Film-Tech

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PANASTEREO

CINEMA SOUND PROCESSOR
MODEL CSP4600

INSTALLATION AND OPERATION MANUAL

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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 CSP4600 system when fitted with the appropriate modules provides 100% compatibility with Dolby Stereo 35mm and 70mm magnetic film prints.

The CSP4600 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 are available and can be purchased separately at any time.

CSP4600 FEATURES

- High performance, electronically-balanced low noise, magnetic pre-amplifiers with SMPTE magnetic playback equalisation characteristic. Individual gain, low frequency, mid frequency and high frequency gap loss equalisation.

- 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

- Optional SR noise reduction decoding for accurate restoration of dynamic range and frequency characteristics of Dolby Stereo SR encoded soundtracks.

- Logic/Audio Control card includes comprehensive crosspoint switching to allow a wide range of formats to be reproduced.

- Replay of all major 70mm 6-track magnetic release print formats including TODD-AO, Dolby Formats 41, 42 and 43.

- Replay of all major 35mm 3-track and 4-track release print formats including Dolby format 22 and non-Dolby prints with 12kHz surround control tone.

- Replay from all sep-mag formats with comprehensive track to output routing.

- Mixdown from L, C and R outputs to Lt, Rt outputs. Individual routing of any channels to Lt and Rt outputs.

- Optional mixdown of Le and Re outputs to L, C and R outputs to produce Le and Re channels as phantom channels for auditoriums without Le and Re stage speakers.

- Optional 30 band, constant-Q third octave equaliser cards with ±7.5dB adjustment for Le and Re auditorium speaker equalisation. High and low frequency contour controls with ±12dB adjustment.

- Optional 10 band, constant-Q stereo octave equaliser cards with ±7.5dB adjustment for Le and Re auditorium speaker equalisation. High and low frequency contour controls with ±12dB adjustment.

- High quality construction. Precision engineered fully enclosed aluminium chassis. 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

177mm high (4 Unit)
482mm wide including rack mount flanges
448mm wide case only
267mm deep.

Card size: 220mm x 144.5mm.

INPUTS

5 x 6-track electronically balanced magnetic preamplifer inputs. Input impedance 47kohms. Input sensitivity –80dBu for 0dB reference level output, at maximum gain (1kHz).

Optional 6-track line input cards for other 6-track sources. Input impedance 10kohms. Input sensitivity –10dBu for 0dB reference level at maximum gain. Nominal sensitivity +4dBu.

OUTPUTS

Ten outputs, comprising - Left, Centre, Right, Left surround, Right surround, Sub-bass, Left extra, Right extra, Left total and Right total.
L, C, R, Ls, Rs, Sw ouputs unbalanced, 100 ohms.
Nominal output level 300mV (-8dBu) to suit most cinema processors.

Le, Re, Lt and Rt outputs electronically balanced and floating, 50 ohms.
Nominal output level 1.23V (+4dBu).
Maximum output level 15.46V (+26dBu).

FREQUENCY RESPONSE

Magnetic preamplifiers: SMPTE magnetic playback equalisation with adjustable low frequency, mid-high frequency and high frequency head gap loss compensation equalisation to facilitate flat response to beyond 16kHz with correctly aligned head.

Audio processing signal path:
20Hz to 20kHz ±0.5dB.

Sub-bass output:
Direct mode: 20Hz to 20kHz ±0.5dB
LeRe sub mode: 20Hz to 100Hz +0, –3dB.

