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

Dolby® *Information*

Cat. No. 683 Electronic Crossover

Description and Features

The Cat. No. 683 Electronic Crossover Board is designed for use in the CP500 Digital Cinema Processor. When installed in a CP500, it provides the following features:

- Electronic crossover filters for three bi-amplified channels (L, C, R) are configured to create a 4 pole Linkwitz-Reilly crossover, taking into account common loudspeaker characteristics. The crossover frequencies are programmable by means of 16 pin DIP headers containing resistors. Standard factory values are presently 500 and 800 Hz, designed to accommodate most popular cinema loudspeakers. Other frequencies can be programmed by user-made headers.

- Woofer time delays to ensure correct time alignment of woofer and HF horn signals. The time delay value is programmable by means of 18 pin DIP headers containing resistors. Standard factory values are presently 1.9 ms and 0.8 ms, designed to accommodate most popular cinema loudspeakers. Other delays can be programmed by user-made headers.

- Low-pass filters for use with two (Ls, Rs) surround bass bins. Two pole filters are provided, programmable with a 16 pin DIP header. As delivered, this is the same header furnished on the Cat. No. 682 and is reversible to accommodate either 50 or 100 Hz Butterworth filter characteristics. These filters plus the high-pass filters on the Cat. No. 682 provide the ability to bi-amp the surround channels in order to improve the bass response and the power handling capabilities of these channels.

- A secondary crossover system with manual adjustments for use when in Bypass.

- All adjustments necessary to permit correct alignment and equalization of a complete bi-amplified system.

Installation

Remove Cat. No. 682 from the CP500 and move jumpers **J901, J3, J4, J5** to the "**yes**" position to enable the crossover features of the Cat. No. 683.

The Cat. No. 683 is installed in the left-most slot in the CP500 after jumpers and headers are configured. When the Cat. No. 683 is installed in a CP500, the **MAIN** screen channel connector on the rear panel becomes the **LF** output connector. The HF horn outputs are available at the additional rear panel connector, **XOVER OUT**, located to the right of the main output connector. The Left and Right Surround bass speaker outputs are also available at this connector. An ID pin on the card automatically tells the Cat. No. 684 System Controller card that a crossover card is present.

Issue 1
Part No. 91442

Alignment

Screen Channels

Jumpers J100, J200, and J300 allow the low frequency portion of the designated channels to be delayed by 1.9 ms or 0.8 ms when the jumper is placed in the “DELAY” position. This compensates for the time offset caused by high frequency drivers being behind the woofers in contemporary stage speakers. With the jumper in the "DELAY" position, sound produced by the low frequency speakers is delayed to cause the low and high frequency energy to reach the listener at the same time. There is no low frequency delay when the jumper is set to “NO DELAY”. The factory setting is “DELAY”.

Board locations RN102, RN202, RN302, and RN600 select the desired crossover frequency and locations RN101, RN201, and RN301 select the time delay. For large horns, the correct setting is usually 500 Hz and 1.9 ms. For small horns, 800 Hz and 0.8 ms is usually correct. Check the loudspeaker manufacturer’s specifications for details. Be sure to use the same Bypass crossover frequency setting header as the screen channels use. Carefully install the correct headers in the appropriate socket locations being sure to orient the header correctly.

Set all power amplifier gain pots to the maximum. Carefully ensure that only HF outputs are routed to the HF horns to avoid damage from excessive low frequency excursion of HF horn diaphragms.

Place microphones in the auditorium and connect the mikes and multiplexer (if available) to the CP500.

Set the fader to 0. Enter the CP500 B-chain EQ screen and select Left channel. Gradually turn up the fader by moving the pointer to the fader slider on the EQ screen. Verify by ear or spectrum analyzer or both that the woofer and HF horn are each producing their appropriate halves of the spectrum.

Turn the fader up until a satisfactory level is achieved in the auditorium. Set all EQ controls to flat. Using the Left trimpot on the edge of the CN683, adjust the relative HF horn output level so that the woofer and HF horn output levels match in the octaves just above and just below the crossover frequency. For example, if the crossover frequency is set to 500 Hz, then the level from 250-500 Hz should match that from 500-1,000 Hz.

Now equalize the room in the usual fashion, adjusting treble and bass controls first and 1/3 octave controls next. The output level is set in exactly the same manner as in a non-biamplifed system.

Set up and equalize the Right and Center channels in the same manner.

