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# DRIVE-IN THEATER VERSION

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## Installation and Service Manual

### ***MOD IIB*** **Cinema Stereo Processor**

Includes MOD IIB/FS, MOD IIB-LRS  
and MOD IIB-DIT Models



# SMART

**THEATRE SYSTEMS**

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## INSTALLATION AND SERVICE MANUAL

# SMART

## MOD IIB OPTICAL STEREO CINEMA PROCESSOR

### INTRODUCTION

The MOD IIB Cinema Stereo Processor is a full featured sound control center which delivers the finest in audio quality for your theatre. The advanced designs and features of the MOD IIB combine to make the heart of your sound system the best it can be. The finest amplifiers, speakers and crossovers can still only reproduce the signal fed into them, so it makes sense to start with a quality sound processor, the MOD IIB.

The MOD IIB can be configured in a variety of ways, from a simple mono system to a full four channel optical stereo with four channel stereo synthesizer. A bass enhancement output for subwoofer is also built in. In addition, other stereo sound signals can be routed directly through the MOD IIB fader, EQ, and output circuitry for total control over the sound operation of your booth. The AUX (Auxiliary) inputs allow you to use either 4-channel magnetic (with an external preamplifier), a digital sound player (combined surrounds), or other audio sources.

Even though we know that there is very little time for reading manuals in the last-minute scramble to open a theatre, we would still like to encourage you to read the sections on INSTALLATION, CALIBRATION, and OPERATION. Then, if you have questions or difficulties, you will know the right questions to ask when you call one of our technicians.

Wiring to the MOD IIB is very straightforward and should not cause any problems. If you have a MOD IIB in one of our pre-wired racks, it is even simpler: you only need to connect your solar cell(s) to the projector input(s), connect your music source for intermission music, and connect power, speakers, and any required logic wiring for changeover and program selection.

### EMERGENCY SOUND BACKUP POWER SUPPLY

A backup power supply is included with the MOD IIB to power the backup preamp built into the MOD IIB. This supply is built into the main power supply package and delivers about 15 VDC at 100 mA. The backup capability is a standard feature on the MOD IIB and is not an extra cost option as it is on some other systems.

### SURROUND CHANNEL TIME DELAY

The MOD IIB has a surround channel time delay for optical stereo. The delay range is from 35 mSec to 115 mSec. Time delay of the surround channel is necessary for two reasons in optical stereo: 1) to mask any front-to-surround crosstalk and, 2) to synchronize the stage and surround channels sufficiently to eliminate echo which will occur due to the different sound path lengths from stage and surround speakers.

## FEATURES

Since magnetic soundtracks and digital soundtracks use discrete channels, the time delay for synchronization is applied directly to the surround soundtrack. When the AUXiliary format is selected, the surround time delay is not in the playback chain. There is no need to eliminate front-to-surround crosstalk in these formats since the discrete tracks have very low crosstalk already. In optical stereo, the surround track is encoded into the left and right tracks and cannot be delayed on the soundtrack. Therefore, the processor must provide the delay after the surround track has been extracted from the left and right tracks. The time delay is bypassed when the AUX input is selected.

### STAGE CHANNELS AND SURROUND GENERATORS

The time delay card also contains the surround generator portion of the Stereo Synthesizer. In the 2 channel configuration (Front-surround), the Mono/Backup Card supplies the center signal, and the surround generator module derives the surround signal. In the 4 channel configuration, another card, the optional Front Generator, synthesizes the stage channel signals, and the surround generator module creates the surround signal. If the optional Front Generator card is not installed in a SMART processor configured for 4 channel operation, then the generator format uses the 2 channel generator mode as described above. There is a jumper on the Format Card which selects the generator mode (i.e., 2 or 4 channel). The synthesizer for the stage channels is an optional plug-in card and is not normally supplied with the MOD IIB.

Soundtrack audio sources (i.e. optical stereo, mono, stereo generator) share the system buss through the SMART Buss Switching Scheme. In this scheme, only one source is connected to the buss at a time, and this connection is made through an electronic switch (typically, a TL185 or ADG212A CMOS QUAD SWITCH IC). The logic circuitry in the MOD IIB sends a control signal to activate the source selected by the operator. The MOD IIB logic circuitry provides a control signal to an external source. This signal appears at the AUX ENABLE Terminal on the rear of the MOD IIB card cage. If you wish to connect an external source permanently to the AUX INPUTS, the SMART Buss Switching Scheme must be employed in the *external source* device to prevent buss loading when modes other than AUX are selected. Please contact the factory for details on implementing a buss switching arrangement for your auxiliary source.

The MOD IIB Auxiliary inputs use the buss switching scheme prevalent in several Smart processors. The AUX inputs go directly to the main signal busses in the MOD IIB. There is no internal switching of these signals. Therefore, the external signal source must have some means of switching its outputs into a high impedance or off condition. Smart peripherals such as our SMP435 Mag Preamp have this capability built in. Also the DTS (Digital Theatre Systems) digital player will disconnect its outputs when no digital code is being read on the film.

There is a terminal on the back of the MOD IIB marked AUX ENABLE which goes high (approx. 15 VDC) when AUX format is selected. It is low when any other format is selected. This control signal can be used to feed the logic circuits in another piece of equipment in order to control the output state (On or Off/High Impedance). When this is utilized properly, there will be no chance of signals from the AUX inputs mixing with other formats.

*Remember, unless the audio source signal is disconnected at the AUX inputs, you will hear the sound from this source when other formats are being played.*

### MUSIC INPUTS

The MOD IIB is designed to handle both stereo and mono music sources. There are left and right inputs which are designed to match the levels from most typical tape players, CD players, or cartridge players. The music processing circuitry contains a simple matrix which derives 4 channels of sound from a standard stereo music source.

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## SOLAR CELL INPUTS

The MOD IIB has stereo solar cell inputs with electronic changeover for two projectors. Each pair of stereo cell inputs is a quasi-balanced circuit which helps to reduce any interference pickup on the solar cell leads. Changeover is accomplished electronically by a MAINTAINING ground on the CHNG-OVER terminal to activate projector two. Releasing the ground will revert to projector one operation.

## MAIN OUTPUTS

The MOD IIB has five output channels: LEFT, CENTER, RIGHT, SURROUND, and SUB(bass). The SUB outputs are balanced with SUB+ and SUB- terminals available. This allows a standard dual channel amplifier to be used in mono bridged mode for high power into a subwoofer speaker. The subbass output may also be operated in an unbalanced configuration by connecting to either the SUB+ or SUB- terminal and ground.

## MODULAR CIRCUITRY

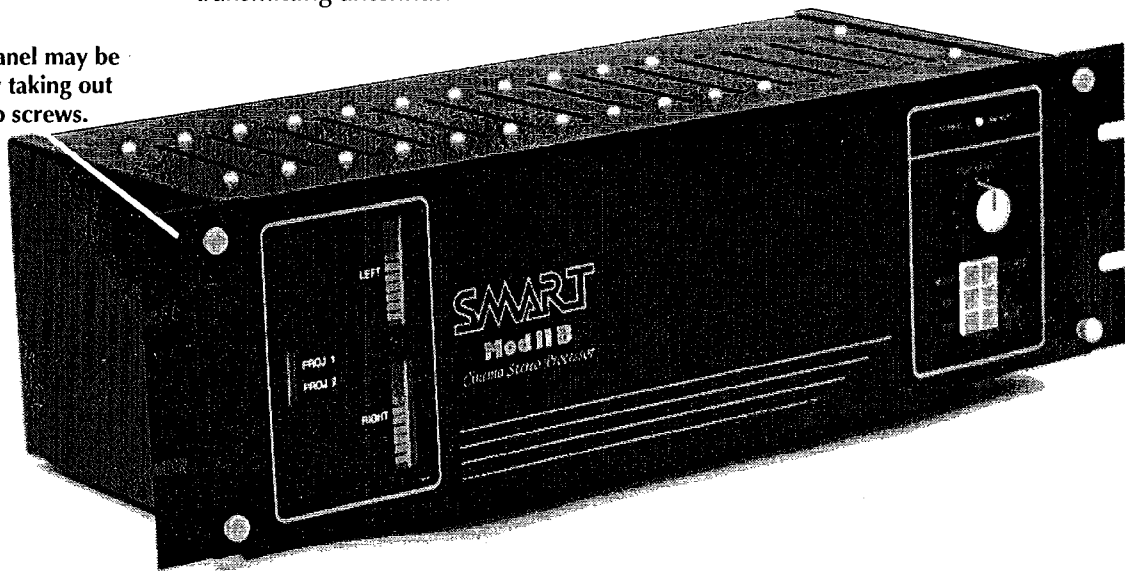
All circuitry in the MOD IIB is on individual plug-in cards. Each card has its own voltage regulators that stabilize the circuits locally as well as filter unwanted signals that may be on the main power busses. This feature contributes greatly to the excellent sound quality of the SMART MOD IIB.

Test points are included on some cards for the sound engineer to access vital circuit points with his scope meter. These terminals will accept a meter probe or "alligator" clip.

## PREAMP CARD

The Stereo-optical preamplifiers on this card increase the incoming level from the stereo solar cells. There are four identical preamps on the card. Electronic changeover between stereo pairs is built into the card to be used in dual projector booths. RF interference protection is built in to reduce the risks of noise when used in the vicinity of radio or TV transmitting antennas.

The front panel may be removed by taking out the 4 thumb screws.



The MOD IIB circuitry is entirely enclosed in steel with no open backboard.

## MONO CARD

The MONO Card provides the necessary frequency response shaping and level shifting to provide a quality mono signal from mono prints. In addition, a special open ended noise reduction circuit called Dynamic Noise Reduction is used to eliminate much of the "hiss" type noise present on film. This card also provides the necessary drive signal for the stereo synthesizer portions of the MOD IIB.

## **MOD II B Stereo Processor**

### **METER CARD**

LED arrays are used to monitor the levels of various points in the circuitry. These are used during calibration for setting the preamp levels and also during normal operation for monitoring other levels.

### **NOISE REDUCTION CARDS**

The ComboCat 350 cards provide noise reduction for decoding Dolby® type A stereo prints and SR encoded prints. These cards are supplied with the MOD IIB without extra charge. The noise reduction circuitry is automatically switched to the proper mode when selected by the format switch on the front of the processor. SR and Type "A" format can also be selected remotely by pulsing the automation format pins on the rear of the MOD IIB. There are 4 trimpots and 2 test points on each NR card. These are for *factory use only*. Do not attempt to adjust these trimpots or use the test points. One ComboCat SR/A noise reduction card is installed in the MOD IIB when the system is configured for 2-channel Front-Surround operation. The card is located in the *Left* NR card slot. Two ComboCat cards are installed when the system is set up for 4-channel operation.

### **MATRIX CARD**

This is the heart of the stereo conversion process. The Wide Trac Deluxe Matrix card takes the signals from the preamp and the noise reduction circuits and converts the 2 channel soundtrack into the four channels required for normal stereo mode. In the 2-channel Front-Surround version of the MOD IIB a simple matrix is used to process the soundtrack into a 2 channel (front/surround) mode for less expensive installations.

### **EQUALIZER CARDS**

There are two dual equalizer cards in the MOD IIB. These are used to tune the speaker/room frequency response to the established standard for cinemas. The circuitry is combining type for smooth response curves and superior audio quality. The card in Slot 7 is for both the Center channel and Surround channel. The card in Slot 8 is for the Left channel and Right Channel.

Each card has two equalizers on the PC card. Each equalizer section has 8 one octave wide bands centered at 60 Hz, 125 Hz, 250 Hz, 500 Hz, 1 kHz, 2 kHz, 4 kHz, and 8 kHz. In addition, there is 24 kHz low pass filter which removes high frequency out-of-band noise from the MOD IIB. All bands are boost and cut with a range of  $\pm 12$  dB. The trimpots are of the "single turn" type. When the pot is in the center of its range, the filter is flat (no boost or cut).

### **TIME DELAY/SURROUND GENERATOR CARD**

The time delay circuitry for the surround channel is a premium dual Bucket Brigade Device circuit with special companding circuitry to increase the dynamic range. It is a quiet and low distortion circuit which contributes to the sound quality of the MOD IIB.

The Surround Generator circuitry is part of this card and is used in the Generator format to provide a synthesized surround channel from mono film sources.

### **OUTPUT CARD**

All main outputs (including subwoofer) come from this card. The music input circuitry is also on this card, along with a special music matrix to generate a four channel, non-sync sound from a standard two channel music tape player or CD player.