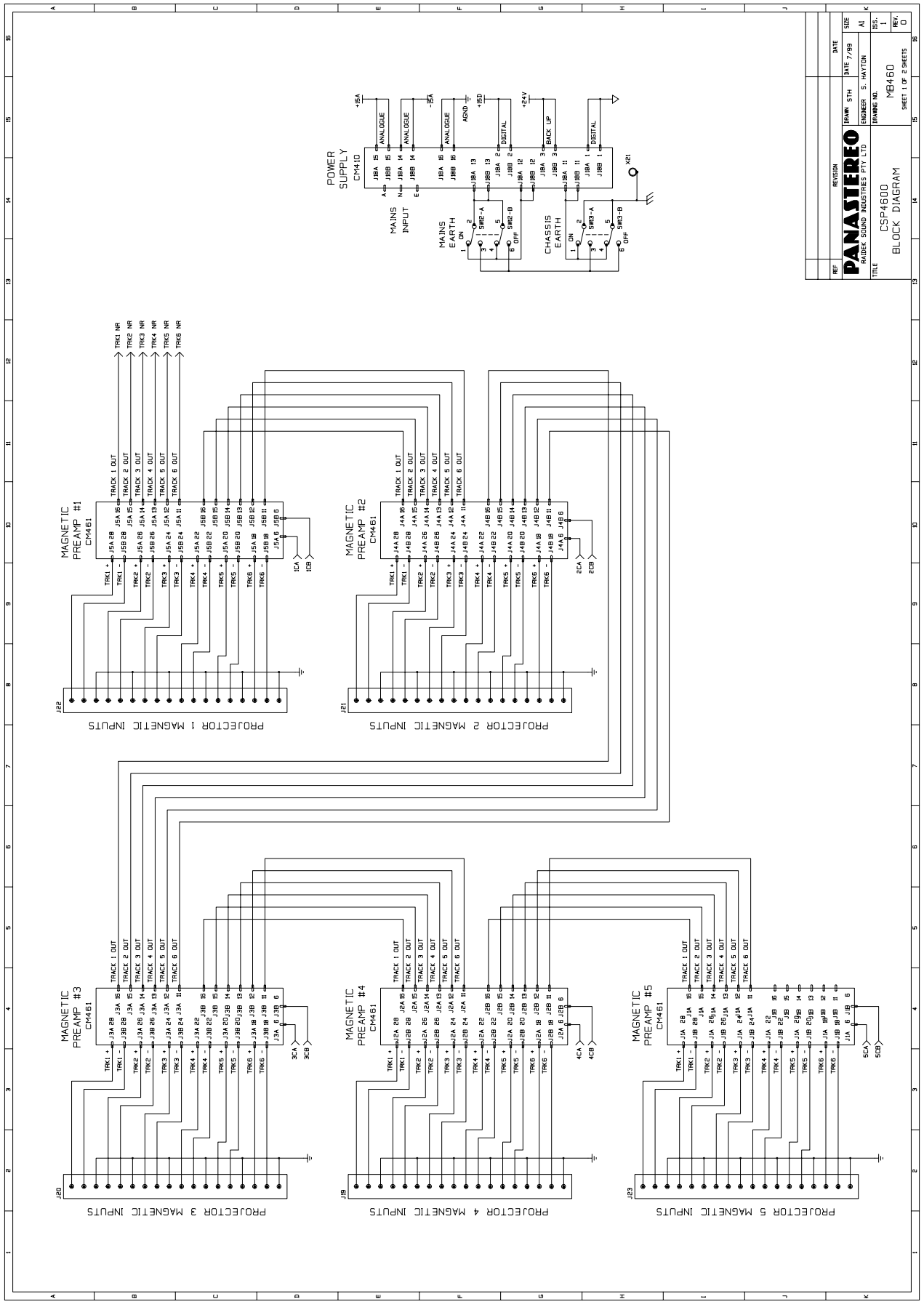
NOISE AND DISTORTION PERFORMANCE

Magnetic Inputs:

Noise:	Typically -65dBu (unweighted)
	Typically –80dBu (400Hz – 22kHz)
	Typically -80dBu (A weighted)
Headroom:	16dB
THD:	.05% @1kHz, 0dBu
Dynamic Range:	96dB

Line Inputs:

Noise:	Typically -92dBu (unweighted)
	Typically -102dBu (A weighted)
Headroom:	16dB
THD:	.005% @1kHz, 0dBu
Dynamic Range:	112dB


