatedly in the same order, until any of the **Show #** buttons are pressed a second time which will de-activate that show. To return to manual operation, all active Shows must be disabled by pressing each active **Show #** button.

UPDATING A RUNNING SHOW

If you want to change the settings for an Event in a Show which is already running, you can do so whilst the Event is occurring. For example, say you are running a Show in which Event 6 is Optical Stereo with a volume setting of '65'. When the event occurs you find that volume '65' is too soft. You can change the volume by simply moving the Film volume control but this will not store the new value for the next time this Show is run.

Therefore, to UPDATE the event with the new volume setting, press the **PROG** button BEFORE you change the volume setting. Now change the volume (or any other setting) and press the **STORE** button. The new volume setting for Event 6 is now stored permanently. Now press the **PROG** button again to exit programming mode and return to the running Show.

The UPDATE procedure will not interrupt the running of the pre-programmed Show, however any changes you make will have an immediate effect.

FUNCTION PROGRAMMING

It is possible to change the settings of some of the internal functions of the processor using the Function Programming feature. This programming should not be attempted if you are unsure of what you are doing, as any changes you make are retained in the system memory.
The control functions that can currently be re-programmed are:

1. Surround channel on/off
2. Sub-bass channel on/off
3. Noise reduction on/off
4. Auto cross-fade fade up and fade down times
5. Non-Sync auto dip-fade down and up time.
6. Left and right surround delay times
7. Surround delay in digital mode on/off
8. Surround noise reduction on/off

Each of these settings can be changed either for overall normal operation or independently for each event in a "Show". This latter feature allows you to fine tune your presentation, such as turning off the noise reduction just for a stereo trailer that has not been noise reduction encoded.

PROGRAMMING THE FUNCTION SETTINGS FOR NORMAL OPERATION

STEP 1. SELECT PROGRAMMING MODE

Press **PROG** to enter programming mode.

STEP 2. SELECT THE FUNCTIONS THAT YOU WISH TO CHANGE

Press **FUNCTION**, then rotate the middle volume control clockwise to select a function. The following abbreviations are used in the middle display window for each programmable function:

Su = Surround on/off
Sb = Sub-Bass on/off
nr = Noise Reduction on/off
Fu = Film auto cross-fade up time
Fd = Film auto cross-fade down time
nu = Non-Sync auto cross-fade up time
nd = Non-Sync auto cross-fade down time
nc = Non-Sync auto dip-fade time
dL = Left Surround delay time
dr = Right Surround delay time
dd = Surround delay in digital mode
Sn = Surround noise reduction

STEP 3. CHANGING THE CURRENT SETTINGS

The current setting for each function, is displayed in the right display window. To change the current setting of a function, press the **SELECT** button or rotate the right volume knob to the left or right. The following abbreviations are used in the right display window for the various function setting options:

on = on
oF = off
FA = Fast
SL = Slow
01 - 16 = Surround delay time (÷ 10)

Change whichever settings you wish, and then press **STORE**. The changes will now apply to all normal processor operations.

STEP 4. EXIT FROM PROGRAMMING MODE

Press **PROG** at any time to exit programming mode.

PROGRAMMING THE FUNCTION SETTINGS FOR AN EVENT IN A SHOW

During the programming of a Show as previously described, if you wish to change a Function Setting for a particular event, press the **FUNCTION** button whilst programming that event, and change whichever settings you wish. The new settings will be stored for that event and will only apply when that event is re-called during the running of the appropriate Show.

IMPORTANT: If you change any of the function settings whilst programming an event, the changes will also apply to any following events that you program. Therefore, if you don't want the changed settings to apply to the next event that you program, make sure that you change the function settings back to normal when programming the next event.

"EMERGENCY BYPASS" BUTTON

(Audio Output card)

Should a failure occur within the processor causing total or partial loss of sound or incorrect operation, this button may be depressed to allow the show to continue in 'simple' mono. The button causes the output of a standby mono preamplifier to be sent to the Left, Centre and Right loudspeakers, bypassing all other processing circuits. After the show, it is possible, by using the "Bypass" switches located at the rear of the processor, to locate which card is faulty by bypassing each card until the fault is rectified. Provided the problem is not in the Preamplifier card or one of the Control cards, it will then be possible to run the processor as normal with the faulty card bypassed until a replacement can be obtained.

MAINFRAME INSTALLATION

The CSP4200 Mainframe has been designed for installation in a standard 19" equipment rack. The unit can also be free standing.

IMPORTANT NOTICE

The CSP4200 processor is fitted with ventilation slots on the top and bottom covers to allow for the free flow of air through the processor. Thus heat which is normally generated by the circuitry is able to quickly dissipate into the surrounding air. It is important to allow a clear space above and below the processor of one rack unit (approx 40mm) so that air can freely circulate through the unit. Failure to provide such free space could result in the unit overheating, or shorten the life of internal components.

To ensure a hum and buzz free installation, care should be taken to correctly interconnect the audio equipment earthing. Furthermore, the length of the leads connecting the solar cells to the CSP4200 should be kept as short as practicable.

EQUIPMENT EARTH

Every piece of audio apparatus has a signal (audio) ground and an electrical (mains) ground. In some equipment these are linked, in others these are held apart by a small resistance (10-27ohms). Some manufacturers also provide facilities to connect or break the signal-electrical ground. The electrical ground should always be connected to the input mains supply earth.

Whatever the system, the best method is to connect every equipment electrical ground to one central star point. This star point should be tied to the mains supply earth. The mains supply earth should be part of the one or three phase supply, being a three wire (live, neutral and earth) or four wire (red phase, yellow phase, blue phase and earth) system. The mains earth must not be a "phantom" earth derived by capacitors. If it does not exist, drive a copper stake into the ground outside and establish the electrical earth!

We will call this mains supply our "clean" mains. We will use it to connect all our audio equipment only, and not the dimmer pack for the lighting or the rectifiers for the projection equipment etc.

Obtain an ohm meter and establish which of your equipment has it's electrical ground tied to signal ground. If an earth lift switch is fitted, use it to connect the electrical ground to the signal ground. Write down a list of which equipment is internally connected. This can be useful later in solving earth loops.

MAINFRAME GROUNDING

At the bottom left hand corner of the CSP4200 Mainframe rear panel are located two ground switches. These are labelled "CHASSIS EARTH" and "MAINS EARTH". The Chassis Earth switch connects the CM210 power supply ground to the mainframe chassis. The Mains Earth switch connects the CM210 power supply ground to the mains input earth. If both switches are off the mains input earth is automatically connected to the mainframe chassis leaving the CM210 power supply ground floating. Ideally, both switches should be **ON**, however, following installation, if hum or buzz proves to be a problem, different combinations of these two switches can be tried to reduce or eliminate the problem.

INPUT CONNECTIONS

Some of the input connections to the CSP4200 are balanced (+, - and E) and others are unbalanced (+ and E). When connecting unbalanced sources to the balanced inputs, the signal connection should be connected to the "+" terminal, and the ground connection should be connected to the "-" terminal. If the source equipment does not have a mains earth, the ground connection should also be connected to the "E" terminal.