### **FORMAT CARD**

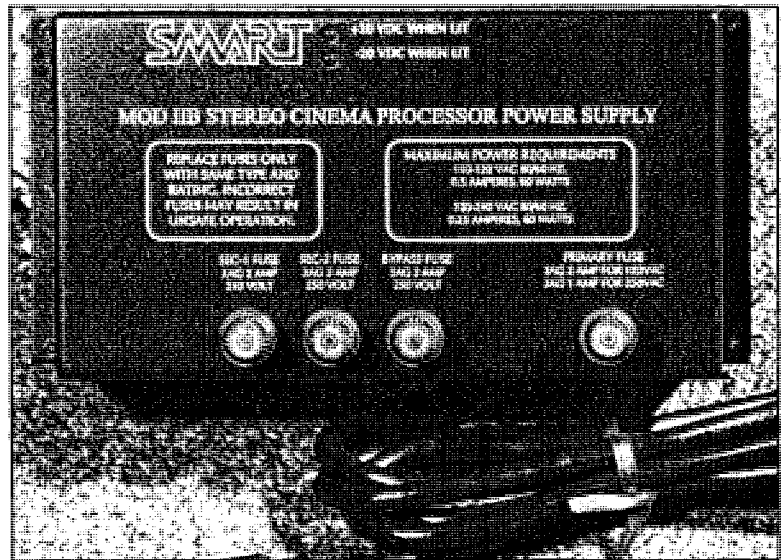
Format selection, both manual and through automation, is controlled by this card. Electrical power to the rest of the cards is also distributed through this card. The switch for

# Installation Manual

BACKUP operation is included along with the manual pushbuttons, music trimpot, and remote/local volume control (Master Fader) switching.

## POWER SUPPLY

Place the power supply in a convenient position in the equipment rack away from major heat producing components and high gain audio circuits. A good place is usually on the floor of the equipment rack. The power supply chassis is shipped with a cover on the back. This cover can be removed for mounting the power supply to the rack. If the power supply will be just sitting on the floor of the rack, then leave the cover in place. When the cover is removed, the chassis flanges are exposed. these flanges have 4-40 press nuts installed (2 on each flange) which can be used for mounting to a surface of the rack. Use the holes in the cover as a template to mark for drilling the rack. Drill four 1/8" holes and mount the supply with the 4-40 screws that held the cover.



**All fuses are removable from the front of the supply.**

The SMA300 power supply is a dual voltage range unit and can be easily changed in the field. The low range is for 110-120 Volts AC, 50/60 Hz. The high range is for 220-240 Volts AC, 50/60 Hz. The units are shipped for 110-120 Volts operation and **MUST BE CHANGED BEFORE** connecting to a 220-240 Volts mains supply. To change the voltage, remove the power supply cover and locate the two transformer leads that have the FASTON style connectors. These leads will be color coded VIOLET and GRAY. Disconnect them from the terminals marked 115V and move them to the terminals marked 230V. These terminals are marked on the board with the same colors as the wires. Be sure the connectors are firmly seated. Replace the cover (or mount the unit to the rack as described above). This completes the voltage conversion.

The power supply AC cord comes with a standard USA style plug. If this does not match your local power connecting scheme, then cut off the plug and replace it with the correct type. The color code follows:

*AC HOT = BROWN*  
*AC NEUTRAL = BLUE*  
*AC GROUND = GREEN/YELLOW*

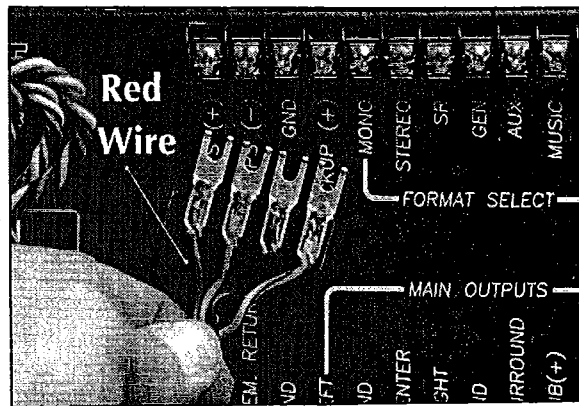
16 AWG color coded wire comes from the the supply and should be run along the left side of the cabinet to the MOD IIB card cage. Dress the wires for appearance and craftsmanship. The wires are terminated in a fanning strip which mates with the appropriate terminals of the MOD IIB main unit. Check your work to assure that the polarity is correct on the leads

## MOD II B Stereo Processor

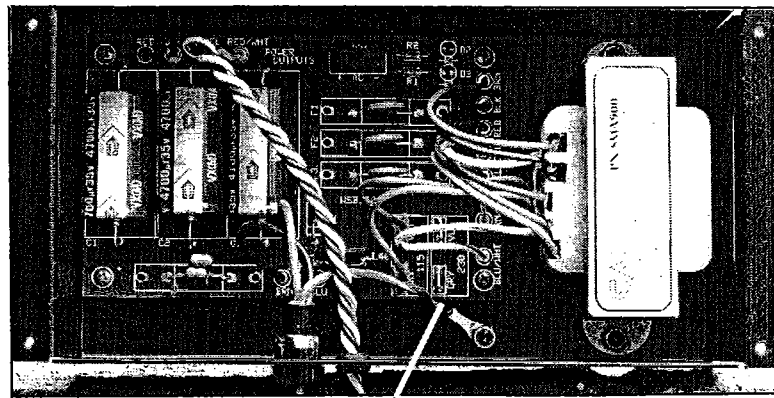
from the supply to the processor. A wire that is reversed could be very destructive to the system.

The color code follows:

RED = +20 VDC  
YELLOW = -20 VDC  
BLACK = Ground  
RED/WHITE = Backup DC



**If you do not hook the red wire to the (+) terminal you can destroy the cards in the MOD IIB!**



**The Power Supply line input voltage may be changed by moving the color coded FASTON connectors to their proper terminals.**

### PROCESSOR

The processor should be mounted in a suitable location away from intense magnetic fields or high current AC circuits. This unit is well shielded from normal amounts of magnetically and electrically induced noise due to its all steel construction. The MOD IIB should operate normally in temperatures up to about 90 degrees F. ambient room temperature.

### WIRE TYPE

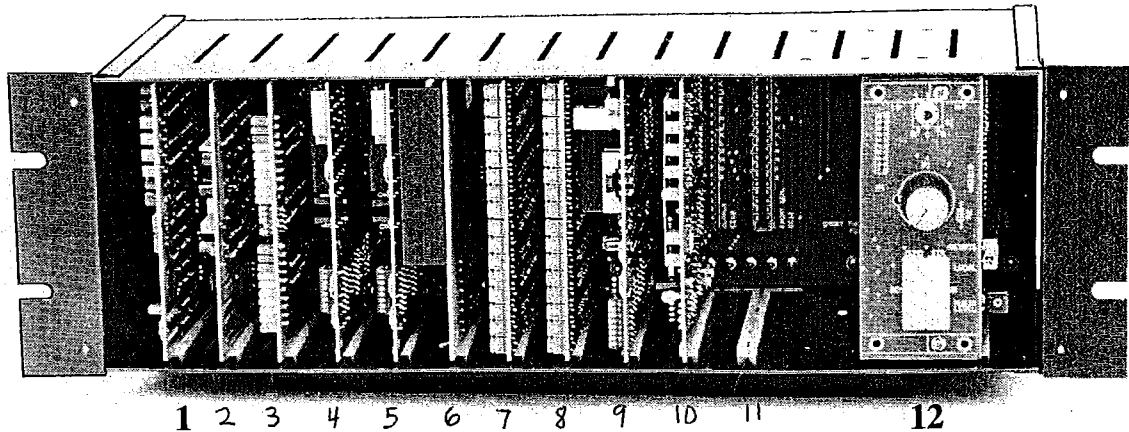
All logic wiring can be done with unshielded wire pairs, but for the best immunity against induced noise and consequent false triggering of logic functions, it is best to use shielded pair cabling. In this case, the shield will be connected to ground at the MOD IIB input end ONLY and will be cut off at the automation end.

### CHNG-OVER TERMINAL

A relay closure in the automation equipment will execute a changeover by grounding the CHNG-OVER terminal. Run a pair of wires to the "dry" contacts of the automation changeover relay. Connect one of the wires at the other end of the pair to the projector CHNG-OVER terminal of the processor. Ground the other wire of the pair to the nearest ground terminal. When the automation relay contacts close, the projector #2 preamps will be "enabled," and the first pair of stereo preamplifiers (PROJ 1) will be "disabled." Releasing the relay will cause the reverse action to occur. In other words, PROJ 1 is always ON until the CHNG-OVER terminal is grounded.



## CARD PLACEMENT



## CARD DESCRIPTION

- |   |                                     |
|---|-------------------------------------|
| 1 - Dual Projector Stereo Preamplifiers         | 7 - Center & Surround Channels EQ   |
| 2 - Mono/Emergency Backup Card                  | 8 - Left & Right Channel Equalizer  |
| 3 - Dual LED Meter Card                         | 9 - Surround Time Delay/Synthesizer |
| 4 - SR/A Noise Reduction card                   | 10 - Output Card                    |
| 5 - SR/A Noise Reduction card (4channel system) | 11 - Front Stage Synthesizer Option |
| 6 - Stereo Matrix                               | 12 - Format Selector Logic          |

### FORMAT TERMINALS

Connect to any or all of the format terminals as needed for the desired format changes. You may want to use a multiconductor shielded cable for these connections rather than several 2 conductor shielded wires. A **MOMENTARY** ground on any of these terminals will cause a format change. **Do not use a maintaining ground on these terminals. If you do, the pushbutton override from the front panel will not work.**

### MUTE TERMINAL

A **MAINTAINING** ground on this terminal will mute all channels of the output of the processor. When this terminal is ungrounded, the output returns to normal. This feature is useful in life safety situations where the audio must be killed so that emergency paging can be heard by the patrons.

### WIRE TYPE

ALL audio wiring must be done with 2 conductor shielded cable and should follow good audio wiring practices. The shield should be connected to ground at one end only and will not normally be used as a conductor, but only as a shield. Of the two internal conductors, one will be connected to ground at both ends, and the other will be used for the hot connection. This practice helps to prevent hum and noise problems which can be difficult to trace.

### AUX (Auxiliary) INPUT TERMINALS

The SMART MOD IIB has 4 inputs on the rear barrier strip. The AUX inputs accept any line level (approx. 0.5 volt AC) 4-channel source. The signals pass through the processor volume control, equalizers and output stages.

### MUSIC INPUT TERMINALS

These terminals accept any standard non-sync music source such as a cd player or cassette tape deck. The non-sync music inputs for the MOD IIB feature a special music matrix decoder that separates in-phase and out-of-phase signals on a standard two

# MOD II B Stereo Processor

Use shielded two conductor or single conductor wire to hook up the music source to the MOD IIB. If you use two conductor wire, use one of the wires for hot, one for ground, and connect the shield to ground only at the MOD IIB end. If you use single conductor wire, the shield must be grounded at the MOD IIB and at the music source.

Since many music sources use RCA PHONO PLUG connectors, you may want to obtain a standard RCA type stereo patch cord and cut the plugs off one end to connect to the MOD IIB, and the other end will plug directly into the music source. In this case, the shields must be connected to ground at both ends, and the single conductors are the hot leads which will connect to the MUSIC LEFT and MUSIC RIGHT terminals.

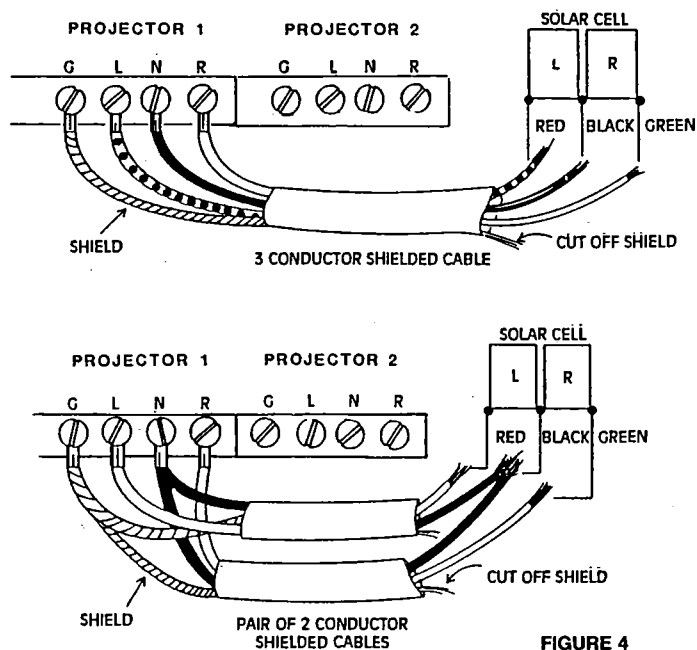
Occasionally, a theatre may use a monaural sound player, such as a background music cartridge player, that does not have stereo capabilities. A jumper on the OUTPUT CARD in the main frame of the MOD IIB may be moved to the mono position for this use. Connect the mono signal to both L & R music inputs. Adjust the L & R music trimpots so that L & R volumes are equal. (You can use your monitor to check the L to R balance.) Music will appear on all stage channel speakers and the surround speakers when mono material is feeding the sound system.

## SOLAR CELL INPUT TERMINALS

The MOD IIB uses a special type of balanced solar cell input circuit, and the wiring to the cell **MUST** be done properly to reap the benefits of this a scheme. Also, the EMERGENCY BACKUP operation is dependent on the correct wiring.

Each projector solar cell input has four terminals, PxLEFT, PxNEUT, PxGND, and PxRIGHT (where x is 1 or 2). The LEFT and RIGHT terminals hook to the left and right cell leads. The NEUT terminal connects to the cell common lead. The GND terminal hooks to the shield of the cable(s) going to the the cell. The shield **MUST** be cut off on the projector end of the cable. It is a good idea to tape the end of the cable at the projector end to prevent any stray pieces of the shield from touching any part of the projector housing.