Surround Channel Bass Drivers

Both the Cat. No. 682 Output card and the Cat. No. 683 have reversible filter headers labeled 50/100 Hz for the surround channels. Ensure that the headers on both cards are set to the same frequency, chosen to suit the low frequency handling capability of the surround speakers in use. If you have separate surround bass drivers, it is probably best to set both headers to 100 Hz in order to improve the low frequency power handling ability of the surround channel.

Enter the B-chain EQ screen and select Left Surround. Set the EQ to flat. Adjust the Ls trimpot on the Cat. No. 683 so that the level in the room is reasonably equal in the 40-100 Hz and 100-200 Hz regions on average. Now adjust the EQ controls as usual.

Bypass Crossover Subsystem

In a bi-amplified system, the bypass subsystem must have its own electronic crossover as well, to avoid damage to the HF horns from low frequency signals. This channel is set up differently than the normal screen channels in the following ways:

- Set up is accomplished with trimpots
- A trimpot on the **Cat. No. 683** now governs the **overall** Bypass Output Level
- The trimpot on the **Cat. No. 682** formerly used to set the Bypass Output Level now governs the bypass **woofer output level (or "balance")** relative to the overall setting above.

In order to perform these adjustments, select the A-chain alignment screen (Menu/Alignment/A-chain alignment/Manual EQ). Turn the fader to select the EQ mic and press OK. This displays the real-time analyzer screen connected to the multiplexer (optional) and microphone(s) in the auditorium.

Play a loop of Cat. No. 69 pink noise test film. Press the Bypass switch (S8. lower right corner) to select bypass mode. Now set the **LF balance pot on the Cat. No. 682** for equal average levels in the octaves just below and just above the crossover frequency (usually 500 Hz).

Next, adjust the **bypass level pot (now on the Cat. No. 683)** by playing a typical reel of film and adjusting the pot to a suitable level. Note that the pink noise signal on the Cat. No. 69 test film is not at Dolby level, but approximately 15 dB below it. Therefore a preliminary setting can be achieved by setting the SPL to 70 dB while playing Cat. No. 69 pink noise. This is an approximate adjustment and must be confirmed with actual film program material to ensure that bypass works correctly should it be needed.

Bear in mind that when the unit first switches into Bypass mode, (when power is first applied, for example) the fader level in Bypass will be set to 7. When in Bypass mode, the fader setting can be adjusted and will be remembered until Bypass power is interrupted. Adjustments made to the fader level while not in Bypass do not affect the setting of the fader for Bypass mode.

Special Applications

The Cat. No. 683 was designed to be very flexible. The factory supplies standard programming headers to suit the usual types of speakers in service. Over time, other headers may become available. Contact your dealer.

It is also possible to make your own headers, using 1% resistors and DIP sockets. The information below describes how to do this. This process should not be undertaken without a complete understanding of your requirements. Consult the speaker manufacturer's information if you are unsure.

Time Delay

The values given in the table are for a 1.9 ms delay. The delay can be set by scaling ALL resistors in the same manner. Larger resistors give longer delays. The delay for a 1.9 ms header is constant within 10% up to about 800 Hz, and this upper frequency will scale with the delay. Shorter delays are constant to higher frequencies.

1.9 ms Header	
DIP Pins	**Resistance**
1-18	44.2K
2-17	1.43K
3-16	499
4-15	44.2K
5-14	1.43K
6-13	499
7-12	44.2K
8-11	1.43K
9-10	499

Example: Suppose you wish to create a 1.2 ms time delay. Multiply each resistor value above by 1.2/1.9. The table shows the resulting values rounded to the nearest standard 1% resistor value.

1.2 ms Header	
DIP Pins	**Resistance**
1-18	28.0K
2-17	909
3-16	316
4-15	28.0K
5-14	909
6-13	316
7-12	27.4K
8-11	909
9-10	316

Crossover Frequency

The values given in the table are for a 500 Hz crossover frequency. The frequency can be set by scaling ALL resistors in the same manner. Larger resistors give lower frequencies.

500 Hz header	
Pins	**Resistance**
1-16	10.0K
2-15	10.0K
3-14	6.98K
4-13	13.0K
5-12	8.45K
6-11	8.45K
7-10	16.9K
8-9	none

Example: Suppose you wish to create a 630 Hz crossover frequency. Multiply each resistor value above by 500/630. The table shows the resulting values rounded to the nearest standard 1% resistor value.