OUTPUT CONNECTIONS

All outputs are electronically balanced. If your power amplifiers have balanced inputs, use two-core shielded cable to connect "plus" to "plus", "minus" to "minus", and "Earth" to "Earth". If your power amplifiers have unbalanced inputs, connect "plus" to "plus", and the "minus" terminals of the CSP4200 to the "Earth" terminals of the power amplifiers. Connect the shields at the CSP4200 "Earth" terminals only.

REMOTE CONTROL INSTALLATION

The RC420 remote control panel connects to the CSP4200 processor via standard 9 pin D

connectors using 6-way cable. Each panel can be installed at any reasonable distance from the processor (such as beside the projector). Several RC420 panels can be installed at convenient locations around the Projection room by looping through each panel to the next. The RC420 panel has a male and a female 9 pin D connector. Where only one control panel is used the male connector is used to connect to the CSP4200 processor. The male connector of each additional panel must be connected to the female connector of the previous panel. All control panels in a multi-remote panel installation can be used simultaneously without need to switch control from one panel to the next.

AUTOMATION INTERFACE

An external automation system can be used to control the CSP4200 processor. Interface between the automation system and the processor can use either the usual parallel connection method or can be achieved via a standard RS232 serial communications interface. Parallel connection can be made via the "Automation" 25-way D-connector on the rear panel of the processor. Momentarily connecting any function-select terminal to the common (ground) terminal will select the relevant function. The exception being the *Mute* and *External Volume* functions, which will toggle on or off each time the appropriate terminal is grounded. There are several variations of the parallel automation protocol available which vary with the firmware version installed in the processor. For details of these options, plus serial communications protocol and the automation pin-outs for your firmware version, see the Automation Interface Reference section at the end of this manual. Connection to the RS232 serial interface is made via the "Automation" 9-way connector at the rear of the processor.

TWO-PROJECTOR CHANGER-OVER SHUTTER INTERFACE FACILITY

In cases where two projectors are installed, it is possible to inter-connect the processor sound change-over with the projector shutter changeover so that both occur simultaneously.
The terminal strip marked "Preamplifier Change-over" at the bottom left hand corner of the CSP4200 backplane is for connection of external relays and indicator LED's to drive a two projector shutter changeover system. If this facility is to be used, we recommend using 12V solid state relays with an appropriate contact rating for the shutter solenoid system. The output from each of the "Rly" and "Lmp" terminals is 12V fed from the emitters of switching transistors via current limiting resistors. The load current for each output should not exceed 25mA.

EMERGENCY CHANGE-OVER SWITCH

With two-projector installations is advisable to include an emergency projector change-over switch, as a back-up in case the main processor logic fails. To facilitate this, a terminal marked C/O is included on the "Preamplifier Change-over" terminal block at the bottom left hand corner of the CSP4200 backplane. A simple momentary-contact push-button switch should be wired between this terminal and the adjacent "E" terminal and mounted in a conspicuous position.
The switch will toggle the emergency pre-amplifier output between projectors 1 and 2, *however it should be noted that this terminal does* ***not*** *effect the main pre-amplifier change-over and should not be used as an automation input.*

PRELIMINARY SOUND HEAD ALIGNMENT

1. Clean the sound head optics thoroughly. If the film guide rollers are worn, replace them. Excessive side to side weave of the film will cause insurmountable problems for the surround decoding circuitry and must be corrected prior to installation.

2. If the exciter lamp is old or blackened inside, replace it. Make sure the lamp is operating at a voltage greater than 70% of it's rating.

3. If a mono solar cell is installed, run the SMPTE BUZZ TRACK test film and align the guide rollers for minimum output signal.

4. For stereo installations, remove the mono solar cell and place a white card about an inch away from the sound lens. The image of the exciter lamp should look like Figure 1. If necessary, raise or lower the lamp and move it in and out until the filament is centred in the spot of light. This will ensure that the slit is evenly illuminated, thereby producing the least distortion.

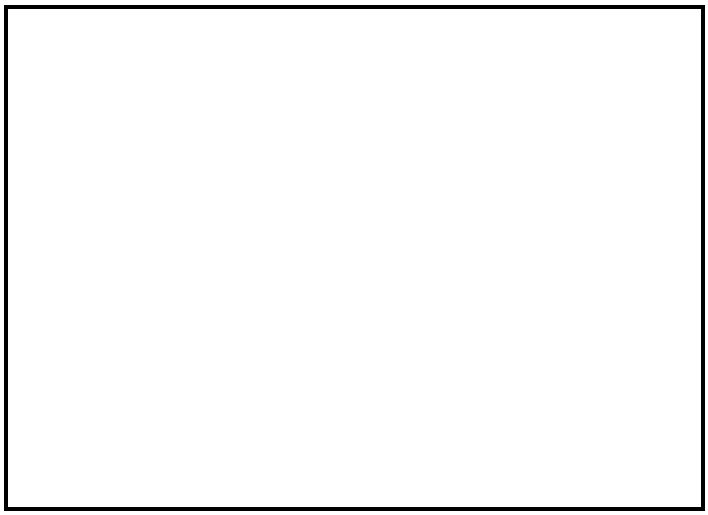

FIG.1 PRELIMINARY LAMP ALIGNMENT

SOLAR CELL INSTALLATION AND ALIGNMENT

1. Mount the stereo solar cell in the projector sound head and position the bracket so that the slit image from the exciter lamp hits the top quarter of the cell. The cell should be located approximately 1mm behind the film so that the slit image just fills the cell width, but does not spill over.
(See Figs. 2 & 3).