The cell wiring can be done with a THREE CONDUCTOR SHIELDED cable or two pieces of TWO CONDUCTOR SHIELDED cable. Please refer to the diagram showing these two methods.

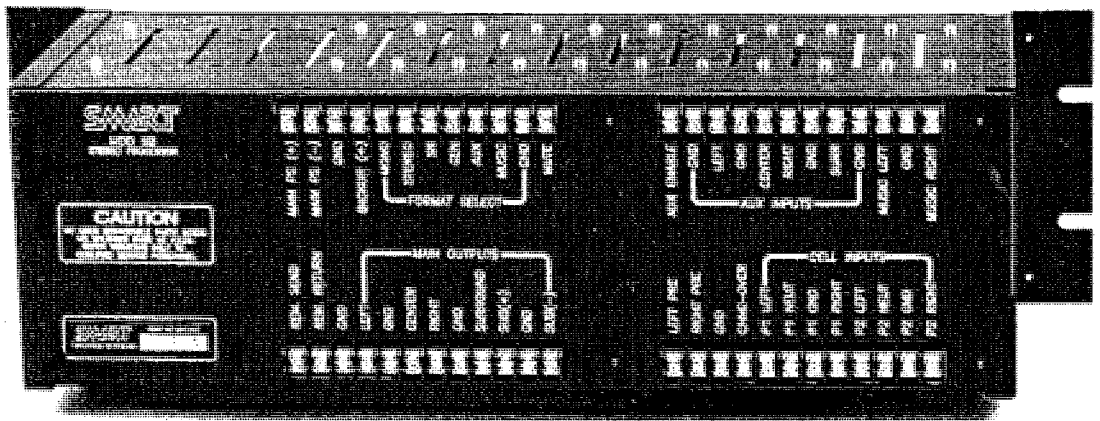


## MAIN OUTPUT TERMINALS

The wiring for the four main outputs is straightforward and should present no problems. Normally, these outputs will feed directly into power amplifiers, although in some cases, they may feed other equipment such as electronic crossover networks.

The SUB(+) and SUB(-) outputs are used to feed a dual channel power amplifier with the subwoofer speaker connected in mono bridged mode. In this mode, the speaker lead are connected to the amplifier's two HOT output terminals (NOT TO GROUND). Each of the SUB outputs will use a 2 conductor shielded cable like the other MAIN outputs. The SUB(+) signal will feed the amplifier's channel one input, and the SUB(-) signal will feed the amplifier's channel two input. The ground conductors of the two cables are grounded at each end like the other MAIN outputs. Shields are grounded at one end only. If the amplifier has volume controls, they should be turned to the same setting, usually all the way up.

If you are using a single amplification channel for the subwoofer, then you only need to connect to the SUB(+) output.



**Fanning strips are available to assist in wiring the MOD IIB**

## MOD IIB SYSTEM CALIBRATION

There are two phases to the system calibration, the "A" chain and the "B" chain. Certain test equipment and test films are required to properly adjust the MOD IIB. Included are such items as the following: oscilloscope, real time analyzer, voltmeter, sound pressure level meter, Dolby CAT# 69 test film, left/right test film, and etc. If you do not have the proper equipment and test films, you will NOT be able to do a CORRECT calibration.

Also, soundhead alignment is one of the most important aspects of setting up a stereo system. If not done exactly right, the entire system will suffer. The MOD IIB is a superior product, but it can only process the signals coming from the soundhead. If the soundhead is delivering a poor signal, then the MOD IIB can do nothing to improve it.

### INITIAL CONDITIONS

NORMAL/BACKUP switch to the NORMAL position.  
FILM LEVEL control turned down.

## INSTALLATION

### B CHAIN

The B chain is generally considered to be the signal path from the master fader to the speakers. B chain calibration consists of setting the equalization and house levels.

Equalization requires the use of a real time analyzer (RTA) and a pink noise source. Most RTA's have a built-in noise source. The pink noise source is connected to each of the AUX input terminals as needed for the four channels. Alternatively, there is a Pink Noise Generator Card available from SMART which will plug into the MOD IIB.

### SETTING PINK NOISE LEVEL

The external pink noise source must first be set to the proper level to feed the AUX inputs. Since pink noise is a randomly varying signal, it is not possible to accurately set the level with a digital type meter. The level of the pink noise source should be set to 1 volt AC with a good analog voltmeter. The meter pointer will not be steady, but it should average around the 1 volt mark.

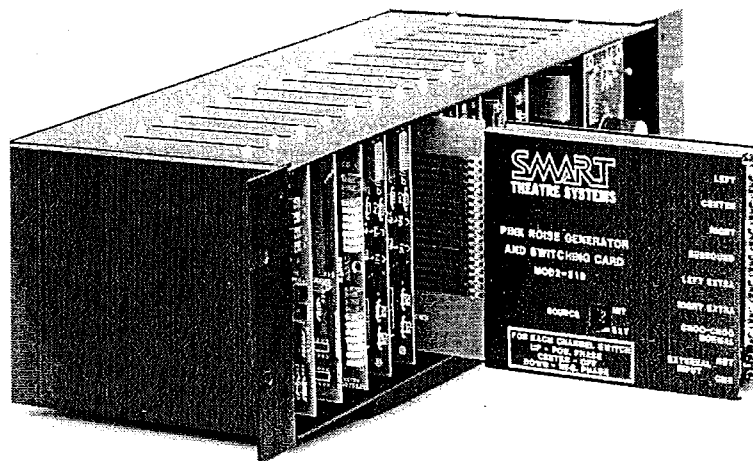
### EQUALIZATION

Select the AUX format by pushing the AUX pushbutton on the front panel. If you are using a subwoofer, turn the subwoofer amplifier OFF at this time. Feed the pink noise to the LEFT AUX input. Turn the front panel FILM LEVEL control up until you get approximately 85 dBc SPL near the rear of the auditorium. You will need a Sound Pressure Level meter for this setup unless your RTA has a built in SPL function.

Using the left EQ trimpots, set the house EQ for the left speaker to the ISO 2969 curve. This specifies a flat response up to 2 kHz, then down 3 dB per octave at the higher frequencies.

Repeat this procedure for each of the other channels. The response of the stage channels should be very similar if the speakers are all the same. It is important that the stage channels sound as much alike as possible so that the sound quality will not change as the various sounds in the film move from one channel to another. It is likely that the surround speakers will not be able to achieve the same response as the stage speakers, but do not attempt to use gross amounts of EQ to make the surround speakers sound similar to the stage speakers.

**In general, do not use too much EQ. You may make a system actually sound worse by over EQ'ing.**



The Pink Noise Card is shown connected to an optional card extender board.

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The SMART MOD2-319 pink noise generator card is a tool designed for Sound Engineers to aid in the adjustment of MOD IIB system levels and house equalization curves. Included are six switches for channel selection (L,C,R,S,LE & RE) {LE and RE not used in the MOD IIB} which can feed a positive phase or negative phase pink noise (or external signal) to each channel of the MOD IIB. Either the internal pink noise generator or an external signal source can be used with this card.

The channel selector switches are three position switches. For each channel, UP is positive phase, MIDDLE is off, and DOWN is negative phase. Set all channel selector switches to the MIDDLE position to begin. Set the Choo-Choo/Normal switch to the Normal position.

Remove the MATRIX card from the Card Cage and plug in the PINK NOISE GENERATOR CARD in its place. Select the Optical Stereo format by pressing the STEREO pushbutton on the front panel. Set the LEFT channel pink noise switch to the up position. Turn the front panel FILM LEVEL control up until you get approximately 85 dBc SPL near the rear of the auditorium. You will need a Sound Pressure Level meter for this setup unless your RTA has a built in SPL function.

Do the EQ as described above using the pink noise switches to turn each channel on and off as needed.

## HOUSE LEVELS

Setting the house levels should only be done after the EQ is finished because the EQ process affects the overall level. This step is important because the house levels must be balanced properly in order for the 4 channel decoding matrix to present the best stereo imaging.

First, set the front panel FILM LEVEL control to the 1 o'clock position. Then, feed the 1 volt AC pink noise source to each AUX input, one at a time. (If you are using the Pink Noise Generator Card, use the switches to turn each channel on and off as needed.) Using the trimpots on the OUTPUT card, set each channel for 85 dBc SPL near the rear of the auditorium.

If you are using a subwoofer, turn the subwoofer amplifier back ON at this time. Feed pink noise to the left channel and observe the low frequency response on the RTA. Adjust the subwoofer trimpot on the output card until the smoothest and most extended low frequency response is obtained. The subwoofer should complement the low frequency response of the stage speakers and not overwhelm them.

## SYSTEM PHASING

If you are using the Pink Noise Generator Card, it is very easy to verify the speaker phasing.

Set the Center channel switch to the UP position and note the OVERALL level reading on the Real Time Analyzer. Leave the Center channel switch ON and set the Left channel switch to the UP position. The OVERALL level reading on the Real Time Analyzer should increase by 3 or 4 dB. If the level decreases instead, set the Left channel switch to the DOWN position, and check for a level increase. If the level increases in this condition, then there is a phase (polarity) reversal on the Left channel relative to the Center channel. The most likely place for this to occur is in the speaker wiring, either at the amplifier or at the speaker. Turn the Left channel switch off (middle position) and repeat the procedure with the other channels (Center channel switch stays on).

Note that in bi-amped systems, you may have only one of the drivers reversed. If the woofer is out of phase, it should be easily seen on the Real Time Analyzer when combining with the Center channel. However, the woofer could be in phase and the HF driver out of phase. This may not be readily apparent on the Real Time Analyzer when combining with the Center channel (due to short wavelengths at the higher frequencies and room acoustics).

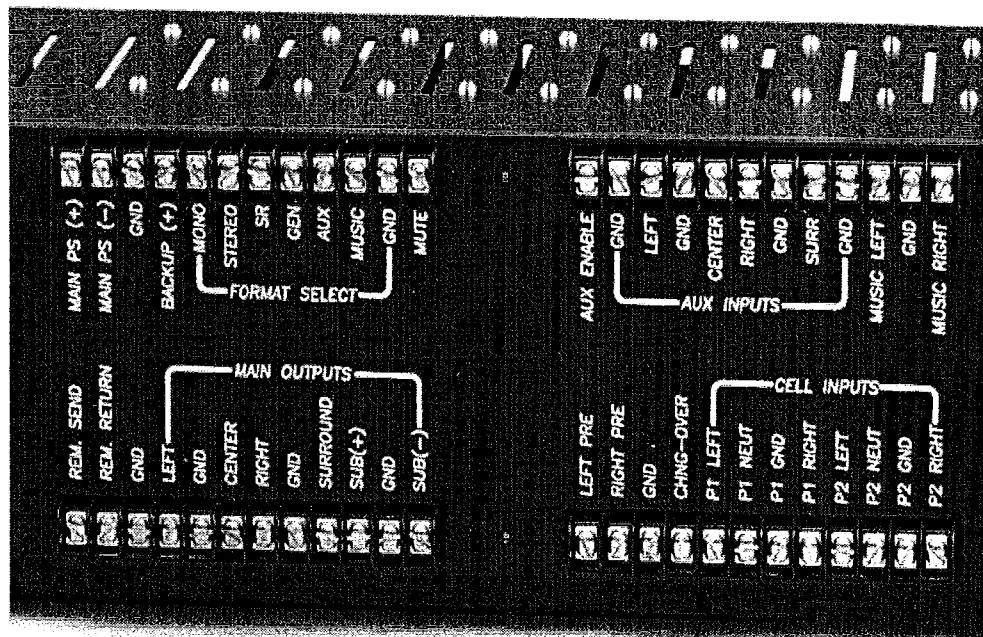
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However, you will probably see response problems at the crossover point when you are attempting the house equalization. You will most likely correct this type of problem then.

### TIME DELAY SETUP

Locate the Time Delay Card. The bottom of this card contains 8 small dip switches. The amount of time delay is adjusted by means of these DIP switches. With all switches set to the right (on) position, the delay is 35 mSec (milliseconds). Each switch set to the left (off) position adds 10 mSec of delay. All switches set to the left position yields 115 mSec of delay. For example, 4 switches to the left (off) =  $35+10+10+10+10 = 75$  milliseconds.

Here is how to figure the amount of delay needed. Find the distance in feet from the screen to the optimum seat (usually about  $2/3$  of the total auditorium distance back from the screen). Find the distance from this seat to the nearest surround speaker and subtract this number from the screen-to-seat distance. Add 20 to this number to get the delay (in milliseconds) required in the auditorium. Set the delay to the closest selectable delay. For example, the screen-to-optimum-seat distance is 52 feet. The closest surround speaker is 20 feet. The difference is 32 feet. Add  $20 + 32$  to obtain 52 milliseconds. Set 2 DIP switches to the left (off) to get 55 milliseconds delay, the nearest available delay setting.



Rear view of the card cage. Each terminal is clearly labeled.

### HINTS AND TIPS

Dress high level AUDIO OUTPUT leads to the left of the rack, along with the power wires, and dress the low level leads to the right of the rack (when viewed from the rear). NEVER TIE WRAP OR BUNDLE HIGH LEVEL AND LOW LEVEL AUDIO WIRES TOGETHER.

Push the PC cards in firmly before turning on the system. It is possible to cause a regulator "latch-up" if only partial connection is made to the card when a card is plugged in with the power already applied.