POWER SUPPLY CM410
+15A
-15A
+15D
+24V
ANALOGUE
DIGITAL
BACK UP
AGND
MAINS INPUT
MAINS EARTH
CHASSIS EARTH
SW2-A
SW2-B
SW3-A
SW3-B
X21
MAGNETIC PREAMP #1 CM461
MAGNETIC PREAMP #2 CM461
MAGNETIC PREAMP #3 CM461
MAGNETIC PREAMP #4 CM461
MAGNETIC PREAMP #5 CM461
TRACK 1 OUT
TRACK 2 OUT
TRACK 3 OUT
TRACK 4 OUT
TRACK 5 OUT
TRACK 6 OUT
TRK1 NR
TRK2 NR
TRK3 NR
TRK4 NR
TRK5 NR
TRK6 NR
PROJECTOR 1 MAGNETIC INPUTS
PROJECTOR 2 MAGNETIC INPUTS
PROJECTOR 3 MAGNETIC INPUTS
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PROJECTOR 5 MAGNETIC INPUTS
PANASTEREO
RAIDEK SOUND INDUSTRIES PTY LTD
TITLE
CSP4600
BLOCK DIAGRAM
DRAWN STH
DATE 7/99
ENGINEER S. HATTON
DRAWING NO.
MB460
SHEET 1 OF 2 SHEETS
SIZE A1
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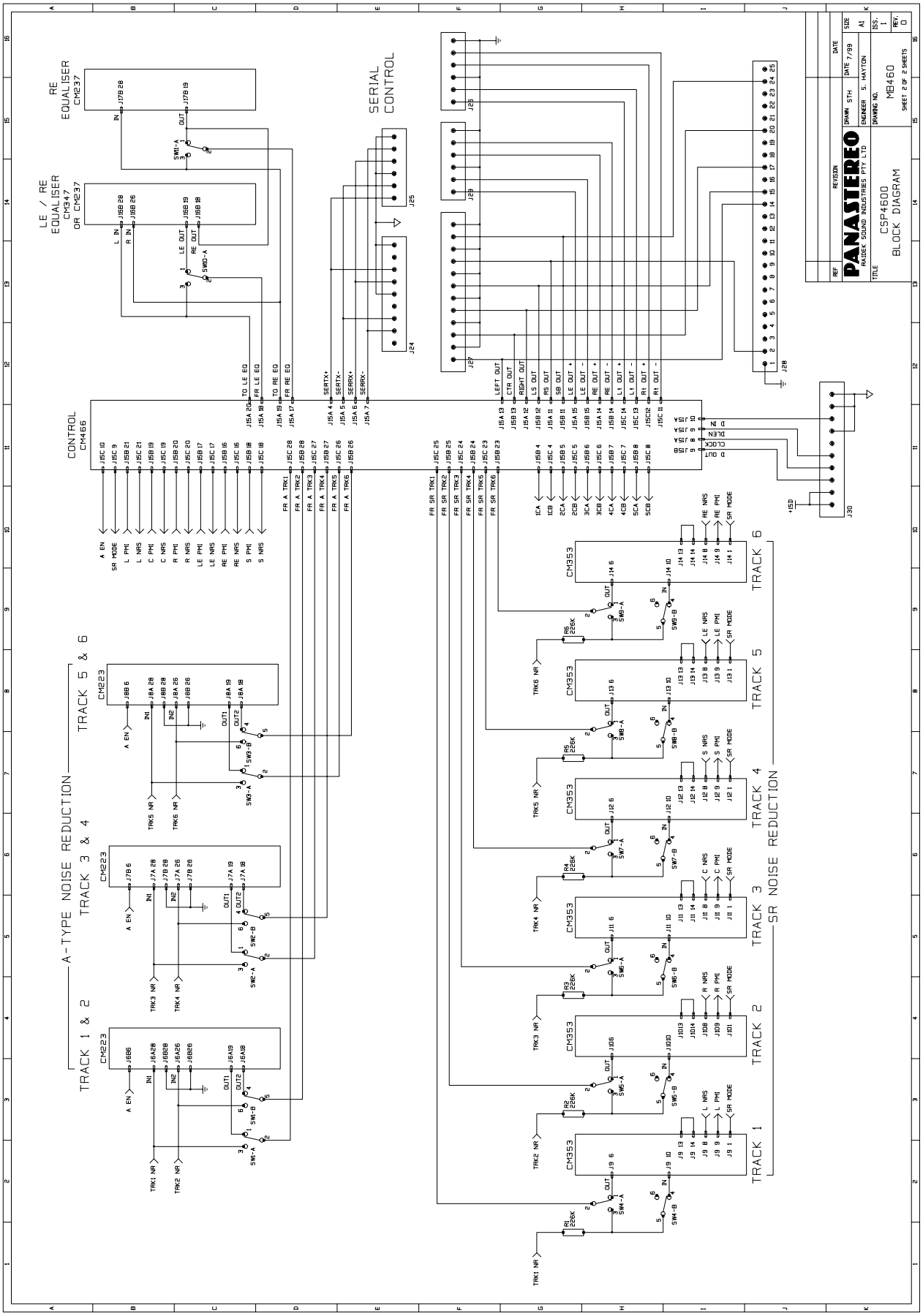
RE EQUALISER CM237
LE / RE EQUALISER CM347 OR CM237
SERIAL CONTROL
CONTROL CM466
A-TYPE NOISE REDUCTION
TRACK 1 & 2
TRACK 3 & 4
TRACK 5 & 6
SR NOISE REDUCTION
TRACK 1
TRACK 2
TRACK 3
TRACK 4
TRACK 5
TRACK 6
CM223
CM353
PANASTEREO
RAIDEK SOUND INDUSTRIES PTY LTD
CSP4600
BLOCK DIAGRAM
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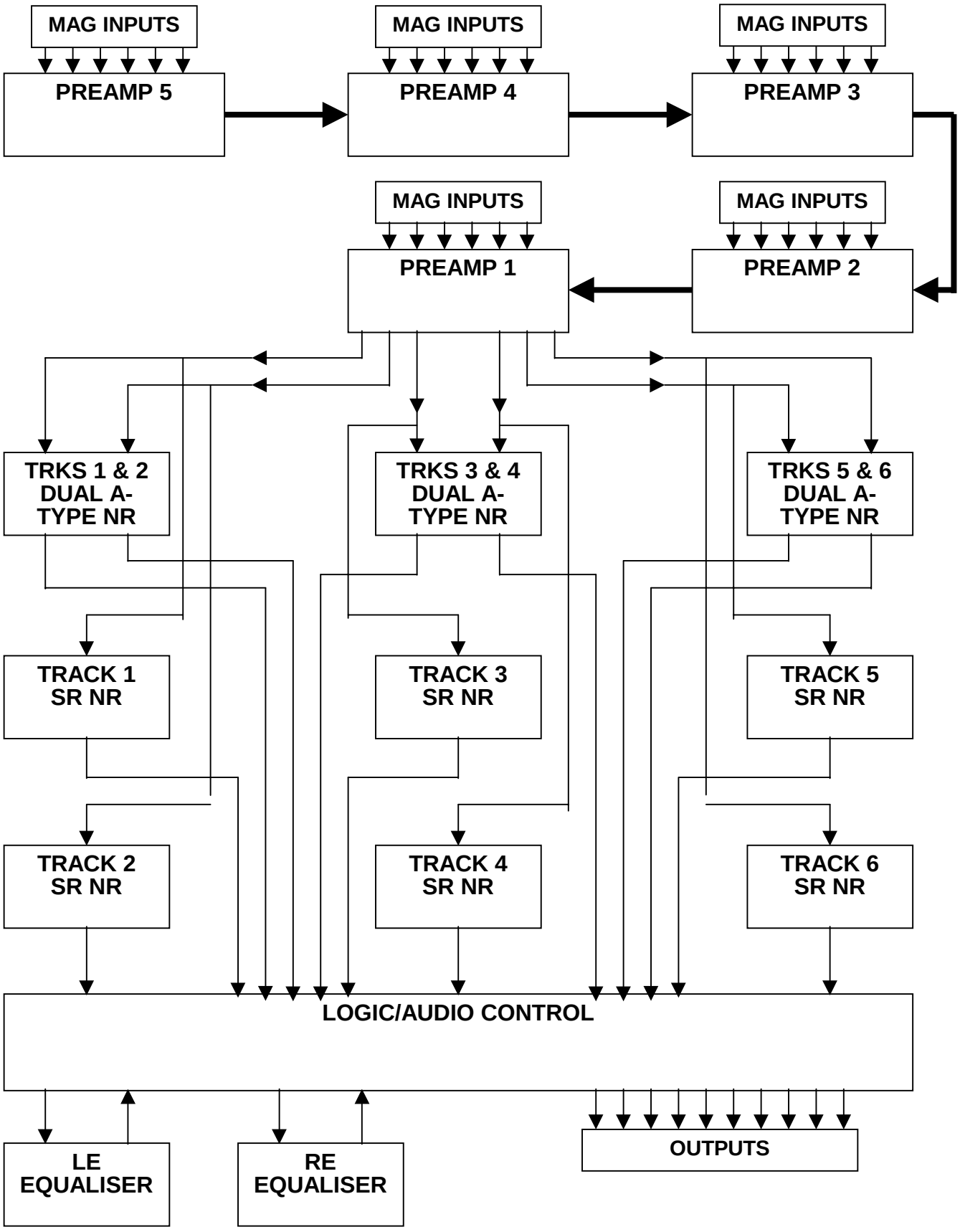
DRAWN STH
DATE 7/98
ENGINEER S. HAYTON
SHEET 2 OF 2 SHEETS