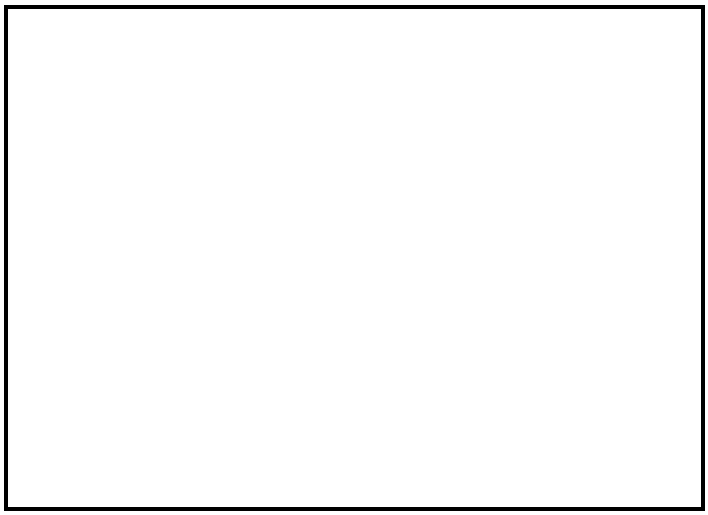

FIG.2 STEREO SOLAR CELL

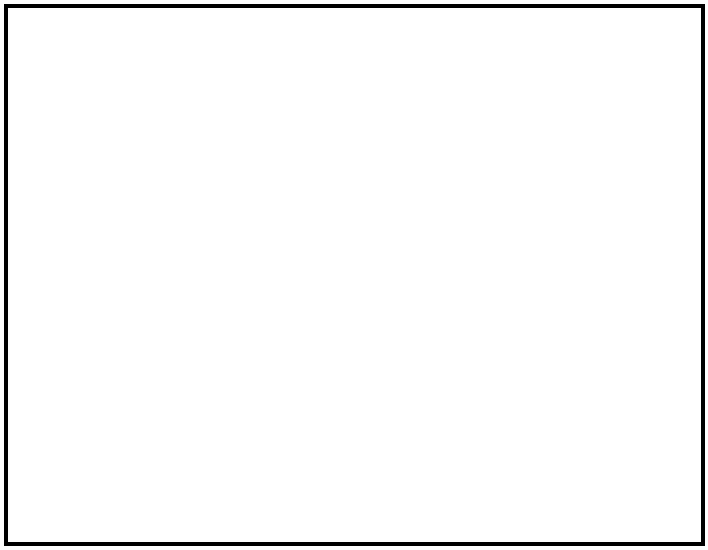

FIG.3 CELL POSITION

2. Install the audio cable from the cell to the optical pre-amp. Use four conductor twin shielded cable (Belden 8404 or equiv.), or a pair of two conductor shielded cables such as Belden 8451. (A single two conductor shielded cable is not recommended.) Connect the lines to the terminal block marked SOLAR CELL INPUTS at the rear of the processor. Be sure that the RED lead of the cell is connected to the left input terminal marked "+" and the GREEN lead of the cell is connected to the right input terminal marked "+". The BLACK cell lead(s) connects to the low "-" input terminals of both left and right channels respectively. Do not connect the shields to anything at the projector end, but ensure that the shield of each pair is **connected to the corresponding "E" terminal** on the input terminal block.

3. SOLAR CELL CROSS-TALK ADJUSTMENT

Connect the probes of a dual trace oscilloscope to the test points at the lower front edge of the left and right Noise Reduction cards. Run a 100% alternating left/right STEREO ALIGNMENT film, such as the Dolby Cat. No. 97 test film. Adjust the triggering and timebase of the oscilloscope to give traces similar to Fig. 4. Move the cell in and out laterally across the film plane until the cross-talk is at a minimum on both channels as shown in Fig. 4. It may be necessary to roughly set the gain of the pre-amp at this time. When satisfactory results are attained lock-off the cell adjustment, taking care not to disturb the setting in the process.

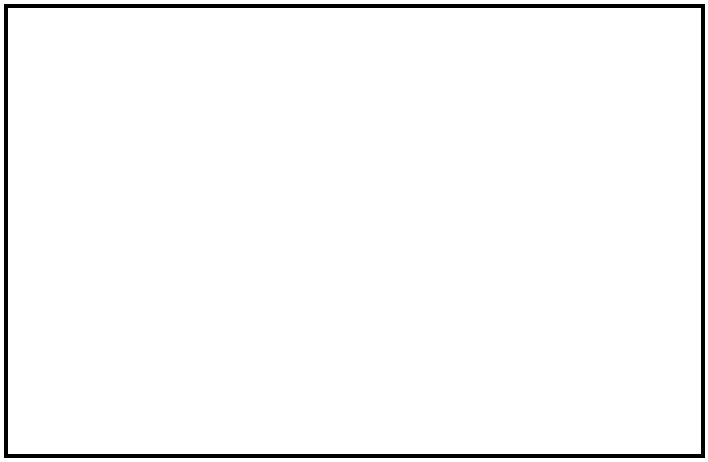

FIG.4 *Minimum cross-talk results when this display is obtained on a dual-trace scope using a Left-right test film.*

4. Run a 50% level test film such as the Dolby tone side of the Dolby Cat. No. 69 test film. Adjust the left and right gain controls for projector one (RV1 & RV2) on the optical pre-amplifier card until the two green LED's on each of the noise reduction cards are illuminated with equal intensity. Repeat the procedure for projector two (if applicable) using RV3 & RV4.

5. Check that the left and right channels are connected the right way around by slowly inserting a business card into the light path from the outside edge of the film. The right channel is located nearest the edge of the film so the LED meter on the right noise reduction card should change from green to amber (indicating a drop in level) before the LED meter on the left noise reduction card.

6. Double check the cell alignment by running a 100% stereo alignment film, or the Dolby Cat. No. 97 left/right STEREO ALIGNMENT film. The *amplitude* of the two 100% modulated wave forms should be identical. (See Fig. 5). If one is greater than the other, whilst the modulated wave forms of the 50% level film are identical, there is a problem with the scanning beam. Either the slit is not uniformly illuminated along it's length, or the scanning beam is not in perfect alignment with the film guide roller and solar cell. Since most sound head optics cannot be moved in or out, it will be necessary to adjust the position of the film guide roller and realign the solar cell so that both the 50% and 100% modulated tones match from channel to channel. When this fine alignment is not done, loud sounds (above 50% modulation) will be distorted and will leak into the surround speakers.

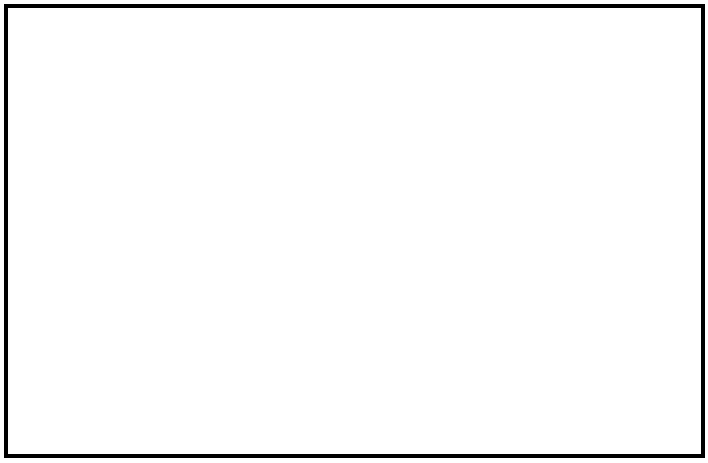

FIG.5 *Double check of alignment as shown on a dual-trace scope.*

7. OPTIC LENS ALIGNMENT

With the oscilloscope still connected as above, run a FOCUS test film such as the SMPTE P35-SF-B 7kHz Sound Focus Test Film. Adjust the gain and timebase of the scope to obtain a suitable display showing one or two cycles of the waveform. Adjust the focus of the sound lens by moving it closer to, or further away from the film, to obtain the maximum amplitude of both left and right waveforms. At the same time, adjust the azimuth by rotating the lens so that the left and right waveforms precisely coincide at their peak amplitude.
Alternatively, switch the scope to X/Y mode and adjust the azimuth for the thinnest display (Fig. 6).