Recheck the power supply hookup before turning the system on. You could have the positive and negative supplies wired backwards.

## A CHAIN

The A chain is usually considered to be the signal path originating at the solar cell and continuing to the Master Fader. This path includes preamps, filters, noise reduction, matrix decoders, etc.

## PREAMP LEVELS

Set the FILM LEVEL control counter-clockwise to avoid loud noises through the speakers during calibration procedures. Locate the LED meter card and set DIP switches 2 and 5 ON (to the right). All other DIP switches should be off. This causes the top LED array to indicate the left channel preamp level, and the bottom LED array is for the right preamp.

Thread and run a Dolby CAT. #69 Test Film, Dolby tone side.

*Adjust preamp levels as follows:*

Make sure you are changed over to the correct projector by observing the changeover LED's on the preamp card. The top LED is projector 1.

Note that clockwise rotation of the trimpots increases gain.

Turn Projector 1 Left Channel gain control clockwise until first red LED on Meter Card just ignites, then counter-clockwise about one quarter to one half turn. The red LED should just blink on and off with the REFERENCE tone. All green and yellow LED's on meter card should be lit (on the channel you are adjusting).

Repeat the same procedure with Right Channel gain control.

You can verify that the LED meters are indicating correctly by connecting a voltmeter to the LEFT PRE and RIGHT PRE terminals on the rear panel. You should read 700 to 725 mV AC at these test points.

If this is a two projector system, changeover from Projector 1 to Projector 2 by grounding the CHNG-OVER terminal on back of MOD IIB card cage, and repeat the alignment and level set procedure with Projector 2 inputs. Then, remove the short from the CHNG-OVER terminal to select Projector 1.

Turn off switch #2 on Meter Card. Turn on switch #3-Null. Select the STEREO format by pressing the STEREO pushbutton on the front panel. Adjust the left channel Projector 1 Preamp Gain control until you have the least number of LED's illuminated on bottom display of meter card. You should have only two or three LED's illuminated. This step is very important. The least number of LED's that are lit means you are achieving the best possible null, and optimum performance (minimum crosstalk) in the surround channel. This should also be done for projector 2 in a dual projector system.

The most likely cause of difficulty in obtaining a good null is the azimuth alignment of the optical sound lens. This is a very critical soundhead adjustment if you expect to get the best performance.

## MOD II B Stereo Processor

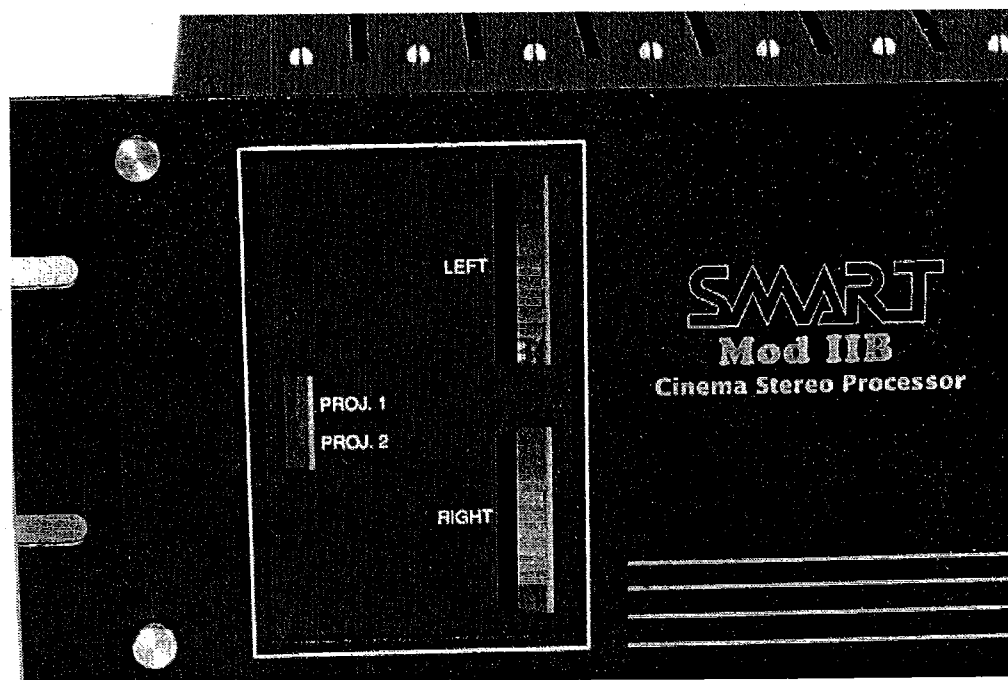
### BACKUP LEVEL

The Backup Level is controlled by a trimpot located on the MONO card. To adjust this level, run a piece of regular program material film in the STEREO format and adjust the FILM LEVEL control for a normal level in the auditorium. Now, either listening in the auditorium or on the center channel of the booth monitor, move the front panel NORMAL/BACKUP switch to the BACKUP position. Adjust the Backup Level trimpot until the Backup Level is the same level as the STEREO format level. Now, when switching from NORMAL to BACKUP, there should be no significant volume differences.

### MUSIC INPUT LEVELS

As set at the factory, the Music Input Level calibration is about correct for most typical music sources. Therefore, it will probably not need adjustment. If you can obtain a normal amount of non-sync music volume in the auditorium, AND if the music signal does NOT bleed through when in film mode, then the music input levels are good. If the Music Input Levels are set too high, then you may hear a slight amount of non-sync music during very low volume passages in the film.

The Music Input Level trimpots are located on the OUTPUT card. The MUSIC LEVEL control is located on the right hand side of the FORMAT card, between the card and the right side of the chassis. It is a small trimpot with a 1/2" shaft. First set the MUSIC LEVEL control to the full up position. With your music source playing the type of music you will be using, adjust the left and right Music Input Level trimpots until you have the auditorium level slightly louder than normal. Try to adjust the trimpots for approximately equal levels (listen on the booth monitor left and right channels for equal levels). Now while playing some music with a vocal part, listen to the surround channel on the booth monitor and adjust either the left or the right Music Input Level trimpot for a MINIMUM of vocal sound. Adjust the MUSIC LEVEL control for a normal level of non-sync music sound in the auditorium.



**Yellow LED in the meter array indicated 50% modulation when running "Dolby tone" test loop.**



## Operation

### OPERATOR FUNCTIONS

The format selection is done by simply pressing the pushbutton for the desired format. Each pushbutton has a built-in LED which will illuminate when the button is pushed. If automation is in control, the LED's in the pushbuttons will indicate which format is selected. Also, the pushbuttons will override an automation selection if a mistake occurs. (This assumes the automation is correctly set up for controlling the MOD IIB, that is, momentary contact closures across the format terminals.)

The FILM LEVEL control will usually be set at about the 1 o'clock position for most films. There is automatic volume compensation built in for the differences in level between mono and stereo prints. Therefore, you will not have to change the FILM LEVEL control in most cases when playing, for example, mono trailers and a stereo feature. When a new film is first run, the operator may have to make slight changes in the volume, but afterwards, the same film should not require any changes except to compensate for a noisy audience or for the difference between an auditorium full of people on one day and almost empty the next.

The MOD IIB also has remote volume capabilities, and there may be a remote FILM LEVEL control installed in some other part of the theatre. To activate the remote control, the front panel must be removed, and the REMOTE/LOCAL switch set to REMOTE. This switch is a miniature toggle switch located on the right side of the FORMAT card between the card and the right side of the chassis.

The MUSIC LEVEL control is also located near the REMOTE/LOCAL switch. If it is necessary to change the non-sync volume, then this control will do that. **Do not change this control unless it is necessary. It has been set by the installer, and should not require adjustment.**

The last operator item is the BACKUP/NORMAL switch located above the FILM LEVEL control. This should be in the NORMAL position at all times unless there is a processor failure causing a loss of sound or a serious problem with the quality of the sound. Setting this switch to BACKUP will cause a built-in backup circuit to take over and deliver sound only to the center channel in the auditorium. If the problem is not serious, it is probably desirable to continue to play the film in the NORMAL mode until the problem can be solved.

### FORMATS

The MOD IIB has six operator selectable formats: MONO, STEREO, SR, GENERATOR, AUX (Auxiliary), and MUSIC. Digital Sound or Magnetic Soundtracks may be connected to the AUX inputs.

#### MONO

This format is for mono prints and trailers, although generally mono prints should be played in the GENERATOR format.

#### STEREO

Prints recorded in stereo with a "type A" style of noise reduction should be played in this format. This applies to most of the currently released prints. Be sure to check the print for format information.

#### SR

This format is for prints recorded in stereo with the Dolby type SR noise reduction. The MOD IIB contains special noise reduction cards that will decode the SR format.

## MOD II B Stereo Processor

Simply push the SR button on the format card whenever you are playing an SR encoded soundtrack.

### GENERATOR

This is a special format which will create a stereo type of sound (not true stereo) from a mono print. This is the preferred way to play a mono print. This format should not be used on trailers because these films are usually overmodulated and will cause the Generator circuitry to behave unpredictably. (SEE APPENDIX A)

### AUX

This is also a special purpose format. It is used when there is an external processor such as a magnetic preamplifier, Digital decoder, 16mm sound, or other source connected to the MOD IIB.

### MUSIC

Non-sync intermission music will play when this format is selected. When the pushbutton is pressed, the music will slowly fade in up to its normal level. When another format is selected, the music will gradually fade out as the film sound comes in.

### SYN(thesizer)

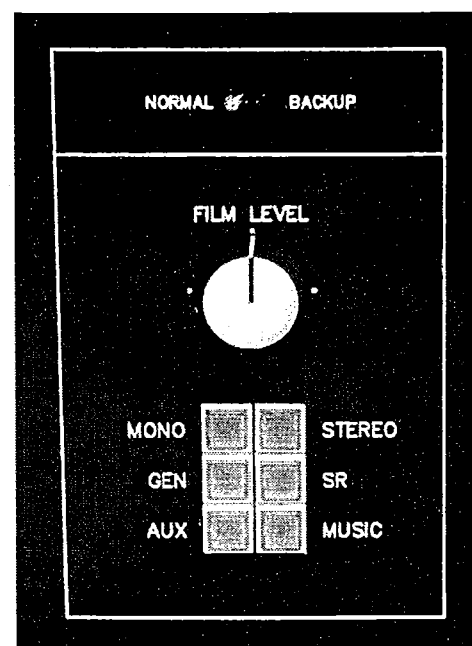
The SMART Surround Generator produces a surround track for mono prints. This separate sound source is generated by using special circuitry to sense program level and frequency components of the single monaural soundtrack. The generator is designed to eliminate dialog from getting into the surround speakers and to pass "effects" sounds to the surround. Effects are defined as moderate to loud sounds that are below the voice frequency range. You cannot expect the same kind of surround behavior as is recorded on a true stereo optical soundtrack.

The action of the Surround Generator will vary from print to print, depending on the recorded level and frequency content of the print. In other words, some prints may exhibit large amounts of synthesized surround sound, while other prints will exhibit little, or NO surround sound.

*REMEMBER THAT SOME MONO PRINTS WILL NOT CAUSE THE SURROUND GENERATOR TO COME ON AT ALL BECAUSE THE FILM MAY BE PRIMARILY DIALOG AND LIGHT MUSIC.*

**The Normal-Backup switch should always be in the normal position.**

**If emergency backup is ever required, move the switch to backup. The backup level is set by the installer internally.**



## REMOTE VOLUME CONTROL.

The MOD IIB may be easily wired to a remote volume control. The lower left terminal strip on the rear of the processor contains the necessary connections for the remote control. You will need a 10k Ohm linear pot mounted in a box at your remote location. The wiring will be done with 2 conductor shielded cable just like the audio wiring to the other parts of the MOD IIB. The wiring follows:

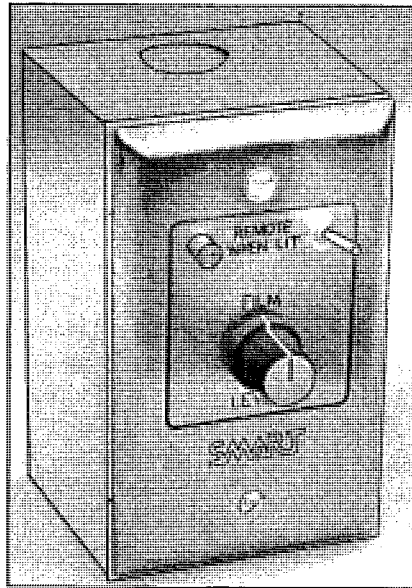
REM. SEND to one conductor of the cable then to the top of the pot.

REM RETURN to the other conductor of the cable then to the wiper of the pot.

GROUND (GND) to the shield of the cable then to the bottom of the pot.

This cable can be any reasonable length, but try not to exceed 200 feet (60 meters). Also, run the cable away from AC wiring or any other noise sources. Be sure to check your wiring carefully. A reversal of the 2 conductors to the top and wiper of the pot could cause some strange problems and possible damage.

**You may build your own remote panel or purchase a manufactured unit.**



## FINAL CALIBRATION AND CHECKOUT

Almost every component used in the MOD IIB is available locally from a radio parts house. The only parts that are not likely to be found are the special sealed modules and the time delay chip. Refer to the schematic diagram and parts list for information regarding a component description. IC sockets are used to facilitate easy removal and replacement of any Integrated Circuit, should this ever become necessary.