SIGNAL FLOW DIAGRAM



THE CONTROL PANEL

LCD DISPLAY PANEL

The display panel indicates which format is currently selected, whether A-type or SR noise reduction is selected and which projector, 1 or 2, is selected.

A typical display is as follows:

70mm FMT43 SPLIT SURR
A-TYPE NR PROJ 1

FORMAT SELECTION

There are ten format buttons which are used to select the current format. The currently selected format will be displayed on the top line of the LCD display.

The first 6 formats are preset for standard magnetic release prints, the last 4 formats are for user configured formats. All 10 formats can be fully edited to suit users' requirements.

NOISE REDUCTION SELECTION

There are two buttons for noise reduction type selection. One for A-type and one for SR. If only one type of noise reduction module is fitted, selecting the other type will turn the noise reduction off (although it will still be displayed in the LCD panel).

70mm FMT43 SPLIT SURR
SR NR PROJ 1

Whenever a format is selected the default noise reduction mode for that format is also selected. For example, TODD-AO format does not normally have noise reduction so whenever this format is selected the NR is turned off. Whereas Format 42 normally does have noise reduction so whenever this format is selected, the NR is turned on. The default settings can be overidden at any time using the Noise Reduction select buttons.

If there is no NR selected, pressing either of the Noise Reduction buttons will turn on that NR type.

If you wish to turn off the noise reduction press the same NR button again.

PROJECTOR SELECTION

The projector is controlled from the main cinema processor via the serial data link. Whenever the projector is changed at the main sound processor, the CSP4600 will follow.

MENU

It is possible to edit the track-to-output routing for each of the ten formats using the Menu controls.