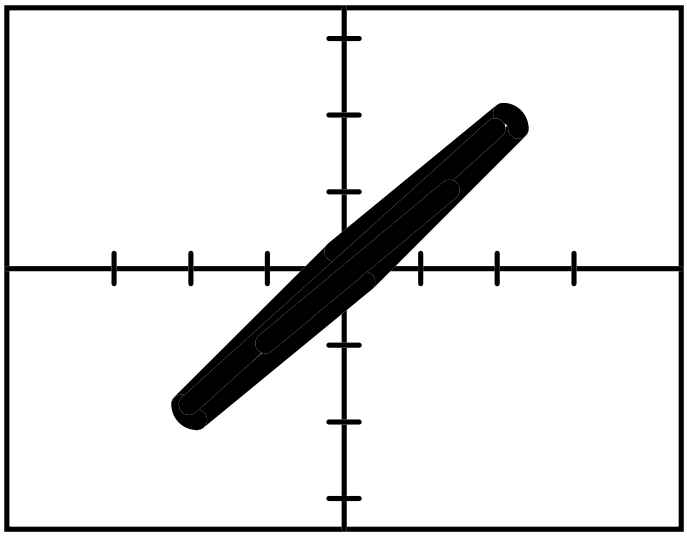

FIG.6 *Left-right phase response with dual-trace scope in X/Y mode.*

8. FREQUENCY RESPONSE CORRECTION

Once the focus and azimuth settings have been optimised, connect a Real Time Analyser alternately to the left and right noise reduction card test points and adjust the high frequency controls for each projector on the lower front edge of the Optical Pre-amplifier card to achieve a flat response on the analyser. It should be possible to attain a flat frequency response up to a limit that is governed by the vertical size of the slit in the sound lens. Above this limit the response will have a rapid roll-off. Adjust each HF control to extend the response until a high frequency peak appears, then back off the control slightly to minimise the peak.

An extended response with a significant high frequency peak may cause audible phase response degradation. Unless there is some problem with the optics, it should be possible to achieve a response which is flat to 12-16kHz.

9. DOLBY LEVEL METERS

The meters on the CM223 Noise Reduction cards consist of four LED's. An orange LED illuminates at a signal level some 16db below operating level (-12dbu) and indicates that the signal is below reference. Two green LED's provide a window +/-0.6db wide around reference level. Correct alignment to 50% level test films (Dolby tone) is indicated by equal intensity of both green LED's. A red LED illuminates 0.6db above operating level to indicate that the signal is above reference. Note that the red LED does not indicate maximum level or clipping.

10. DOLBY LEVEL ALIGNMENT

Run the Dolby tone side of the Dolby Cat. 69 test film and fine tune the pre-amplifier gain controls so that the two green LED's on each noise reduction card are of equal intensity. Ignore any brief fluctuations in level caused by splices in the test film loop. If the level of the Dolby tone varies slowly over a period of time, it is probably due to voltage fluctuation in the exciter lamp power supply. In such cases it will be necessary to replace the supply with a regulated type.

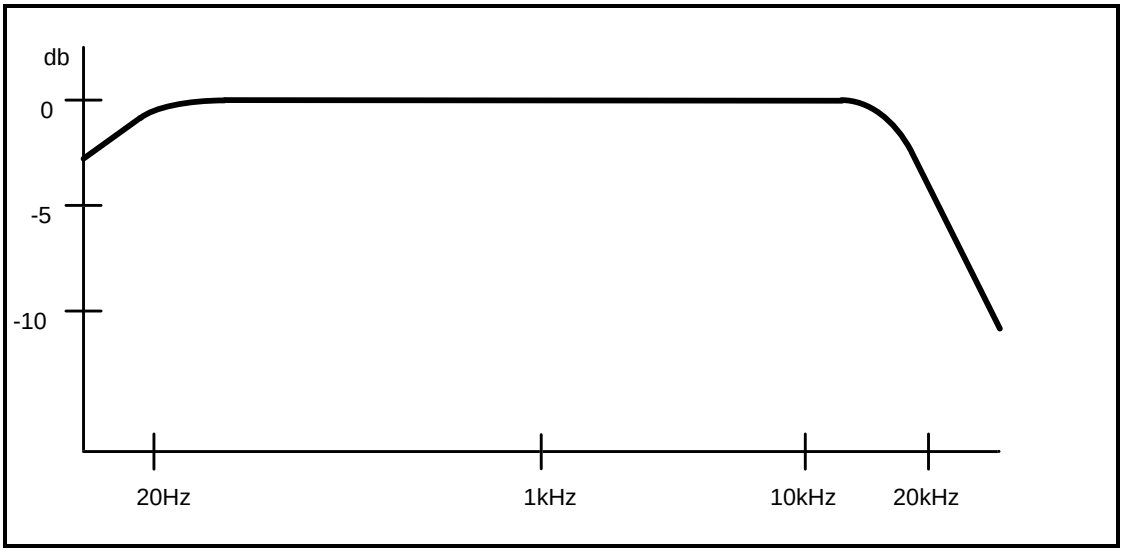

FIG.7 *Checking optimum high frequency response on a real time analyser with a Pink Noise film.*

MATRIX DECODER

The CM224 card decodes stereo sound-tracks that have been 4 track matrix encoded to produce the left, centre, right and surround channels. The card utilises a sophisticated high speed logic steering controlled matrix to produce a high degree of separation between the decoded channels. The logic steering circuitry has been designed for maximum compatibility with the Dolby Stereo 35mm Optical SVA matrix format.

MATRIX DECODER MODE SWITCHING

The Matrix Decoder card logic scheme is switchable for use with different speaker configurations and must be correctly set in accordance with the speaker arrangement used. This switching is achieved by means of the four "MATRIX DECODER MODE" dip switches, located on the rear panel of the CSP4200 processor. The first three switches labelled "L/R, C and S" must be set according to which speaker channels you have installed.

For example if your installation has all four channels, all three switches must be set to "ON". However if your system has no centre speaker (i.e. left, right and surround only), the "C" switch should be switched to "OFF", or if your system has left, centre and right speakers, but no surround, the "L/R" and "C" switches must be set to "ON" and the "S" switch set to "OFF" etc. Failure to correctly set these switches will result in incorrect reproduction of the sound-track.

SURROUND DELAY ADJUSTMENT

Because the surround speakers are located much closer to the audience than the speakers behind the screen, it is necessary to delay the sound from the surround speakers to ensure that it does not reach the audience before sound from the screen speakers. This is particularly important with matrix encoded stereo optical soundtracks because of the likely presence of dialogue leakage from the centre screen channel into the surround channel due to normal crosstalk in the matrix decoder.

If the surround channel delay is increased by an additional 10-20mS beyond what is required for synchronisation, any surround channel crosstalk is not heard by the audience, so that dialogue appears to come only from the screen. This is due to a phenomenon known as the Haas effect. When two identical sounds arrive at a listener about 20mS apart, the brain interprets the direction of the source of the sound as that of the first arriving sound. Therefore by ensuring that the listener hears the surround channel about 20mS later than the front channels, any front to surround cross-talk will not be heard by the listener.

The surround delay is adjustable separately for the left and right surround channels in 10mS steps from 10mS to 160mS to allow for optimum adjustment for auditoriums of differing sizes. This adjustment can be made either by setting two rotary switches located on the CM425 card or using the "Functions" programming on the Remote Control panel. Both methods are described in the following paragraphs, however the CSP4200 processor is supplied with the delay set using method 2, i.e from the remote control panel. This is the recommended method unless you have a specific reason for using method 1.