630 Hz header	
Pins	**Resistance**
1-16	7.87K
2-15	7.87K
3-14	5.49K
4-13	10.2K
5-12	6.65K
6-11	6.65K
7-10	13.3K
8-9	none

Headers Available

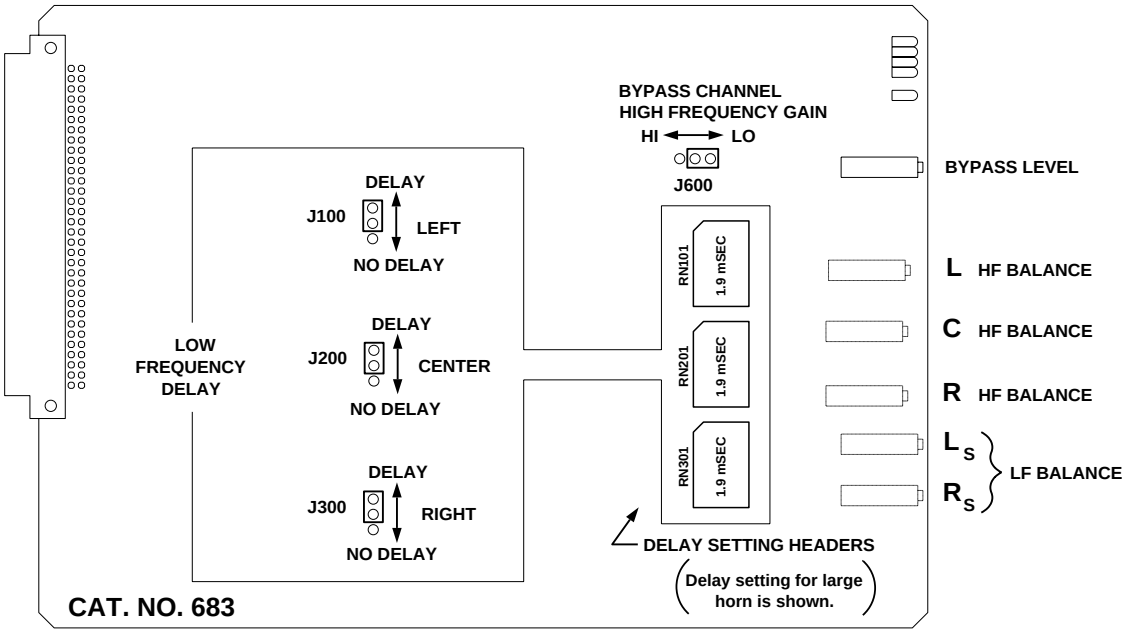
Factory-made headers currently shipped with the product are:

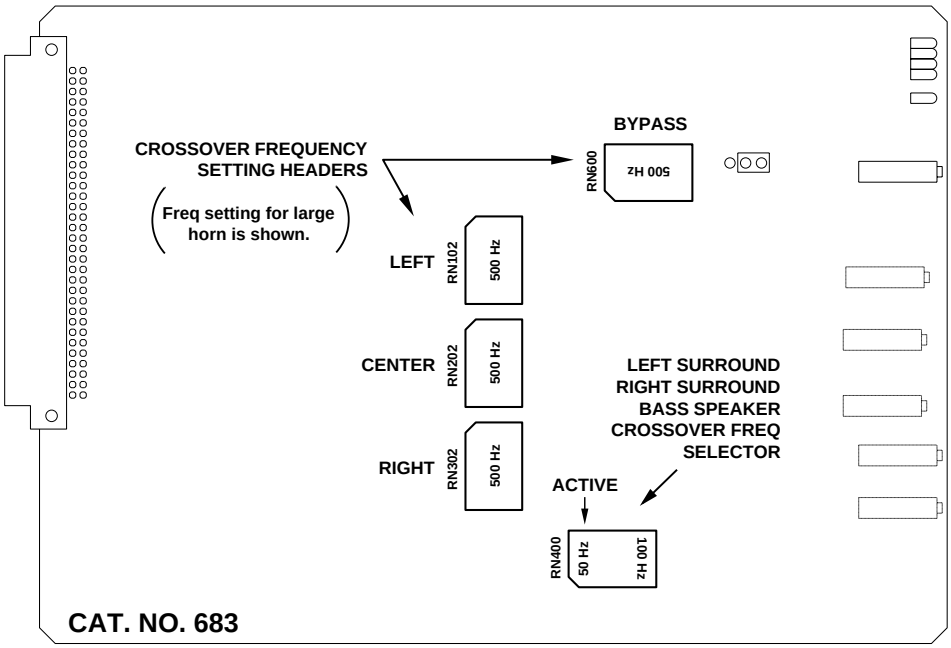
Channel	Function	Dolby Part no.
LCR and Bypass	500 Hz Crossover	74114
LCR and Bypass	800 Hz Crossover	74117
LCR	1.9 ms LF Delay	74115
LCR	0.8 ms LF Delay	74116

The Ls and Rs crossover frequency setting header is available only as the 50/100 Hz reversible header shipped with the product.