EDITING A FORMAT

STEP 1. SELECT MENU MODE

- Press MENU to enter menu mode
- The LCD display changes to:

Build Format? OK/EXIT

STEP 2. SELECT BUILD FORMAT

- Press EXIT to return to normal operation.

  Or

- Press OK to continue. The display changes to:

Select a Format to edit

STEP 3. SELECT THE FORMAT THAT YOU WISH TO EDIT

- Press EXIT to return to normal operation.

  Or

- Press one of the ten format buttons to select the format to edit.
  The display changes to:

Track 1 - > Left Out < Input > < Output >

STEP 4. CHECK (AND EDIT, IF REQUIRED) THE TRACK OUTPUT ROUTING

- The display now shows the output routing for Track 1. In the above example, Track 1 is routed to the Left Output. The second line of the display indicates that the buttons immediately below the LCD screen (the Format 40 to 43 buttons) can be used to select another input or output.
- If you want to change the output routing for Track 1, press either the Format 42 or the Format 43 button to select another output.
- If you want to check the output routing for next track, press the Format 41 button.
  The display changes to:

Track 2 - > Le Out
< Input > < Output >

- To go back to the previous Track, press the Format 40 button.
- If you want to change the output routing for Track 2, press either the Format 42 or the Format 43 button to select another output.
- Using the Format 41 button, continue stepping forward through each Track to check, and change if necessary, the output routing for each of the 6 Tracks
- When you step forward from Track 6 the display will change to show the base Preamp allocation for this format. The Display changes to:

Preamp No: 1
< Input > < Output >

STEP 4. CHECK THE PREAMP ALLOCATION

- The example above indicates that the format will use Preamp 1 as the base preamp. In a two projector installation, the system uses Preamps 1 and 3 as "base" preamps when in Projector 1 mode. When the system changes over to Projector 2, the output from Preamp 1 is replaced with the output from Preamp 2 and the output from Preamp 3 is replaced with the output of Preamp 4. Preamp 5 is unaffected by a projector changeover.
- Formats should not be selected for a base Preamp of 2 or 4, in a two projector system.

STEP 5. CHANGE THE PREAMP ALLOCATION

- To change the Preamp allocation use the Format 42 button to decrement, or the Format 43 button to increment, the Preamp number.

STEP 6. SAVE THE CHANGES TO THE FORMAT AND EXIT

- Simply press **EXIT** to save any changes and go back to normal operation.
- If you wish to discard the changes that you have made, press the **CANCEL** button before pressing **EXIT**.

MAGNETIC FILM FORMATS

70MM 6-TRACK FORMATS

TODD-AO (Format 40)

This format uses 6 full bandwidth channels – Left, Left Extra, Centre, Right Extra, Right and Surround. The Left Extra and Right Extra channels are stage channels which frequently carry panned dialogue.

Dolby Format 41

This format is the same as TODD-AO (Format 40) but uses Dolby A-type Noise Reduction on all tracks.

Dolby Format 42

This format is 6 track but uses only 4.1 channels – Left, Centre, Right, Surround and Sub Bass and normally uses Dolby A-type or SR Noise Reduction on all tracks. The Sub Bass information is carried by the Le and Re channels, which must be combined and low pass filtered before being sent to the Sub Bass speaker.

Dolby Format 43

This format uses 5.1 channels – Left, Centre, Right, Left Surround, Right Surround and Sub Bass and normally uses Dolby A-type or SR Noise Reduction on all tracks. The Surround channels are only stereo above 500Hz. The Le track carries high frequency Left Surround information and Sub Bass information. The Re track carries high frequency Right Surround Information plus Sub Bass information. The Surround track carries full bandwidth mono surround information. The Le track is high pass filtered and the Surround track is low pass filtered. Then they are added together and sent to the Left Surround Output. Likewise, the Re track is high pass filtered and added to the low passed Surround track signal before being sent to the Right Surround Output. The Le and Re tracks are also added together and low pass filtered (100Hz) and then sent to the Sub Bass output. Format 43 soundtracks can be played sucessfully on Fomat 42 systems with mono surround.

35MM 4-TRACK FORMATS

Conventional 4 track (Format 20)

This format uses 4 full bandwidth channels – Left, Centre, Right and Surround.

12kHz Surround (Format 21)

This format uses 4 tracks – Left, Centre Right and Surround with the Surround channel controlled by a 12kHz pilot tone.

Dolby Format 22

This format is the same as Format 20 but uses Dolby A-type Noise Reduction on all tracks.

FORMAT EDITING - OVERVIEW

The routing of each of the six magnetic tracks to any one of sixteen destinations can be set up differently for all ten formats. The processor is supplied with all formats pre-routed to provide six standard film formats and four user formats. All ten formats can be edited and changed by the user. Each track can be sent to only one destination, but more than one track can be sent to the same destination.

ROUTING DESTINATIONS

Each track from a preamp can be routed to one of sixteen destinations. The destinations are not all direct outputs from the processor. Some destinations are processing inputs for special formats and these are descibed in further detail below.