To determine the correct delay time, find the seat nearest to the rear-most surround speaker and estimate the distance (in feet) from this seat to the front speakers and to the surround speaker. Then subtract the smaller distance from the larger and add 20. This will give the required delay time in milliseconds (sound takes about 1mS to travel a distance of 1 foot). For example if the seat is 70 feet from the front speakers and 10 feet from the surround speaker, subtracting 10 from 70 gives 60, and adding 20 gives 80. Therefore the delay should be set to 80mS.

Method 1:
Setting the delay from the CM425 Card

Remove the CM425 Surround Delay card and set SW1 to the "LOCAL" position. Using the following table, set the rotary switches SW2 and SW3 to the correct position for the desired delay times. The left and right delay times can be set to different values to compensate for auditoriums where the seating area is off-centre.

SWITCH POSITION	DELAY TIME	SWITCH POSITION	DELAY TIME
0	10mS	8	90mS
1	20mS	9	100mS
2	30mS	A	110mS
3	40mS	B	120mS
4	50mS	C	130mS
5	60mS	D	140mS
6	70mS	E	150mS
7	80mS	F	160mS

Method 2 (Recommended method):
Setting the delay from the Remote Control

Remove the CM425 Surround Delay card and set SW1 to the "REMOTE" position. Replace the card. At the remote control, press the **PROG** button to enter programming mode. Now press the **FUNCTIONS** button to access the functions. Turn the middle volume knob to the right until the centre display shows **dL**, denoting "Delay Left". The right hand display will show the current setting of the Left Surround delay time.

Note that the number shown is the delay time divided by ten, so a display showing **05** represents **50mS** delay and a display showing **14** represents **140mS** delay. To increase the left delay time rotate the right volume knob clockwise. To decrease the delay time rotate the right volume knob anti-clockwise. The delay time changes in 10mS increments from 10 to 160mS. To set the right delay, turn the middle volume knob clockwise and the centre display will change to **dr** denoting Delay Right. Follow the same procedure to set the right delay.

Additional Surround Delay Options

The surround delay can be bypassed whenever a digital or magnetic format is selected. This may be desirable if the digital or magnetic processor has a built in surround delay. To activate the digital delay bypass feature, use the **dd** function to switch off digital surround delay. It is also possible to bypass the B-type noise reduction in the surround channel by using the **Sn** function, however this should only be done if your processor is equipped with a CM424 matrix decoder card. The B-type noise reduction is only used in optical stereo mode and is an essential part of the Dolby Stereo process.

AUDITORIUM EQUALISATION

The CSP4200 processor produces the best noise and distortion performance with the output level trimpots at maximum, and is shipped from the factory in that condition. If your power amplifiers do not have volume controls, all of the output level trimpots on the CM329 Audio Output card should be turned fully anti-clockwise prior to first switching the system on. If your power amplifiers do have volume controls, do not adjust the output trimpots on the processor. Instead, turn the amplifier's controls to minimum before first switching on.

Set up a Real Time Analyser and position the microphone in the auditorium two thirds of the way back from the screen, near the centre of the seating area (but off-axis to the centre speaker), and 1.2 - 1.5 metres above the floor. Remove the CM224 Matrix Decoder Card and insert the CM218 Pink Noise Generator card in it's place. At the remote control panel select "**OPTICAL STEREO**" and set the film volume to "**70**". If the installation includes a sub-bass speaker, switch off the sub-bass power amplifier. Select "Centre" on the Pink Noise card.

For power amplifiers *without* volume controls, increase the setting of the centre output trimpot on the CM329 card to obtain a sound pressure level of 85dbc in the auditorium. For power amplifiers *with* volume controls increase the power amplifier volume control to obtain 85dbc, and then increase the control a little further to a convenient, easily marked position. Then reduce the auditorium level to 85dbc using the centre trimpot on the CM329 card.

With the Centre Equaliser card extended using the extender card, adjust the equaliser controls to achieve a flat response to 2kHz. Above 2kHz adjust the controls for a roll-off of 1db per frequency division (i.e. -1db @ 2.5kHz, -2db @ 3.15kHz, -3db @ 4kHz, etc. up to -10db @ 20kHz).

NOTE: Due to the high frequency attenuation of the screen, it may be necessary to turn the 16kHz and 20kHz controls close to maximum to attain a linear roll-off to 20kHz.

Avoid extreme opposite settings of the controls for adjacent bands as this will introduce severe phase distortion around these frequencies and thus degrade overall phase response.

When equalisation is complete, check that the average setting of the 30 frequency band controls is in the centre, not mostly clockwise or mostly anti-clockwise. Occasionally during, and after equalisation, check that the sound pressure level in the auditorium is still at 85dbc. If not, adjust the centre output trimpot on the CM329 card until it is.
Repeat the above procedure for the Left and Right channels, selecting the appropriate buttons on the Pink Noise card.

MONO SURROUND SYSTEM ALIGNMENT

If your system is wired for mono surrounds utilising the left surround output only, select the "Left Surround" position on the Pink noise card, and adjust the "Left Surround" output level trimpot on the CM329 card for a sound pressure level in the auditorium of 88dbc.

If the processor has a surround equaliser installed, switch the CM425 Surround Delay line card to "bypass" using "SW12" on the backplane of the processor. Adjust the frequency response in the same manner as for the screen channels i.e. flat to 2kHz with a 1db per 1/3 octave band roll-off above 2kHz.

After equalisation, switch the Surround Delay bypass switch back to "normal" and adjust the "Left Surround" output level trimpot on the CM329 card for a sound pressure level in the auditorium of 88dbc.

STEREO SURROUND SYSTEM ALIGNMENT

If your system is wired for stereo surrounds, select the "Left Surround" position on the Pink noise card, and adjust the "Left Surround" output level trimpot on the CM329 card for a sound pressure level in the auditorium of 85dbC. Next select "Right Surround" on the pink noise card and adjust the "Right Surround" output level trim pot for 85dbc.

If the processor has a surround equaliser installed, switch the CM425 Surround Delay line card to "bypass" using "SW12" on the backplane of the processor. Adjust the response in the same manner as for the screen channels i.e. flat to 2kHz with a 1db per 1/3 octave band roll-off above 2kHz.

After equalisation, switch the Surround Delay bypass switch back to "normal" and adjust the Left and Right Surround output level trimpots on the CM329 card for a sound pressure level in the auditorium of 85dbc for each channel.

FINAL ALIGNMENT CHECKS

Finally, use the "sequence" button in conjunction with various combinations of the Left, Right, Centre and Surround buttons to aurally double-check the balance between the channels. The sequence speed can be adjusted using the "rate" trimpot situated below the "sequence" button on the pink noise card.

SUB-BASS SET UP

If the CM228 sub-bass excavator card is installed, remove it from the mainframe. Using the 4-way DIP switches marked "SW1", select a cross-over frequency which suits the speaker system installed. The switches can be used in combination to select additional frequencies other than the four shown.

When two or more switches are selected to "ON", the cross-over frequency will be the sum of the selected frequencies. For example, if both the 50Hz and 100Hz switches are switched to "ON", the cross-over frequency will be 50 + 100 = 150Hz.