Each unit is burned in for a minimum of 5 days before Q.C. testing and packaging. A failure of one or more functions of the MOD IIB will result in a service call from the owner. Always check the *obvious causes* of the symptoms first:

- 1 Is the unit receiving A.C. power? (Remote Control and Main Unit L.E.D's ON)
2. Has the power supply fuse blown? (Replace with 4 amp 3AG type only)
3. Are all controls in their normal operating mode?

## MOD II B Stereo Processor

4. Is the supporting equipment functioning properly? (Amplifiers, equalizers, exciter lamp supply, etc.)

When all symptoms point to an internal problem, your only choice is to substitute a spare (or similar piece of equipment) and fix the unit in the booth or shop.

A quick check of the power supply voltages will indicate the proper operating voltages for the active components. Place your service meter **negative lead** on a convenient chassis **GROUND** point. Switch the meter to the PLUS 30 D.C. range and measure the voltage input to the power supply input terminal on the MOD IIB card cage. It should be 20 volts. Now measure the negative voltage from the power supply. Use *the positive* lead of your meter on the chassis *GROUND*, and the negative lead for voltage measurements. Again, you should measure 20 volts. If you cannot obtain the voltages mentioned, you may have a shorted connecting cable or a bad power supply. Disconnect the low voltage cable at the power supply end and make the tests again on the power supply terminals. **BECAREFUL NOT TO SHORT THE PINS ON THE POWER SUPPLY TERMINALS WHILE MAKING THESE TESTS. A MOMENTARY SHORT COULD PRODUCE A DANGEROUS SPARK BEFORE THE SUPPLY GOES INTO ITS SELF-PROTECT MODE.**

When you are satisfied that the voltages are correct, go to the schematic diagram and study the circuit layout. *The most practical way to troubleshoot audio circuits is through signal tracing.* Put an audio signal into the input and follow the signal with a scope until the signal stops. This method allows you to locate a defective component in the related section.

Since the MOD IIB uses a bipolar supply, each audio IC op-amp output should measure nearly 0 volts D.C. with no signal. That is, you should be able to probe each output pin with your service meter and see a minimum offset. If the op-amp is showing a few volts at the output pin, it is likely that a bad capacitor or resistor is causing an input bias that forces the output of the amplifier to shift. A defective IC could also be the culprit. Also check for a hairline short in the PC card foil traces. Here are several tips that will aid in troubleshooting. **SOME OF THE IC'S OPERATE ON A SINGLE-ENDED SUPPLY.** These chips get their current from the negative supply rail with a ground return. Single-ended chips may show a very large offset voltage at their outputs.

1. Make sure the switches are in the proper position before testing the unit.
2. Very hot IC's usually indicate an internal short.
3. An open resistor may lead you to believe that an IC is defective. Use a substitute device to see if the problem is in the device itself or elsewhere.
4. Shorted input capacitors may bias an IC op-amp OFF.
5. Be sure IC's are firmly in their sockets. They can be vibrated loose during shipment.

Signal tracing procedures may also be employed when servicing the time delay portion of the *SURROUND CHANNEL*. A signal at the input, through the filter circuit, the delay chip, and the anti-alias filter will reveal where the signal has stopped. Refer to the schematic for pin identification of the signal flow. The HFE4047 clock associated with the delay chip must be operating properly for the audio signal to pass through the delay chip. An oscilloscope will reveal high level square wave pulses on pins 10 and 11 of the 4047 when this device is operating. If either phase of the clock fails, no audio can pass. We suggest you **NOT REMOVE** the delay chip itself unless you are positive it has failed. This component is very expensive and can be easily destroyed by stray static caused by handling. The BIAS pots near the chips are factory set to each individual chip, and should not be moved unless

# Installation Manual

the IC must be replaced by a new device.

The *MATRIX MODULE* and *NOISE REDUCTION CARDS* in the MOD IIB contain many components and IC's that are factory calibrated. The module is not intended to be serviced without special test equipment and test fixtures. A defective module is replaced on an *EXCHANGE ONLY* basis. We suggest the MOD IIB be returned to the factory for servicing if a module failure is verified. The "plated through" holes on the main PC card are easily damaged when service is attempted without the aid of the proper de-soldering equipment.

An important part of any pre-service call is to make sure that the operator or other theater personnel *is fully familiar* with the operation of this equipment. Often service calls are made unnecessarily because the operator was not trained with the correct operation procedures.

**MANY IC DEVICES CAN BE DESTROYED BY HANDLING.** CMOS logic devices and BI-FET Op Amps are *very static sensitive*. They are safe when plugged into their sockets, but removal can expose the inputs to conduct static electricity from tools, your hands, or other static generating components. **USE PROPER HANDLING PROCEDURES** when removing IC's from their sockets.

This manual is included with each shipment so that you can leave a copy with the theatre owner or operator.

The LED meters on the second card in the MOD IIB main card cage are not only used for monitoring program material during the theater's performance but are also used to *make all set up calibrations* during the installation phase. See the section of this manual that describes the LED meter use.

**SERVICE ACCESS.** The MOD IIB contains up to 12 plug-in printed circuit cards, depending on the system configuration. These cards should be removed *ONLY WHEN MAIN POWER HAS BEEN REMOVED*. Plugging in a card with power present can cause a jolt to the input regulators, causing them to fail. It should never be necessary to remove the main "Mother Board" that lies at the rear of the card cage.

## **P.C. CARD COMPONENT REPLACEMENT**

All IC's in the MOD IIB are socketed and can easily be replaced from the top surface of the PC boards.

If any of the CMOS logic chips are replaced, use reasonable care to avoid damage due to static electricity. If the relative humidity is below 50%, use a grounded workbench and make sure that the PC board is grounded to it. To prevent static damage to a chip, do not touch any of the leads unless you are also touching the workbench, or you are connected to it through a standard high resistance grounded wrist strap. (Such wrist straps are connected to ground through a 1 megohm or more resistor, greatly reducing danger to personnel due to electric shock.) Other components are soldered in place and may be replaced following the instructions covered in this section. If filter capacitors are to be replaced, fasten them securely to the board using the original factory replacement parts.

**REPLACEMENT OF COMPONENTS ON PRINTED CIRCUIT BOARDS.** It is important to use the correct technique for replacing components mounted on PC boards. Failure to do so will result in possible circuit damage and/or intermittent problems.

The circuit boards used in the MOD IIB are of the double-sided plated-through variety. This means that there are traces on both sides of the boards, and that the through-holes contain a metallic plating in order to conduct current through the board. Because of the

## **MOD II B Stereo Processor**

plated-through holes, solder often creeps 1/16" up into the hole, requiring a sophisticated technique of component removal to prevent serious damage to the board.

**A) COMPONENT REMOVAL:** If the technician has no practical experience with the demanding technique of removing components from double-sided PC boards without board damage, it is wiser to cut each of the leads of the defective component from its body while the leads are still soldered to the board. The component is then discarded, and each lead is heated independently and pulled out of the board with long nose pliers. Each hole may be cleared of solder by carefully heating with a low-wattage soldering iron and sucking out the remaining solder with a spring activated desoldering tool. *THIS METHOD IS THE BEST METHOD OF CLEARING A PLATED-THROUGH HOLE OF SOLDER.*

Another technique is:

1. Use a 30 watt soldering iron to melt the solder on the underside (solder side) of the PC board. Do not use a soldering gun or high wattage iron! As soon as the solder is molten, vacuum it away with a spring activated desoldering tool like the Edsyn "Soldapullit." Do not overheat the board! Overheating will almost surely damage the board by causing the conductive foil to separate from the board. Use a pair of fine needle-nose pliers to wiggle the lead horizontally until it can be observed to move freely in the hole.
2. Repeat step 1 until each lead to be removed has been cleared of solder and is free to move.
3. Now lift the component out of the holes.

### **B) COMPONENT INSTALLATION:**

1. Bend the leads of the replacement component until it will fit easily into the appropriate PC board holes. Using a good brand of rosin-core solder, solder each lead to the bottom side of the board with a 30 watt soldering iron. Make sure that the joint is smooth and shiny. If no damage has been done to the plated through hole, soldering the topside pad is not necessary. However, if the removal procedure did not progress smoothly, it would be prudent to solder each lead at the topside as well in order to avoid potential intermittent problems.
2. Cut each lead of the replacement component close to the solder (underside) side of the PC board with a pair of diagonal cutters.
3. Remove all residual flux with a cotton swab moistened with a solvent like 1,1,1 trichloroethane, naphtha, or 99% isopropyl alcohol. The first two solvents are usually available in the supermarkets under the brand name "Energine" Fire proof spot remover and regular spot remover, respectively. The alcohol, which is less effective, is usually available in drug stores. Rubbing alcohol is highly diluted with water and is ineffective.

It is good policy to make sure that the defluxing operation has actually removed the flux and has not just smeared so that it is less visible. While most rosin fluxes are not corrosive, they can slowly absorb moisture and become sufficiently conductive to cause progressive deterioration of performance.

### **5. TROUBLESHOOTING IC OP-AMPS**

IC op-amps are usually operated so that the characteristics of their associated circuits are essentially independent of IC characteristics and dependent only on external feedback components. The feedback forces the voltage at the (-) input terminal to be extremely close to the voltage at the (+) input terminal. Therefore if the technician measures more than a few millivolts between these terminals, the IC is probably bad.

## Installation Manual

Exceptions are IC's used without feedback (as comparators) and IC's whose outputs have been saturated due to excessive input voltage because of a defect in an earlier stage. Also, be sure that the voltmeter is not interacting with these sensitive points and affecting the measured voltage. However, if an IC's (+) input is more positive than its (-) input, yet the output of the IC is shifting at -14 volts, this almost certainly indicates that it is bad. The same holds true if the above polarities are reversed.

Because the characteristics of the MOD IIB circuits are independent of op-amp AC characteristics, an op-amp can usually be replaced without need for calibration. However some of the control circuitry is sensitive to DC op-amp characteristics, like bias current and offset voltage. Because of this, high performance dual op-amps are used in several sockets. These devices must be replaced with exact replacements; garden variety IC's are not satisfactory.

A defective op-amp may appear to work, yet it may have extreme temperature sensitivity. If parameters appear to drift excessively, freeze-spray may aid in diagnosing the problem. Freeze-spray is also invaluable in tracking down intermittent problems. But use sparingly because it can cause resistive short circuits due to moisture condensation on cold surfaces.

We recommend that all plug-in PC cards or Remote Panel which requiring repair be sent to our factory, if at all possible. We can normally turn a repair around in a short time and get it back into the customer's hands far faster than would be the case should someone attempt a repair with no experience with the MOD IIB system. This also allows us to add reliability data to our files so that future revisions may be undertaken if necessary to improve the evolution reliability problems.

It is an excellent idea to have at least one set of the critical PC cards on hand at all times as a backup.

Almost every component used in the MOD IIB is available locally from a radio parts house. The only parts that are not likely to be found are the special sealed modules and the time delay chip. Refer to the schematic diagram and parts list for information regarding a component description. IC sockets are used to facilitate easy removal and replacement of any Integrated Circuit, should this ever become necessary.

Each unit is burned in for a minimum of 48 hours before Q.C. testing and packaging. A failure of one or more functions of the MOD IIB will result in a service call from the owner. Always check the *obvious causes* of the symptoms first:

1. Is the unit receiving A.C. power? (Remote Control and Main Unit L.E.D's ON)
2. Has the power supply fuse blown? (Replace with 4 amp 3AG type only)
3. Are all controls in their normal operating mode?
4. Is the supporting equipment functioning properly? (Amplifiers, equalizers, exciter lamp supply, etc.)

When all symptoms point to an internal problem, your only choice is to substitute a spare (or similar piece of equipment) and fix the unit in the shop. We recommend that all plug-in PC cards or Remote Panel which requiring repair be sent to our factory, if at all possible. We can normally turn a repair around in a short time and get it back into the customer's hands far faster than would be the case should someone attempt a repair with no experience with the MOD IIB system. This also allows us to add reliability data to our files so that future revisions may be undertaken if necessary to improve the evolution reliability problems. It is an excellent idea to have at least one set of the critical PC cards

## **MOD II B Stereo Processor**

on hand in each multiplex for any backup use that may become necessary. These spares may be purchased separately from the system.

SMART Theatre Systems maintains a factory service department that can provide quick handling of replacement parts, or telephone advice in the event of a problem in installation or service. A technician can be reached during normal business hours from 9 A.M. to 5 P.M. (Eastern time) Monday-Friday.

### **2 TO 4 CHANNEL CONVERSION**

The MOD IIB can be easily converted from a 2 channel (front-surround) to a 4 channel processor very easily. Three cards are required to convert to a 4 channel processor: 1) ComboCat 350 NR card, 2) Wide Trac Matrix card, and 3) Dual EQ card.

1. Add the necessary amps, speakers, and wiring. (Obviously this is not part of the MOD IIB conversion, but it must be done first.)
2. Plug the ComboCat 350 NR card into slot 5.
3. Remove the 2 channel matrix from slot 6, and plug in the Wide Trac matrix card in its place.
4. Plug the Dual EQ card into slot 8. This is the Left and Right EQ card.
5. Set the EQ and house levels (see the calibration section).