The list of destination is as follows:

Name	Destination	Final Output(s)
Left	- Left Output	
Centre	- Centre Output	
Right	- Right Output	
Left Surround	- Left Surround Output	
Right Surround	- Right Surround Output	
Ls + Rs	- Left and Right Surround Outputs	
Sub Bass	- Sub Bass Output	
Le	- Le Output	
Re	- Re Output	
Le/Re Format 42	- Format 42 processing for Le and Re tracks	- Sub Bass Output
Le Format 43	- Format 43 processing for Le track	- Ls and Sub Bass Outputs
Re format 43	- Format 43 processing for Re track	- Rs and Sub Bass outputs
Surround Format 43	- Format 43 processing for Surround	- Ls and Rs Outputs
Surround 12k	- Processing for 35mm 12kHz surround track	- Ls and Rs Outputs
Left Total	- Left Total Output	
Right Total	- Right Total Output	

LE/RE FORMAT 42

For replay of Format 42 soundtracks, both the Le and Re tracks should be routed to this destination. The Le and Re tracks both contain only Sub Bass information so they are combined and low pass filtered at 100Hz and the then sent to the Sub Bass Output.

LE FORMAT 43

For replay of Format 43 soundtracks the Le track should be routed to this destination. The Le track contains Left Surround Information above 500Hz and Sub Bass information below 100Hz. The Le track is high pass filtered at 500Hz and then sent to the Left Surround Output. It is also low pass filtered at 100Hz and sent to the Sub Bass Output.

RE FORMAT 43

For replay of Format 43 soundtracks the Re track should be routed to this destination. The Re track contains Right Surround Information above 500Hz and Sub Bass information below 100Hz. The Re track is high pass filtered at 500Hz and then sent to the Right Surround Output. It is also low pass filtered at 100Hz and sent to the Sub Bass Output.

SURROUND FORMAT 43

For replay of Format 43 soundtracks the Surround track should be routed to this destination. The Surround track contains full bandwidth mono surround information. The Surround track is low pass filtered at 500Hz and then sent to both the left and Right Surround Outputs.

SURROUND 12K

For replay of 35mm four-track films that use a 12kHz Surround pilot tone the Surround channel should be routed to this destination. The pilot tone is detected by the control system and the Surround channel is filtered to remove the pilot tone before being sent to the Left and Right Surround Outputs.

LEFT TOTAL (LT) AND RIGHT TOTAL (RT) OUTPUTS

These outputs provide a permanent stereo mix of the Left, Centre and Right Outputs. Other tracks can additionally be routed to either the Left Total or Right Total Output.

These outputs can also be used for dubbers etc where a 2-track stereo matrixed master mix is to be replayed. In this case, the two tracks can be routed either to the left and right outputs or directly to the Lt and Rt outputs.

MAINFRAME INSTALLATION

The CSP4600 Mainframe has been designed for installation in a standard 19" equipment rack.

Important Notice:

The CSP4600 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 magnetic heads to the CSP4600 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 CSP4600 mainframe rear panel are located two ground switches. These are labelled "CHASSIS EARTH" and "MAINS EARTH". The chassis earth switch connects the CM410 power supply ground to the mainframe chassis. The mains earth switch connects the CM410 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 CM410 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

The magnetic pre-amplifer input connections to the CSP4600 are balanced (+, - and E). When connecting to the magnetic head in the projector, keep the lead lengths as short as possible and make sure that the shield is connected at the processor end only. Do not connect the shield to the projector chassis.

OUTPUT CONNECTIONS

For the outputs to the sound processor, the CSP4600 has two alternative output connectors which are wired in parallel. A 12-way pluggable Phoenix connector (J27) and a 25-way D-connector (J28) which is pin-for-pin compatible with the Digital 1 & 2 Input connectors on the CSP1200 and the External Input on the CP500.

For the Le/Re and Lt/Rt outputs the CSP4600 has 6-way pluggable Phoenix connectors.

The Le/Re and Lt/Rt 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 CSP4600 to the "earth" terminals of the power amplifiers. Connect the shields at the CSP4600 "earth" terminals only.

PROCESSOR CONTROL INTERFACE

If your installation uses two projectors, or has Le and Re stage speakers, it is necessary to connect the CSP4600 RS232/485 serial interface to the sound processor. The interface provides the CSP4600 with format, volume and projector information from the main sound processor.

CONNECTING TO A PANASTEREO CSP1200

The audio connection to the CSP1200 can use either the Digital 1, Digital 2 or Mag/Aux input.

If one of the digital inputs is to be used, use a D25-female to D25-male cable, (either ribbon or multicore cable) and connect to the 25-way D-connector at the back of the CSP4600 (the connections are pin for pin).

If the Mag /Aux input is to be used, use a cable with pluggable Phoenix connectors at each end and connect to the Phoenix output connector at the back of the CSP4600.