SUB-BASS ALIGNMENT

With the pink noise card inserted in the matrix decoder slot, and the sub-bass excavator card extended using the extender card, select "centre" on the Pink Noise card. With the centre channel power amplifier turned on and the sub-bass power amplifier turned off, check that the overall sound pressure level is 85dbc, then make a note of the average level of the bands on the analyser between 100Hz and 1kHz (this is usually around 78dbc).

Switch off the centre channel amplifier and switch on the sub-bass amplifier. Adjust the sub-bass output trimpot on the CM329 audio output card so that the average level of the bands between 25Hz and the selected crossover is the same as that noted for the 100Hz to 1kHz region of centre channel (approx 78dbc). Adjust the equaliser controls on the sub-bass card for the flattest response up to the selected cross-over frequency.

IMPORTANT: Do not adjust any equalisers at or above the selected cross-over frequency and avoid extreme opposite settings of the controls for adjacent frequency bands.

After equalisation, re-adjust the setting of the sub-bass output trimpot to ensure that the average level of the bands between 25Hz and the selected crossover frequency is the same as that noted for the centre channel.

Finally, switch the centre channel amplifier back on and check that the level of the bands below the sub-bass cross-over frequency is approx 3db higher than the bands above the crossover frequency. If the average level of the bands below the crossover frequency is lower than the those above, the sub-bass speaker is wired out of phase and this must be corrected.

EMERGENCY BY-PASS LEVEL

When equalisation is complete and all output levels on the CM329 Audio Output card have been finally set, run a stereo film print and switch from "NORMAL" to "EMERGENCY BY-PASS" by pressing the red "EMERGENCY BY-PASS" button on the CM329 card.

Ensure that the Film volume is still at reference level ("70" on the film volume display) by pressing the "**RESET VOLUME**" button on the remote control.

With the aid of an assistant listening in the centre of the auditorium, adjust the "Emergency Mono" level trim-pot on the Optical Pre-amp card ("1M" for projector 1, "2M" for projector 2) so that *dialogue* is the same volume with the "BY-PASS" switch either in or out. If, at any subsequent time the setting of the centre output level trim-pot on the CM329 card is altered, it will be necessary to re-set the Emergency By-pass level to ensure that the volume of dialogue remains the same when "Emergency By-pass" is selected.

NON-SYNC CHANNEL ALLOCATION

Traditionally, the Non-sync inputs to cinema sound processors have all been sent to a fixed configuration of the auditorium loudspeakers - usually the front left and right speakers. Because of the probable differing nature of the three possible Non-Sync sources, the CM436 Control Logic card provides the facility to program the speaker configuration for each of the three Non-sync inputs separately. Thus it is possible to have the background music fed to say the front left and right speakers in stereo, the theatre ad v/o tape fed to the centre speaker and the microphone fed to the surround speakers. Any combination is possible including generating centre and/or surround information from stereo sources.

Programming is achieved by setting the DIP switches at the bottom of the CM436 Control Logic card. They can be accessed by removing the card from the mainframe. There are four banks of four switches, the banks are labelled N/S 1, N/S 2 and N/S 3 (Mic) corresponding to the three Non-sync inputs. The fourth bank is used for other control function options. The labelling of the switches and their function is as follows:

SWITCH	FUNCTION
LR	STEREO TO LEFT & RIGHT
C	MONO (L+R) TO CENTRE
SM	MONO (L+R) TO SURROUND
S	SURROUND (L-R) TO SURROUND

These switches can be used in combination to select any possible speaker arrangement for each of the three Non-sync inputs.

NOTE: DO NOT SET BOTH THE "S" AND "SM" SWITCHES TO "ON" AT THE SAME TIME ON ANY ONE SWITCH-BLOCK, AS THIS WILL RESULT IN ONLY THE LEFT CHANNEL OF THAT INPUT BEING SENT TO THE SURROUND SPEAKERS.

NON-SYNC PRE-SET LEVEL ADJUSTMENT

Each of the various Non-Sync inputs should be adjusted for a good average listening level with the Non-Sync volume control on the remote control set to level "70". The adjustments are performed using the Non-Sync trimpots on the front edge of the CM446 Audio Control card *only after all optical film levels have been set and after the DIP switches mentioned in the preceding section have been set.* (Do not make any adjustment to the output level trimpots on the CM329 Audio Output card after the film levels have been set).

Press the **RESET VOLUME** button on the remote control before making any adjustment to Non-Sync levels. For both stereo and mono sources adjust both the left and right Non-Sync level trimpots for a suitable average listening level in the auditorium.

If the signal is being fed to the left and right speaker channels, check the input balance by switching the monitor between the left and right channels, adjusting the trimpots for equal level. If a source is being fed to just the centre and/or surround speaker channels, check the input balance by switching the monitor to the centre (or surround channel) and alternately disconnect the left and right inputs, adjusting for equal level from either input.

The microphone input is mono only. Adjust the pre-set level using the trimpot at the bottom front edge of the Audio Control card.

MONITOR SET UP

The processor caters for both mono and stereo monitoring arrangements. To select which mode you wish to use, remove the CM446 Audio Control card and set "SW1" to either MONO or STEREO. In MONO mode, all channels selected using the Monitor section of the remote control, can be monitored through the Monitor Left(mono) output.

In STEREO mode, if "mix" is selected on the remote control, the monitor output is a full stereo mix available from the Monitor Left(mono) and Monitor Right outputs. If just the left channel is selected for monitoring, it is fed to the Monitor Left output. Likewise if the Right channel is selected it is fed to the Monitor Right output. Centre and Surround channels are fed to both Monitor Left and Monitor Right outputs. The Monitor Left(mono) and Monitor Right output level trimpots on the CM329 Audio Output card can be adjusted to provide a suitable level for the monitor amplifier.

AUXILIARY OUTPUTS

A stereo (or mono) auxiliary output is provided for connection to systems for the hearing impaired, or for use with foyer sound systems, etc. To select either stereo or mono operation, remove the CM446 Audio Control card, and set "SW3" to the "STEREO" or "MONO" position. The Aux Left(mono) and Aux Right output level trimpots on the CM329 Audio Output card can be adjusted to provide a suitable level for external amplifiers.

OPTIONS DIP SWITCHES
ON CM436 CONTROL LOGIC CARD

There are two **Options** dip switch banks on the CM436 card which allow for modifications to some of the processor's operating modes. As the availability of these options may vary with the firmware release included with the processor, it is necessary to consult the Automation Interface Reference at the end of this manual for details.

DIGITAL PROCESSOR INSTALLATION

The CM446 Audio Control Card has three six-track inputs which can be used for digital processors. The DIGITAL 1 & DIGITAL 2 inputs are configured specifically for the Dolby and DTS systems. The MAG/AUX input can be used for digital, magnetic or any other multi-channel source.

Dolby SR/D processor

Connect the audio outputs from the Dolby DA10/20 processor (J8 25-way 'D' connector) directly to the Panastereo Digital 1 input (J23 25-way 'D' connector) using 25 way ribbon cable.

Connect the control lines from the DA10/20 (J6 25-way 'D' connector) directly to the Panastereo Parallel Automation connector (J26 25-way 'D' connector) using 25-way ribbon cable.

Provided the analogue system alignment has been correctly performed, no adjustment of audio levels for the DA10/20 is required.