### **4 CHANNEL GENERATOR UPGRADE**

The MOD IIB can be configured as a 4 channel stereo processor with only a 2 channel generator. This is the standard configuration for a 4 channel MOD IIB. If you desire to have a 4 channel generator (stereo synthesizer), then the optional FRONT GENERATOR card can be installed in slot 11. In order to activate this new card, a jumper must be moved on the FORMAT card.

Remove the FORMAT card, and locate the jumper pins and shunt labeled H2 near the top rear of the board. Pull the shunt off the two front pins and place it over the two rear pins. This completes the conversion.

**The optional stereo generator must be installed in slot 11 (from left to right). Normally no calibration is required beyond the factory settings.**

**Disconnect the power supplies from the AC power line before replacing components to avoid the danger of electrical shock!**

### **MOD IIB-DIT (Drive-in-Theatre)**

The MODIIB-DIT is a drive-in theatre specific version of the SMART MODIIB. For stereo films, both Type A and SR noise reduction is included so that these films can be played back with the high fidelity sound that is inherent in these formats. No other drive-in product offers these and the many other features which are standard in the MODIIB-DIT.

The MODIIB-DIT uses a subset of the MODIIB cards, and the motherboard has additional circuitry which configures the four main outputs (L, C, R, and S) for drive-in use. FM Stereo and AM Transmitters as well as field amplifiers are easily accommodated, and the outputs are independently adjustable.

The LEFT and RIGHT outputs become fixed level, noise reduced channels to feed an FM Stereo Transmitter. The level is adjustable by the left and right trim pots on the output card, and the front panel volume control has no effect on the level.



# Installation Manual

The CENTER output becomes a fixed level, noise reduced, summed L+R channel to feed an AM Transmitter. The level is adjustable by the center trim pot on the output card, and the front panel volume control has no effect on the level.

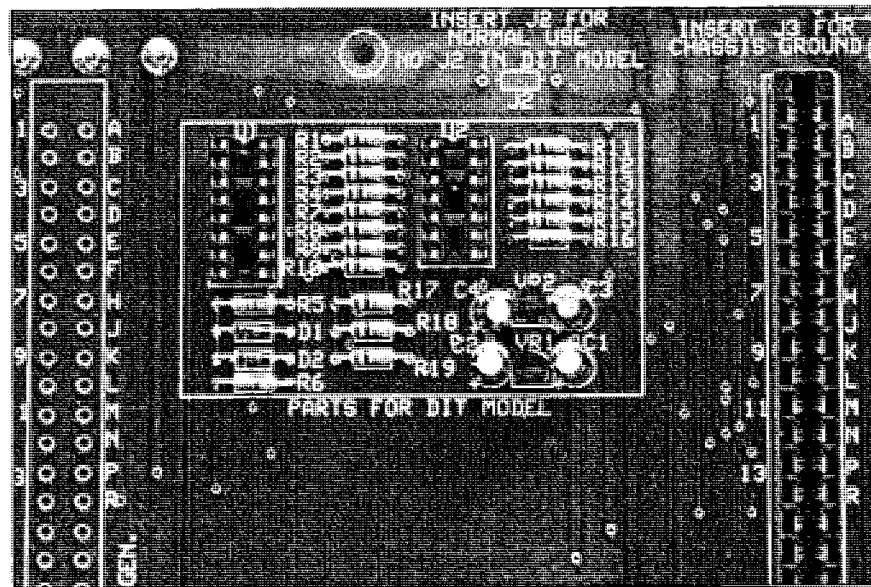
The SURROUND output becomes a variable level, noise reduced, summed L+R channel suitable for feeding a field speakers amplifier and a concession stand speakers amplifier. The front panel volume control is used to adjust this level.

Intermission Music is fed to all outputs when MUSIC format is selected on the MODIIB-DIT. It appears in stereo on the LEFT and RIGHT outputs and is L+R summed for the AM Transmitter and Field Amplifier outputs.

In addition, the terminal on the rear chassis of the unit marked "AUX ENABLE" is re-configured as an input which can be fed from a microphone and a mic preamp combination. When the AUX format is selected, you can speak into the microphone, and your page will be sent to all outputs. To cease paging, simply select another format, for example, MUSIC.

The MODIIB-DIT film formats are MONO, STEREO (type A), and SR. The GEN (Stereo Generator) format is not active in this model. Select the type of format for the film you are playing. Stereo films will receive the correct type of noise reduction depending on whether STEREO or SR is selected. The operator needs to become aware of the types of film formats being played so the correct format selection can be made. Playing a film in the wrong format will seriously degrade the sound quality. This has not generally been an issue in drive-in theatres in the past since most systems were strictly mono.

View of motherboard showing active components used only in the DIT model of the MOD IIB



## INSTALLATION

In general, refer to the MODIIB manual for installation information. Keep in mind the re-assignment of the MAIN output terminals on the rear chassis. The chassis has not been re-labeled, so take care in your hookup. If desired, the film format and intermission music selections can be made through an automation system if the booth has one. Refer to the manual for details on automation hookup. When converting an old mono installation to stereo, a new stereo solar cell will have to be installed. It is also advisable to check the old sound lens and replace it if the slit is 1 mil or higher. Remember that the new processor will only process what is fed into it. If the input is bad, the output will

# MOD II B Stereo Processor

also be bad. Customers listening on an FM Stereo system will most certainly hear any poor quality, so it makes sense to start with the highest possible sound quality.

## CALIBRATION

The PREAMPS will need to be calibrated to Dolby Tone level as indicated on pages 20-22 of the manual. There are no EQ adjustments in the MODIIB-DIT.

The output levels will need to be set by adjusting the trim pots on the output card while the Dolby Tone reference level loop is running. See the cards layout for the proper trimpots. Adjust as needed to achieve 50% modulation on the transmitters. With the front panel volume control at the CAL position, adjust the output trim pot for the field amplifier for a normal level on the field speakers.

The range of output levels should be sufficient for most situations. If there are any difficulties in obtaining the necessary levels for your particular transmitting equipment, please call SMART at 1-800-45-SMART (1-800-457-6278). It will usually be possible to make resistor value changes to obtain the proper levels.

After all levels have been set as described, adjust the BACKUP LEVEL by putting the NORMAL/BACKUP toggle switch in the BACKUP position. Then adjust the BACKUP trim pot on the MONO card for 50% modulation on Dolby Tone.

Finally, select the MUSIC format and adjust the MUSIC input levels as described in the manual on page 23.

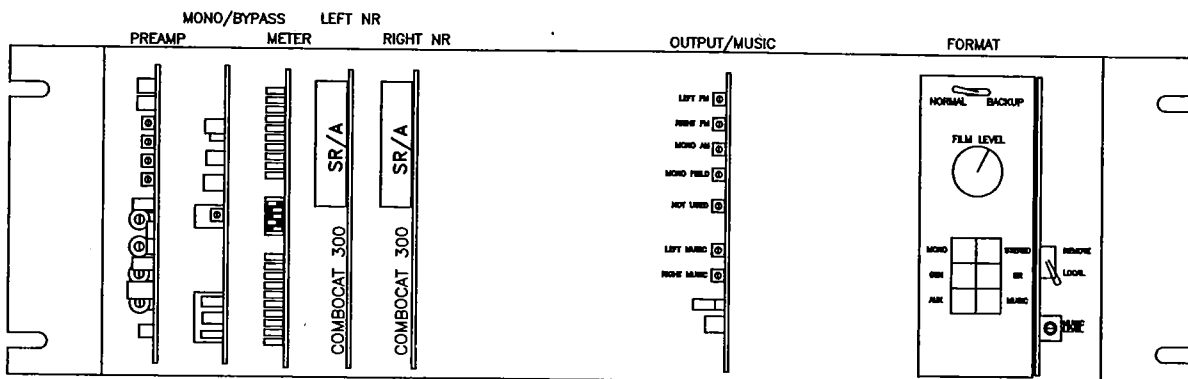
## OPERATION

In normal situations the operator will only have to select formats. If an automation system is being used to control the formats, then the operator will have to do nothing except start the show.

## MODIFICATIONS

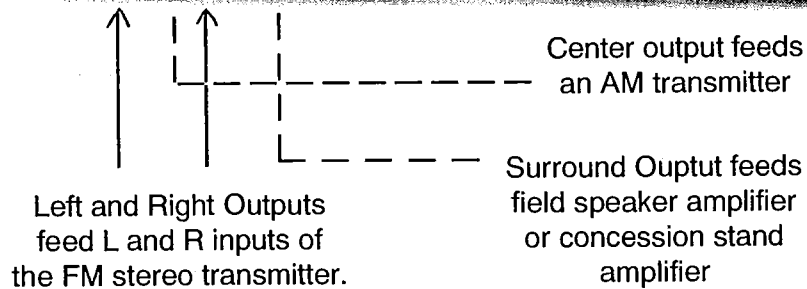
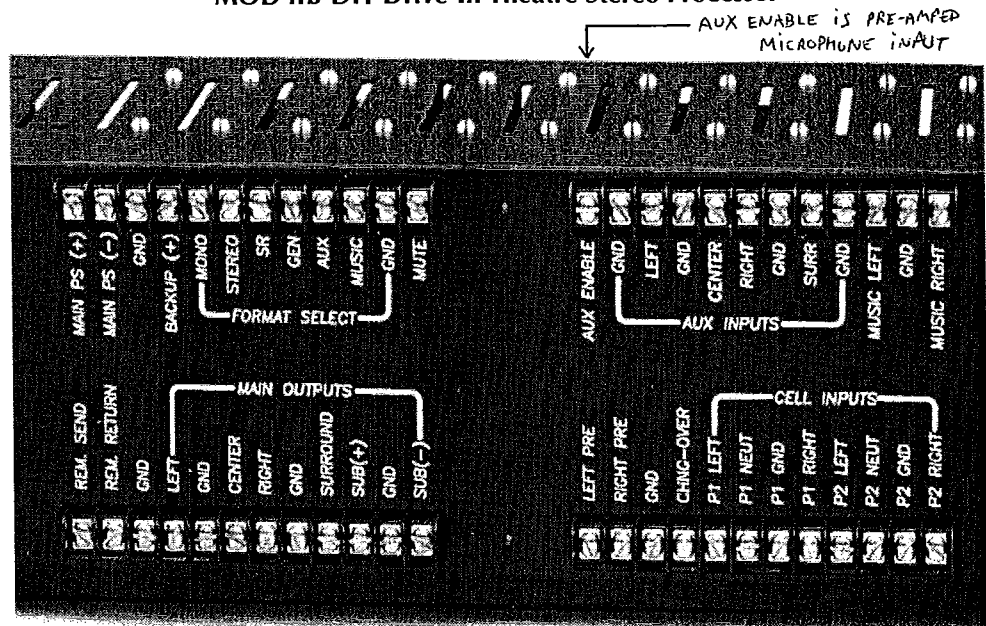
Generally, the cards in the DIT model are interchangeable with all other MODIIB cards. There are two exceptions. The OUTPUT card and the FORMAT card have slight modifications. Resistors R44 and R56 have been removed on the OUTPUT card. On the FORMAT card, U3 has been removed, and pins 7 and 8 of U3 have been jumpered with a small piece of wire inserted into U3's socket.

If a failure should occur on either of these cards, it is important that you specify the DIT version when ordering. All other cards are normal MODIIB cards.



# Installation Manual

## MOD IIB-DIT Drive-In Theatre Stereo Processor



The master fader on the front panel can adjust the Center and Surround channel outputs only. The Left and Right outputs are not adjustable by the master fader.

## MOD IIB-LRS Model

The MOD IIB-LRS is another variation of the MOD IIB processor series. This model is a 3-channel (plus subwoofer) processor designed for small auditoriums that have a small screen, yet the owner wants maximum sound spread. The MOD IIB-LRS is identical to the standard MOD IIB 4-channel processor except it uses the MOD2X315 matrix. The center channel program is impressed on the left and right channel outputs to produce a phantom center channel. This is similar to the scheme used on CD records and tapes where a performer appears between the two channels of the recording.

Since there is no physical center channel, no connection should be made to the center channel output terminal.