Important: If the Mag/Aux input is used, make sure that the **Mag/Aux Input** switch on the CM446 card in the CSP1200 procesor is selected to the **DIGITAL** position.

For the control connection to the CSP1200, the CSP4600 serial port should be selected to RS232 mode and a pin-for-pin D9 male to D9 female cable used to connect between the serial ports of the two processors. Only pins 2, 3 and 5 are used.

CONNECTING TO A DOLBY CP500

For the audio connection to the CP500 use a D25-female to D25-male cable, (either ribbon or multicore cable) and connect to the External Input 25-way D-connector at the back of the CP500 (the connections are pin for pin).

For the control connection to the CP500, the CSP4600 serial port should be selected to RS232 mode and connection made according to the following diagram:

MAGNETIC HEAD INSTALLATION

1. Mount the magnetic head block on the projector, ensuring that the film path is correctly centred on the head and that the head is prescisely perpendicular to the film path. Adjust the zenith of the head so that the film wrap is even on either side of the head gap position.

2. Install the audio cables from the head to the magnetic pre-amp. Use a separate two conductor shielded cable such as Belden 8451 for each track (Single conductor shielded cable is definitely not recommended). Alternatively, use multi-core cable with individual shields around each pair of conductors. Do not use multi-conductor cable with a single shield as crosstalk between channels may occur. Connect the lines to one of the terminal blocks marked **Magnetic Preamp Inputs** at the rear of the processor.

3. Ensure that correct phase is maintained for connections between the head and the processor for all channels. 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 on the processor.

4. Clean the heads thoroughly with alcohol or tape head cleaner. If the film guide rollers either side of the magnetic head are worn, replace them. Excessive side to side weave of the film will cause deterioration of the sound quality.

MAGNETIC HEAD AND ALIGNMENT

1. Connect one probe of a dual channel oscilloscope to the Track 1 A-type noise reduction card test point and connect the probe for the other channel to the Track 6 A-type noise reduction card test point.

2. Run a magnetic Dolby tone test film and adjust the gain of the pre-amplifiers for all Tracks so that the two green LEDs on each A-Type Nr card are evenly illuminated.

3. Observe the phase correlation between the Track 1 and Track 6 waveforms on the oscilloscope. If the two waveforms are not exactly in phase, it may be necessary to apply shims under one side of the head block to correct this.

4. With the oscilloscope still connected as above, connect a real time analyser to the Track 1 A-type noise reduction card test point and run a magnetic pink noise test film.

5. Switch the scope to X/Y mode and adjust the gain and timebase to obtain the display shown in Figure 6.

6. If there is a significant amount of area within the elipse, it may be necessary to add further shims under the head on one side.

FREQUENCY RESPONSE CORRECTION (EQUALISATION)

7. Adjust the RTA to obtain a reading similar to Figure 7.

8. Remove the magnetic pre-amplifier card, insert an extender card into it's slot and insert the preamplifier card into the extender card.

9. Turn the HF controls for all tracks fully anticlockwise.

10. Adjust the LF and MF controls for Track 1 to obtain the flattest response on the RTA. Turn the Track 1 HF control clockwise to achieve the flattest response in the exteme high frequency region on the analyser. It should be possible to attain a flat frequency response up to a limit that is governed by the size of the head gap. Above this limit the response will have a rapid roll-off. Adjust the Track 1 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 the head (or the test film) is very worn, it should be possible to achieve a response which is flat to 16 - 20kHz.

11. Move the RTA connection to the test point on the A-Type NR card for next track and repeat step 10 for all 6 tracks.

DOLBY LEVEL ALIGNMENT

12. Run the magnetic Dolby tone test film and fine tune the pre-amplifier gain controls for all channels 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

DOLBY LEVEL METERS

The two meters on the CM423 Noise Reduction cards each 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.

LE / RE CHANNEL CONFIGURATION

The Le and Re channels were originally intended for reproduction through mid-left and mid-right stage speakers. For films mixed using the original TODD-AO process the Le and Re channels are full range channels of equal bandwitdth and power to the Left, Centre and Right channels. The Le and Re channels frequently included panned dialogue, so it is important for the Le and Re speaker s and amplifiers to be identical to those for the Left, Centre and Right channels for the successful replay of TODD-AO films.

However, if separate Le and Re spaker channels are not available or would be too difficult or too expensive to install, the Le information can be reproduced as a phantom image between the Left and Centre stage speakers and Re information as a phontom image between the Right and Centre stage speakers. To facilitate this, the CSP4600 has jumpers on the CM466 card which allow this mode of operation, by mixing the Le and Re channels in the correct proportions into the Left, Centre and Right stage channels.