DTS processor

Connect the DTS audio output connector (JM21 20-way IDC connector) directly to the Panastereo Digital 2 input socket (J22 20-way IDC socket).

Connect the DTS control cable (BS22) directly to the Panastereo DTS control input (J26 10-way IDC connector).

Ensure that the analogue system has been correctly aligned. Adjust the audio level trimpots on the DTS unit in accordance with the manufacturer's instructions.

Connecting a digital processor to the Mag/Aux Inputs

To connect a 6-track digital processor to the Mag/Aux input, the "MAG/AUX INPUT" switch on the CM446 card must first be set to the "DIGITAL" position.

Connect the digital input channels to the "Mag/Aux" Input screw terminal connector according to the labels above the connector. Use the bracketed labels for the Left and Right Surround and Sub-Bass inputs. If the processor is a Dolby SR/D or a DTS unit, follow the instructions in the Dolby or DTS sections above, regarding alignment of audio levels.

MAGNETIC PROCESSOR INSTALLATION

A 4 or 6 track MPU can be connected to any of the processor's three 6-track inputs. If the MPU is a six track unit with Le/Re outputs, you must use the Mag/Aux input.

Connecting a 6-Track MPU with Le/Re outputs

The "MAG/AUX INPUT" switch located on the CM446 card must be set to the "MAG" position.

Connect the output channels from the MPU to the "Mag/Aux Input" screw terminal connector according to the labels above the connector. Note that the bracketed labels for the Left and Right Surround and Sub-Bass inputs do not apply in this case. The signals from the Le and Re Inputs are combined in the processor to generate the Sub-Bass channel. As the CSP4200 processor has no audio level adjustment for the digital or magnetic inputs, any channel balance and/or level adjustments that may be required must be made on the magnetic processor.

Connecting a 4-track MPU

The "MAG/AUX INPUT" switch located on the CM446 card must be set to the "MAG" position.

Connect the output channels from the MPU to the "Mag/Aux Input" screw terminal connector according to the labels above the connector. Note that the bracketed labels for the Left and Right Surround and Sub-Bass inputs do not apply in this case. As the CSP4200 processor has no audio level adjustment for the digital or magnetic inputs, any channel balance and/or level adjustments that may be required must be made on the magnetic processor.

WARNING: USER ADJUSTMENTS

Some cards have a number of adjustable trim-pots. With the exception of the CM237 Equaliser card, user adjustable trim-pots are located at the front edge of each card and are therefore accessible from the front of the processor with the card plugged in. Those trim-pots which are not accessible from the front are factory set using sophisticated test equipment and on no account should any attempt be made to alter the settings. To do so will severely compromise the performance of the unit.

AUTOMATION INTERFACE

Overview

The CM436 Control Logic card performs all of the function switching and volume control operations of the CSP4200 cinema sound processor, and can be controlled via the supplied remote control, an opto-isolated parallel automation interface, and an RS232 serial interface.

All three control systems act independently and in parallel, which means there is no need to switch between the various methods of control, with the exception of the parallel remote volume interfaces which must be selected using the external volume remote control button or parallel interface line. (It is not necessary to select External Volume when using the serial interface to control volume).

There are sixteen external parallel interface connection lines which can be configured in software as either opto-isolated input lines, output lines or both. Four of the lines can also be used by changing PCB jumpers, for two analogue remote fader/ external volume interfaces. There are also eight dedicated external LED indicator lines.

PARALLEL INTERFACE

The CM436 Control Logic card can accommodate a wide variety of parallel interface arrangements.
All In/Out lines are pulled up to +15V via a 1k resistor in series with an opto-isolator LED. The standard parallel input protocol requires a pulse to ground with a minimum duration of 120mS. This can typically be provided by a set of closing relay contacts or an open collector transistor. In/Out lines which are configured as **output** lines use an open collector transistor to pull the line low when not active. Output lines can be used to drive a standard LED without the need for a series resistor.

Parallel Remote Fader Interface

There is provision for two analogue remote fader interfaces on the CM436 card so that the Film and Non-Sync volumes can be separately controlled. In the standard software only the Film volume interface is enabled and it is used to control both Film and Non-Sync volumes. However if the CM436 card 'Options A' DIP switch 3 is set to the 'ON' position, the two interfaces are enabled and the Non-Sync volume can be separately controlled. The remote fader interface/s can be used with a 100kohm linear pot as a simple additional remote volume control or as an input for volume control from an external automation system. The interface provides a 5V reference voltage output and a constant current sink input.

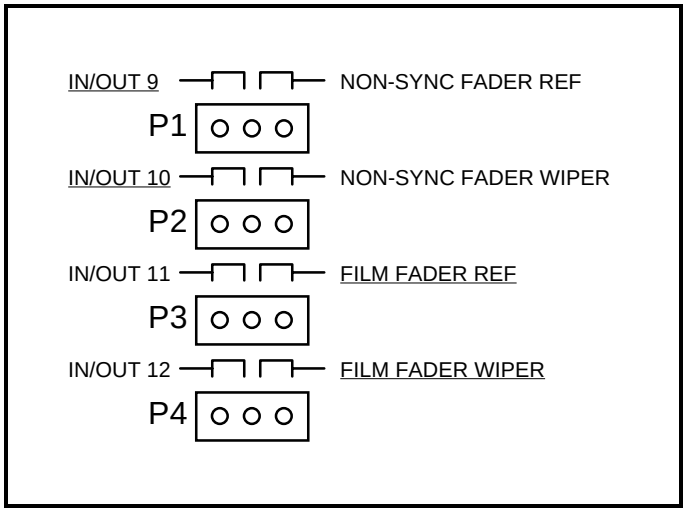

Fig. 8 Jumper Blocks on CM436 card.
Standard jumper positions are shown underlined.

SERIAL INTERFACE

A standard RS232 serial communications interface is provided for connection to automation systems that use serial data transfer. The serial data is available at the 9 pin serial automation D-Sub connector as follows:
Tx data from master (CSP4200 data receive): pin 3
Rx data to master (CSP4200 data transmit): pin 2
Common (if required): pin 5

Serial Protocol Description

The RS232 serial port communicates at 9600 baud, 8 data bits, no parity and 1 stop bit. The protocol has been designed so that a dumb terminal may monitor the interface for debugging purposes.

The protocol provides both a poll response format with the attached equipment initiating the exchange with a seven character poll command, and an unsolicited response, occurring whenever there is a change of system status which has been initiated either by an automation controller or by a local command from the remote control panel. All commands start with a **colon** followed by a four character command code, terminated with a **carriage return**, and a **line feed** character which are also valid if they occur in the reverse order. (This is to allow compatibility with languages that do not provide easy control of the order of these

characters.) The CM436 may respond with a twelve character string starting with a **zero** and ending with a **carriage return**. When the CM436 detects the command start character (a colon) a timer is started and if the rest of the command including the end characters (<CR/LF>) is not received within 500mS then the serial port is ignored until another valid start character is seen. If the command is not known then it is ignored.

When the CM436 sees the **:STAT** command, it will reply with a poll response. When the CM436 starts transmitting there will be a typical inter-character time of 10mS. The poll response will give the controller's status.