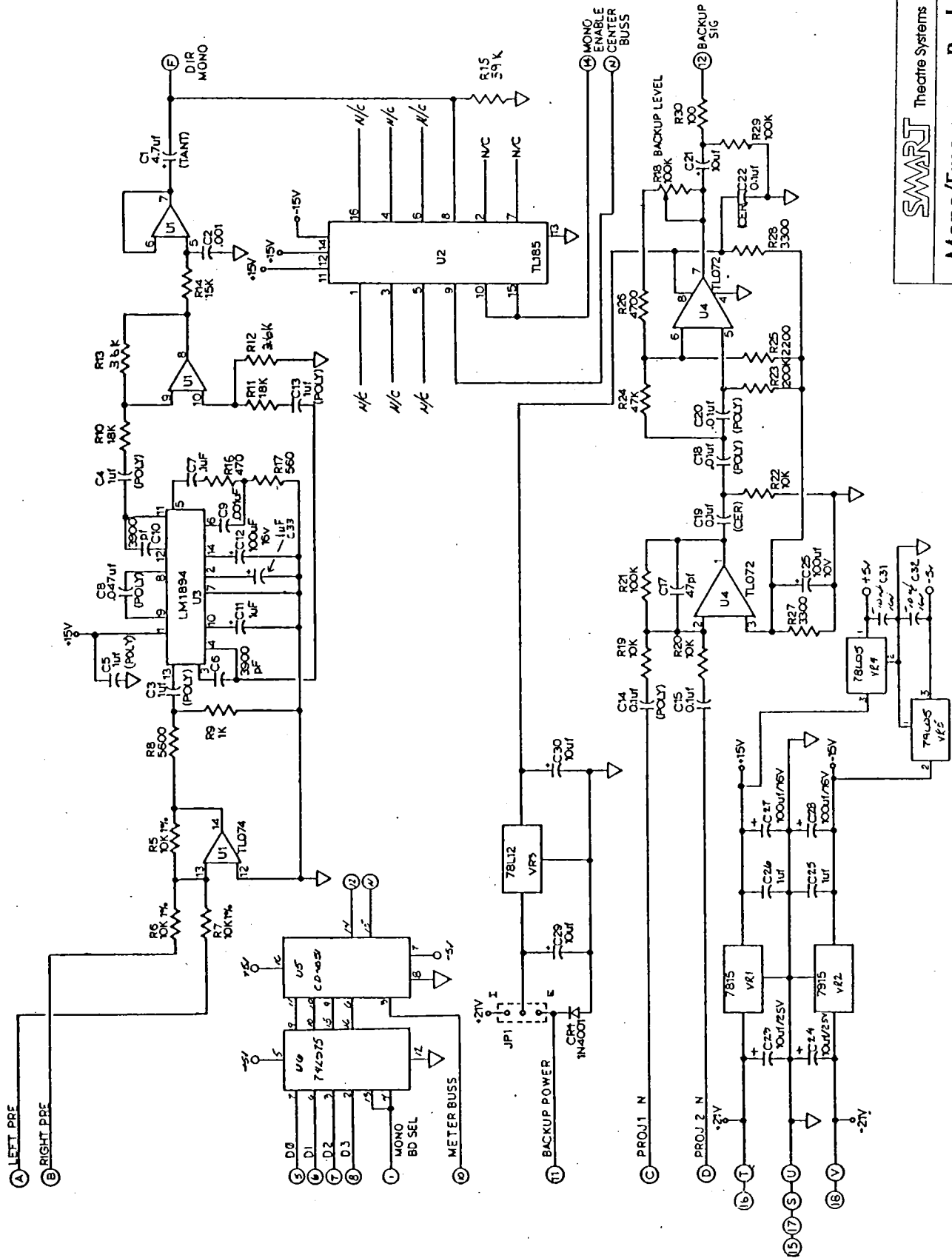
Another difference found in the MOD IIB-LRS processor is the emergency backup signal appears on the left and right output terminals when the Backup mode is selected on the NORMAL-BACKUP switch.

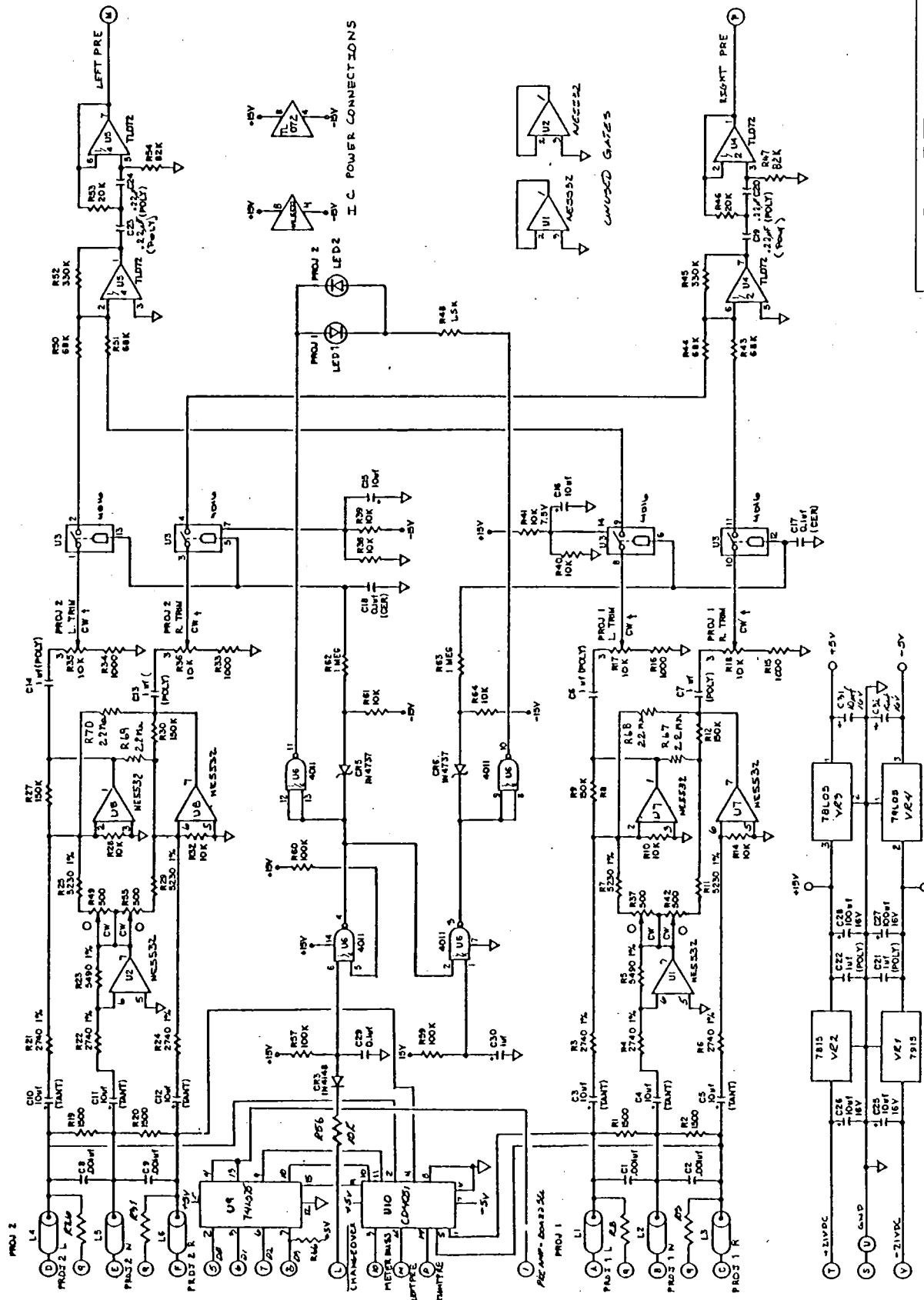
The setup of the MOD IIB-LRS is the same as the MOD IIB 4-channel shown in this manual.

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## Mono/Emergency Backup

Schematic Diagram - 6-1-92





I.C. POWER CONNECTIONS

UNUSED GATES

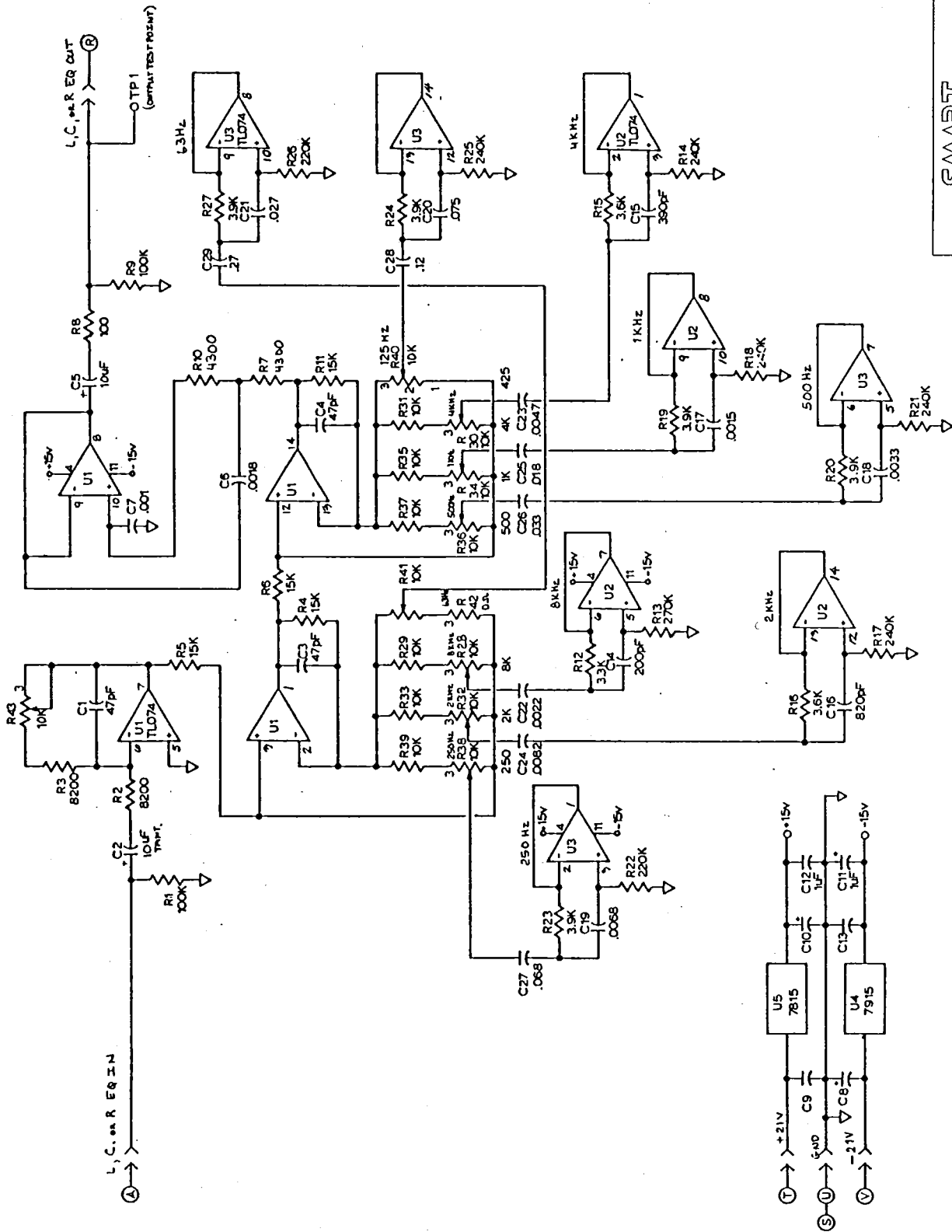
**SMART** Theatre Systems  
**Stereo Preamps**  
 Schematic Diagram - 6-1-92