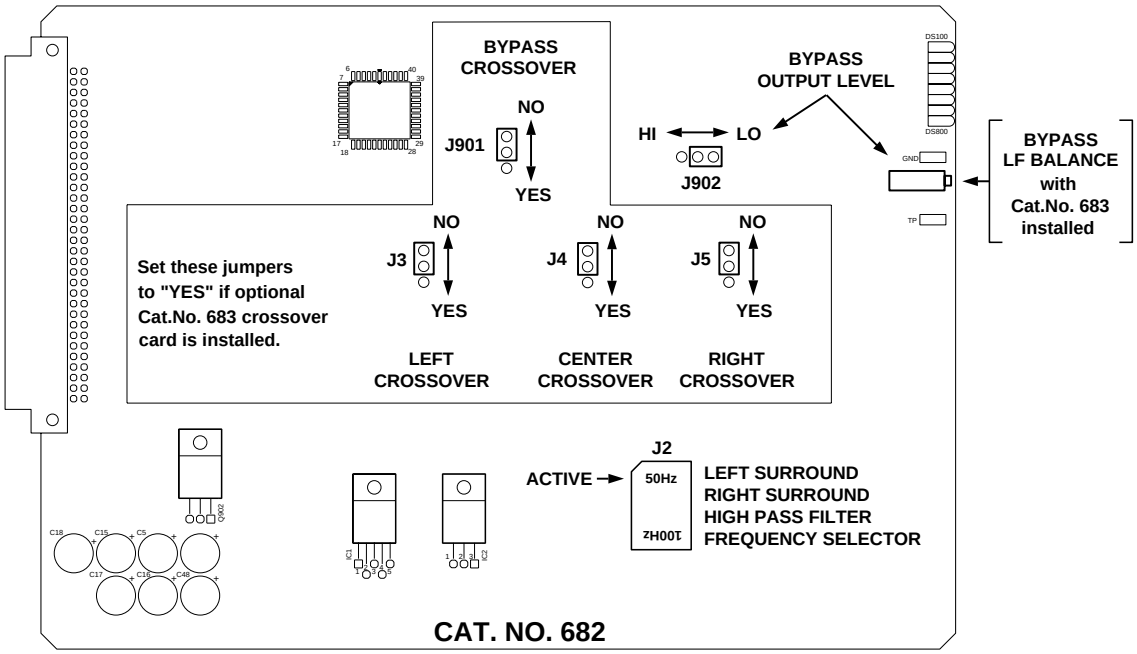
Jumpers and Headers

Cat. No. 683





Cat. No. 682



Crossover Select Jumpers [NO]

J3 **Left Channel**

J4 **Center Channel**

J5 **Right Channel**

J901 **Bypass Audio Channel**

These jumpers route the designated signals through an optional Cat. No. 683 crossover card. If the Cat. No. 683 card is installed, these jumpers should be set to the "YES" position. If the optional Cat. No. 683 is not present, these jumper should be set to the "NO" position. The jumpers are set to the "NO" position at the factory.

NOTE: If bypass audio is routed to the optional Cat. No. 682 crossover card, the bypass portion of the crossover circuitry must be functioning in order to produce a bypass audio output.

J902 **Bypass Channel Output Level Select** [LO]

This jumper, along with the bypass gain adjustment potentiometer (RV901), adjusts the level of the bypass channel. The jumper provides a "coarse" gain setting and the potentiometer provides a "fine" gain adjustment. The "HI" jumper position can be used to produce a higher output level range on the bypass channel. This jumper is factory set to the "LO" position

J2 **L and R Surround High-Pass Filter Frequency Select** [50Hz]

This header sets filter circuits to the indicated high-pass frequency. Signals below this frequency are attenuated in order to prevent distortion or damage to surround speakers that are unable to handle extreme low frequency energy.

NOTE: The function of the Bypass Output Level control changes to Bypass Low Frequency Balance Control if a Cat No. 683 Crossover Card is installed.