Serial Volume Control

The Film and Non-Sync volumes can be controlled via the serial interface. Various commands are included to increase or decrease the volume or set the volume to a specific value. If the CM436 card 'Options A' DIP switch 3 is set to 'ON', the Film and Non-Sync volumes can be separately controlled.

NOTE: Whenever a volume change command is sent, the system volume will ramp (rather than jump) to the new level. The ramp speed is always at the FAST rate. When switching between a Film format and a Non-Sync format (or vice versa) the volume will automatically crossfade as it does with normal remote control operation. Likewise, selecting and deselecting MUTE will cause an auto fade to occur. See the OPERATION section of this manual for full details of the crossfade and dipfade facilities.

System Commands

:STEA<CR/LF> Select Film Stereo Format
:STES<CR/LF> Select Film Stereo SR Format
:MONO<CR/LF> Select Film Mono Format
:DIG1<CR/LF> Select Film Digital 1 Format
:DIG2<CR/LF> Select Film Digital 2 Format
:MAGA<CR/LF> Select Film Mag/Aux Format
:NSY1<CR/LF> Select Non-Sync 1 (Music)
:NSY2<CR/LF> Select Non-Sync 2 (Slide)
:NMIC<CR/LF> Select Non-Sync 3 (Mic)
:MUTE<CR/LF> Select/de-select Mute
:PRO1<CR/LF> Select Projector 1
:PRO2<CR/LF> Select Projector 2
:VOUP<CR/LF> Increase volume by one
:VODN<CR/LF> Decrease volume by one
:VU10<CR/LF> Increase volume by ten
:VD10<CR/LF> Decrease volume by ten
:VSxx<CR/LF> Set volume to level 'xx' where 'xx' is a value between 00 and 99
:VNxx<CR/LF> Set Non-Sync volume to level 'xx' where 'xx' is a value between 00 and 99. (Used only if Options Switch 3 is set to 'on')
:STAT<CR/LF> Poll the processor for the current system status

Response format:

0 1 2 3 4 5 S M D O A R V V_1 V_2 B <CR>

0 = Response Start character
1 = Non-Sync 1 (music) is selected
2 = Non-Sync 2 (slide) is selected
3 = Non-Sync 3 (mic) is selected
4 = Projector 1 is selected
5 = Projector 2 is selected
S = Film Stereo format is selected
M = Film Mono format is selected
D = Digital format is selected
0 = Mute is active
A = A type Noise Reduction is on
R = SR type Noise Reduction is on
V = Character **V** is used to mark that the following two characters are volume digits
V_1 = First decimal digit of volume
V_2 = Second decimal digit of volume
B = Busy indicator used to indicate that the controller is in the middle of changing the settings
<CR> = Carriage return (Response End character)

If a selection is not true then the character is replaced by an "**X**". All characters are capitals.

AUTOMATION INTERFACE - 25-PIN D-CONNECTOR
CONNECTION DATA - FIRMWARE VERSION SP446 V1.0

Pin No.	STANDARD FUNCTION	FUNC WITH OPTION B SW 1 ON *	
1	FILM MONO SELECT	**STEREO/MONO H = S, L = M**	
2	FILM STEREO SELECT	**N/R H = IN, L = OUT**	
3	FILM STEREO SR SELECT	**STEREO/SR H = ST, L = SR**	
4	N/S 1 SELECT	**FILM/TAPE H = FILM, L = N/S**	
5	FILM DIGITAL 1 SELECT	**OPT/DIG H = OPT, L = DIG 1**	
6	FILM DIGITAL 2 SELECT	**NOT USED**	
7	N/S 2 SELECT	**NON-SYNC H = N/S 1, L = N/S 2**	
8	FILM MAG/AUX SELECT	NOT USED	
9	REMOTE FADER SELECT	REMOTE FADER SELECT	
10	MUTE SELECT	MUTE SELECT	
11	REMOTE FADER REF VOLTAGE	REMOTE FADER REF VOLTAGE	
12	COMMON (DIGITAL GROUND)	COMMON (DIGITAL GROUND)	
13	REMOTE FADER WIPER	REMOTE FADER WIPER	
14	FILM MONO INDICATOR	FILM MONO INDICATOR	
15	FILM STEREO INDICATOR	FILM STEREO INDICATOR	
16	FILM STEREO SR INDICATOR	FILM STEREO SR INDICATOR	
17	N/S 1 INDICATOR	N/S 1 INDICATOR	
18	FILM DIGITAL 1 INDICATOR	FILM DIGITAL 1 INDICATOR	
19	FILM DIGITAL 2 INDICATOR	FILM DIGITAL 2/MAG INDICATOR	
20	N/S 2 INDICATOR	N/S 2 INDICATOR	
21	FILM MAG/AUX INDICATOR	FILM MAG/AUX INDICATOR	
22	REMOTE FADE INDICATOR	REMOTE FADER INDICATOR	
23	MUTE INDICATOR	MUTE INDICATOR	
24	NEXT EVENT SELECT	NEXT EVENT SELECT	
25	PROJ SELECT H = P1, L = P2	PROJ SELECT H = P1, L = P2	

* NOTE 1: The Options B Switches are located on the CM436 logic control card. With Switch 1 in the 'ON' position, the CSP4200 automation interface emulates a simple EPRAD-style automation interface.

CONTROL LOGIC CARD 'OPTIONS A' SWITCHES

Sw1 - DOLBY DA10/20 CONTROL PULSE DEFEAT - Normally each of the parallel automation input lines also acts as an output, producing a pulse to ground whenever a particular format is selected either from the remote control panel or the serial automation interface. This is to allow Dolby DA10 and DA20 Digital processors to operate correctly. Options Switch 1 will defeat this feature in the **ON** position.

Sw2 - DTS NON-SYNC DELAY DEFEAT - This feature prevents Optical Stereo or Optical SR format from being re-selected at the end of a feature by the DTS processor, after music (Non Sync 1) has been selected by the operator or by the automation. Switch 2 will defeat this feature in the **ON** position. The delay lasts for 30 seconds, however the formats can still be selected manually at the remote control panel.

Sw3 - SEPARATE NON-SYNC REMOTE FADER SELECT - It is possible to operate two separate Dolby-style remote faders with the processor, one for film volume and the other for non-sync volume. Selecting Switch 3 will enable this feature. Please note it is also necessary to move the jumpers on P1 and P2 on the CM436 card to the non-default positions - see Fig 8 for details.

Sw4 - SUB-BASS ON IN OPTICAL MONO SELECT - Switch 4 selects Sub Bass **ON** in Optical Mono mode.

Sw5 - Not currently implemented

Sw6 - Not currently implemented

Sw7 - PROGRAMMING/SHOW BUTTONS DISABLE - Setting switch 7 to the **ON** position will disable the lower section of the remote control panel. This option is to prevent unauthorised persons from changing the internal functions of the processor.

Sw8 - BACKUP RAM MEMORY DEFEAT - Normally the status of the processor is stored in backup memory so that if the processor is switched off , or if there is a power failure, the current status of the control panel will be restored on power-up. If it is desired that the processor wakes up in it's default mode (Optical Stereo, volume level 70), switch 8 must be selected to **ON**.

INDEX

Error! Main Document Only..**1**