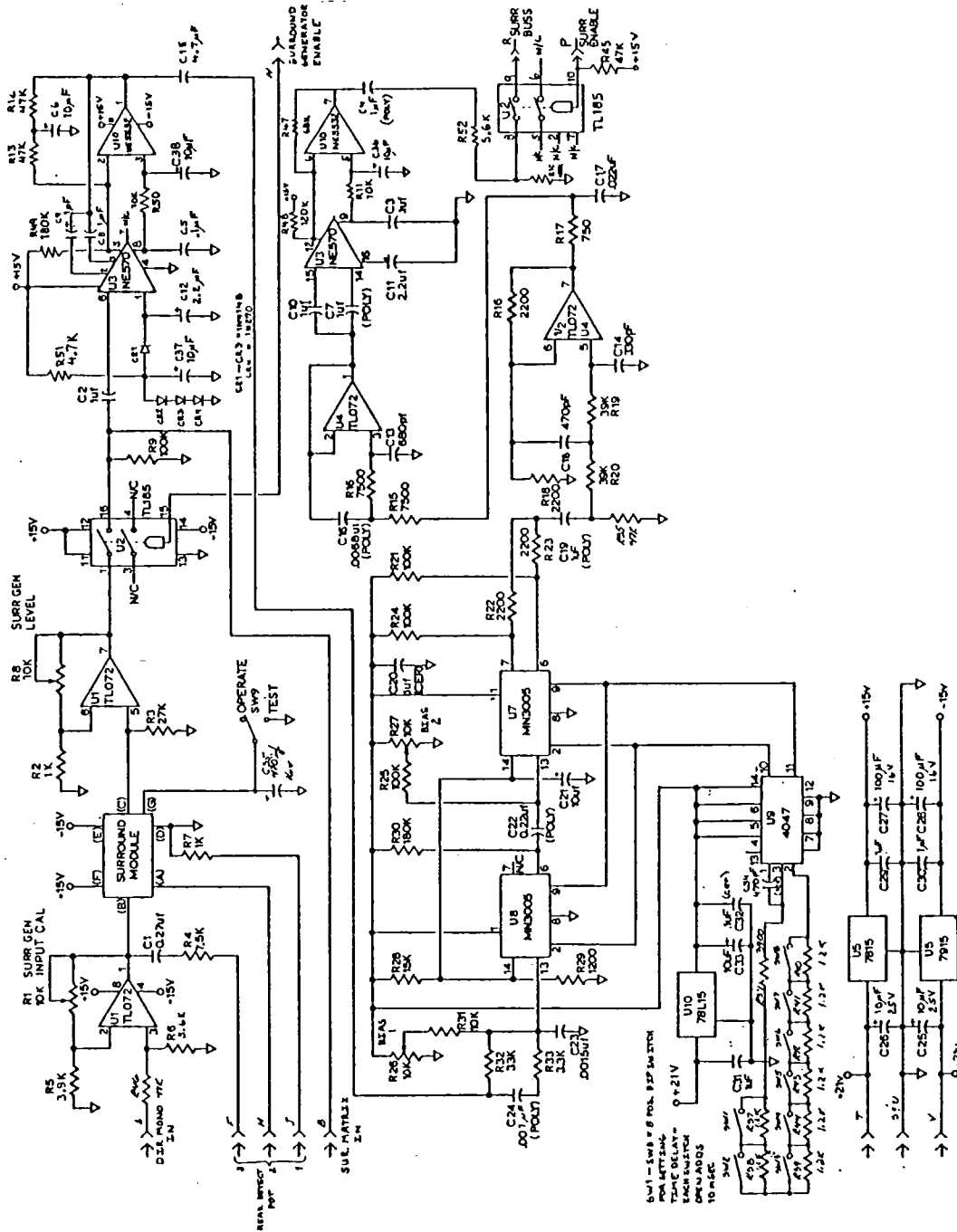
# Installation Manual

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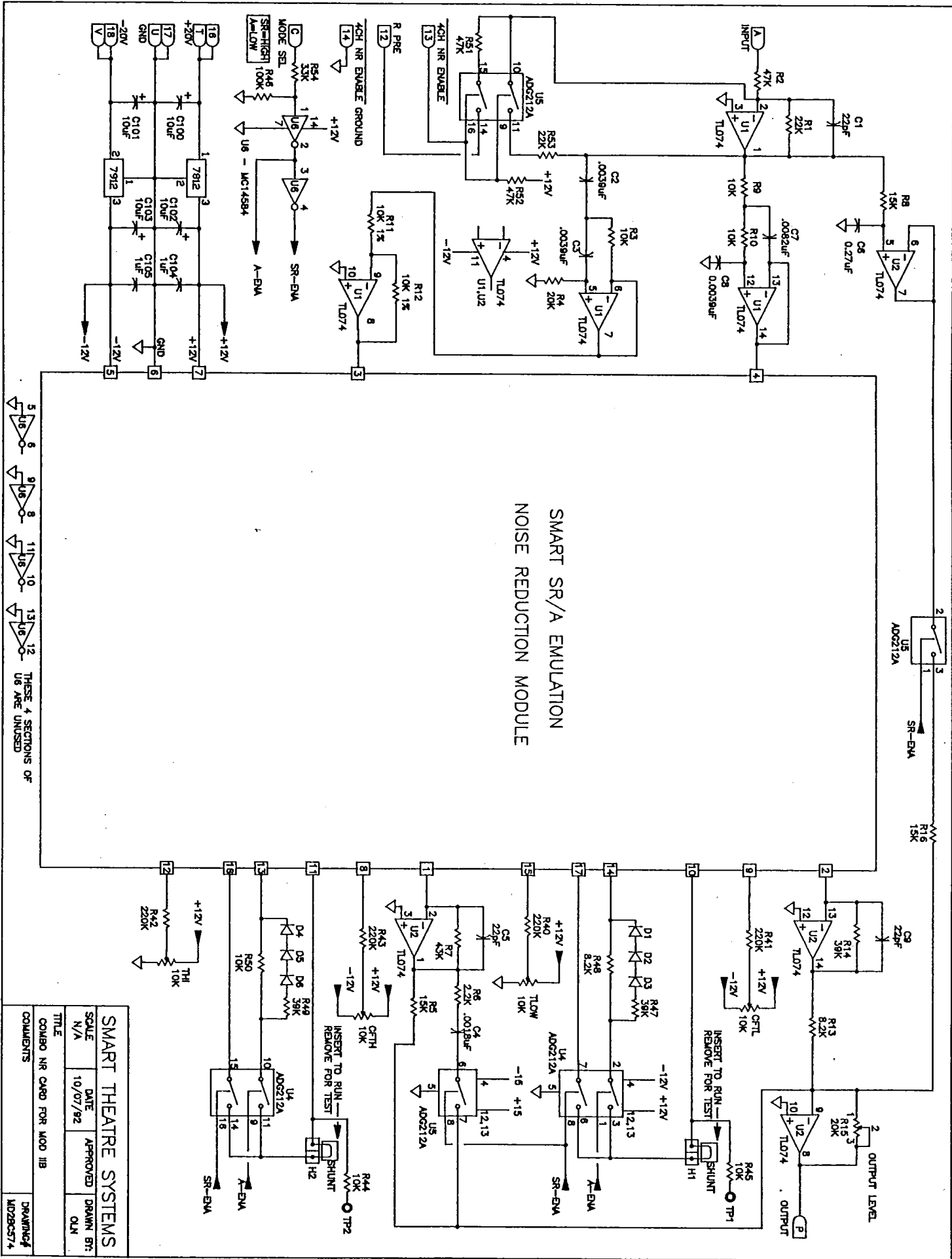
## One Octave Equalizer

Schematic Diagram - 6-1-92





# SMART SR/A EMULATION NOISE REDUCTION MODULE

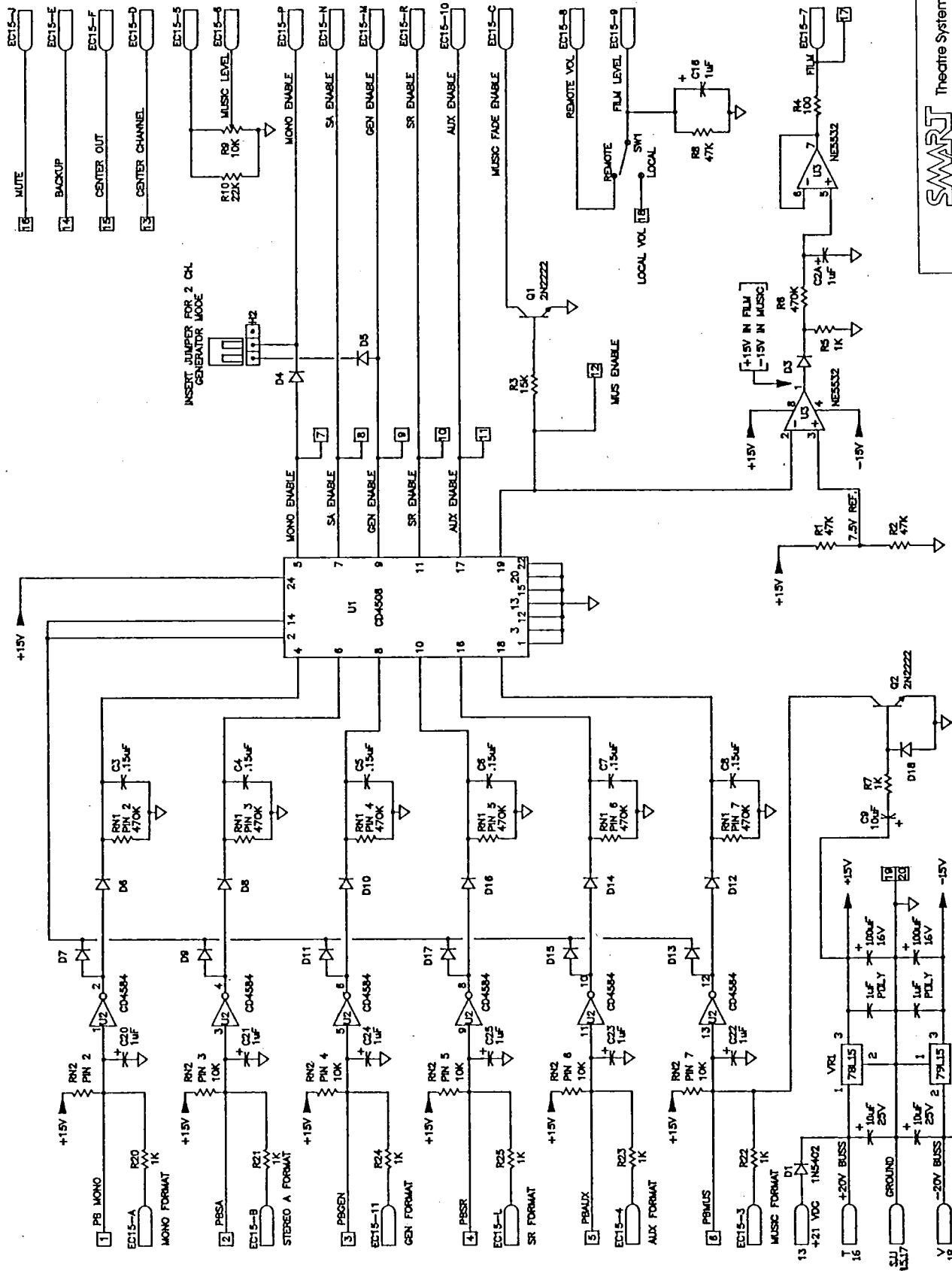


5 U6 5  
9 U6 8  
11 U6 10  
13 U6 12  
THESE 4 SECTIONS OF  
U6 ARE UNUSED

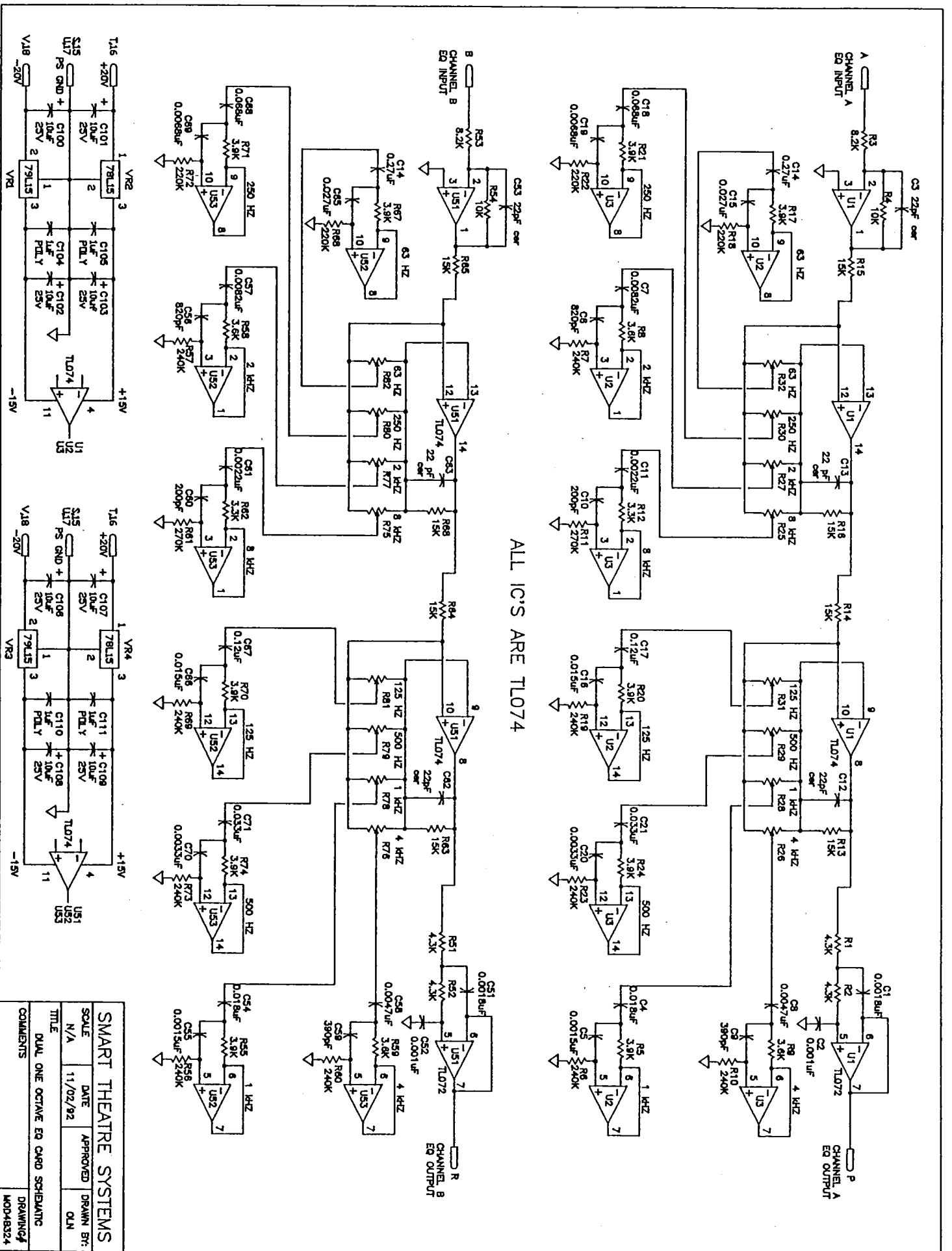
SMART THEATRE SYSTEMS			
SCALE	DATE	APPROVED	DRAWN BY:
N/A	10/07/92		OLN
TITLE			
COMBO NR CARD FOR MOD IIB			
COMMENTS			DRAWING#
			MO296574



# Installation Manual



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**Format Selector Logic**  
 Schematic Diagram - 6-1-92



SMART THEATRE SYSTEMS			
SCALE	DATE	APPROVED	DRAWN BY:
N/A	11/02/92		OLN
TITLE			DRAWING
DUAL ONE OCTAVE EQ CARD SCHEMATIC			MOD#48324
COMMENTS			