SETTING UP FOR PHANTOM LE AND RE CHANNELS

To set up the CSP4600 processor for phantom Le / Re channels, remove the CM466 Logic/Audio Control Card and locate the two jumpers in mid-left region of the board. The jumpers are marked **Le MIX** and **Re MIX**. With the jumpers in the default lower position, the system is set up for normal separate Le and Re stage speakers (NO MIX). If both jumpers are moved to the upper position, the unequalised Le and Re channels are mixed into the Left, Centre and Right channels. In this mode, the Le and Re processor outputs are still carry the equalised Le and Re signals.

VOLUME CONTROL OF LE AND RE CHANNELS.

For installations with separate Le and Re speakers, it is desirable to mute the Le and Re channels whenever they are not required, such as when playing Dolby Format 42 and 43 films. Furthermore, since the Le and Re channels cannot be routed through the sound processor, they are not affected by the sound processor's volume control. So for TODD-AO films it is necessary to control the volume of the Le and Re channels so they track that of the Left, Centre and Right channels.

To acheive these goals, the CSP4600 must be connected to the sound processor using the RS232 or RS485 serial connection in order for the CSP4600 to "know" the format and volume conditions of the sound processor at all times. The serial connection provides the CSP4600 with information regarding to the current format, volume and (in the case of the CSP1200 only) the selected projector.

Whenever MAG (CSP1200) or 70mm (CP500) is selected, the Le and Re channels are enabled and the volume level set to match that of the other channels.

If the Le and Re channels are set up as phantom channels, or are not used at all, AND there is no second projector, the serial connection is not required

LE AND RE CHANNEL EQUALISATION

1. Select **TODD-AO** on the CSP4600 processor. Select **MAG** on the CSP1200 (or **70mm** on the CP500) sound processor and set the fader to **7.0**

2. Remove the Track 1 & 2 CM423 A-type Noise Reduction Card (the leftmost CM423 Card) and insert the CM218 Pink Noise Card in it's place. Select Right channel on the pink noise card.

3. Remove the Le Equaliser Card and install the Extender Card and cable in it's slot. Connect the Le Equaliser Card to the Extender Cable.

4. Adjust the Le channel gain using the upper trimpot on the CM466 Control Card for an SPL of approximately 85dB. Adjust the Le channel equalisation as you would for the other stage channels and then fine set the SPL to **82dB**.

5. Remove the Extender Card and replace the Le Equaliser Card.

6. Remove the Re Equaliser Card and install the Extender Card and cable in it's slot. Connect the Re Equaliser Card to the Extender Cable.

7. Remove the CM218 Pink Noise Card and replace the Track 1 & 2 CM423 A-type Noise Reduction Card.

8. Remove the Track 3 & 4 CM423 A-type Noise Reduction Card (the middle CM423 Card) and insert the CM218 Pink Noise Card in it's place. Select Right channel on the pink noise card.

9. Adjust the Re channel gain using the lower trimpot on the CM466 Control Card for an SPL of approximately 85dB. Adjust the Re channel equalisation as you would for the other stage channels and then fine set the SPL to **82dB**.

10. Remove the Extender Card and replace the Re Equaliser Card.

11. Remove the CM218 Pink Noise Card and replace the Track 3 & 4 CM423 A-type Noise Reduction Card.

35mm SURROUND CHANNEL WITH 12kHz PILOT TONE

The CSP4600 includes circuitry to replay 35mm magnetic films that use a 12kHz pilot tone to switch the surround channel on and off. Such films use a low level 12khz tone superimposed on the surround channel to indicate to the sound processor that the surround channel should be switched on. The processor must filter out the 12kHz tone before sending the surround information to the surround speakers so the 12kHz signal will not be audible to the audience.

When such films are played through a CSP4600, the surround channel is passed through a two-pole State Variable filter which produces a 12kHz band pass output (which is used to detect the presence of the 12kHz tone) and a 12kHz band reject (notch) output (which is the signal that is sent to the surround speakers). The bandpass output is sent to the main system microprocessor which detects with a high degree of accuracy the presence of any tone within +/-10% of 12kHz. The band reject (notch) filter reduces the level of a 12kHz tone by about 45dB which in many cases may sufficient to make the tone completely inadubile, particularly if the projector is running at the correct speed. However an additional 24dB per octave 8kHz low pass filter is included which reduces the level of a 12kHz tone by a further 15dB to about –60dB. As the level of the tone on films is typically recorded at about -15 db, the final level after filtering is about –75dB. In a worse case situation where the tone is 8% off frequecy due to the projector running two frames too fast or slow, the level of the tone will still be 45dB down. The 8kHz filter may be optionally bypassed if the notch filter provides sufficient rejection on it's own (See "Bypassing the 8kHz Filter" below).

Bypassing the 8kHz Filter

A Filter Bypass jumper is provided on the CM466 Logic/Audio Control Card. The jumper is located in the upper right quarter of the board and is marked “8KHZ FILTER”. Moving the jumper from the default left “IN” position to the right “OUT” position will bypass the filter