Film-Tech

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Installation and Service Manual

MOD III Cinema Stereo Processor

SMART

Theatre Systems

5945 Peachtree Corners East - Norcross, GA 30071
1 (800) 45-SMART or (404) 449-6698

made in AMERICA

MOD III PROCESSOR

INTRODUCTION

SMART is proud to present the MOD III, a small, inexpensive, full-featured stereo processor destined to bridge the gap between high performance and low price.

The MOD III was designed from the start to fill the need for a very high quality two-channel (Center/Surround) and four-channel (Left, Center, Right, and Surround) stereo processor which can be built, tested and sold inexpensively. Many prints are being released in stereo, and yet, there are still thousands of mono houses which cannot enjoy the benefits of stereo playback. The MOD III is the perfect solution for new houses on a budget, and it also allows for inexpensive revamping of mono houses to stereo.

The MOD III is exceptionally easy to install and use. Installation consists of plugging in the
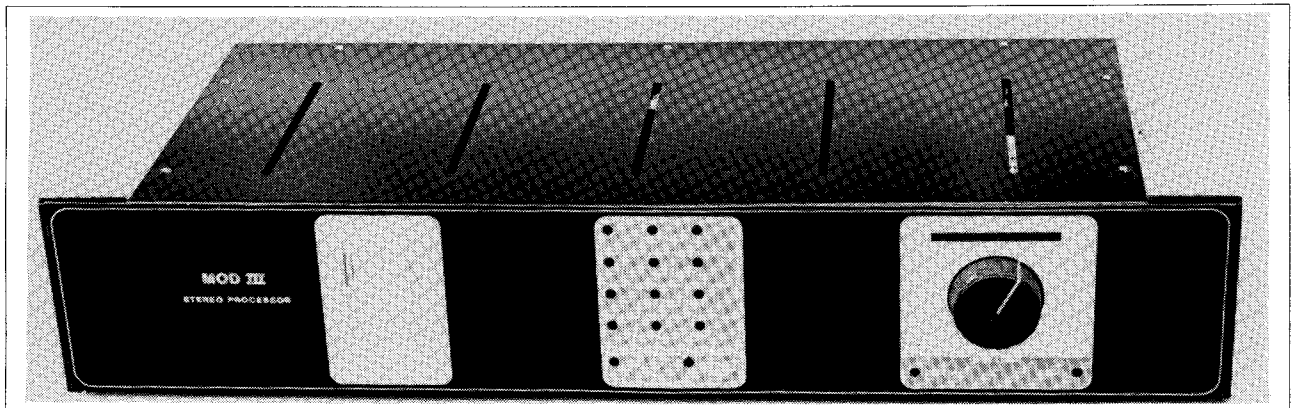
The hinged Front Panel of the MOD III folds down to gain access to the internal calibration and adjustment controls. Install the processor above the 1 3/4" vent panel that is supplied with the unit so that the door won't catch. A standard blank panel is too thick.
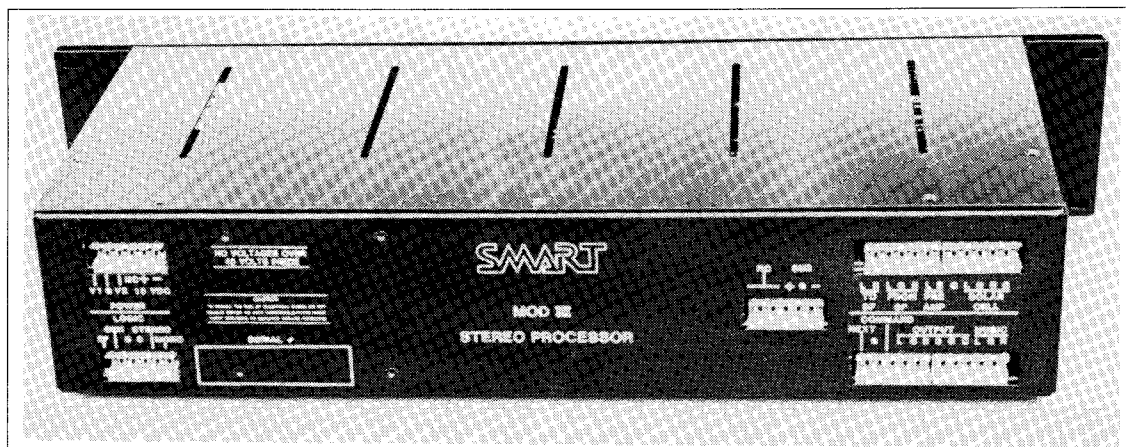
All connections to the rear of the unit are made through un-pluggable connectors. This allows quick connect and disconnect.

power pack and attaching its leads to the MOD III terminals, connecting input and output leads, and, optionally, connecting leads to an automation system if it is desired to be able to automatically control sound formats and intermission music.

Operation is simplicity itself, and anyone should know how to use the MOD III after only a few minutes of familiarization. The SoftSwitch control panel and LED indicators make it easy to program sound formats and tell at a glance what is going on. The AudiLevel sound pressure level LED's guide the operator in setting the house volume level.

Improved mechanical design as well as designed-in automated QC testing facilities combine to make the MOD III efficient in terms of Production time and Quality Control testing which in turn allows for a very competitive pricing structure. The MOD III offers you a truly exceptional value in a stereo processor.

DESCRIPTION

The MOD III is a two or four channel stereo processor with provisions for a single projector input, a stereo music input, and two or four stereo outputs (depending on model ordered).
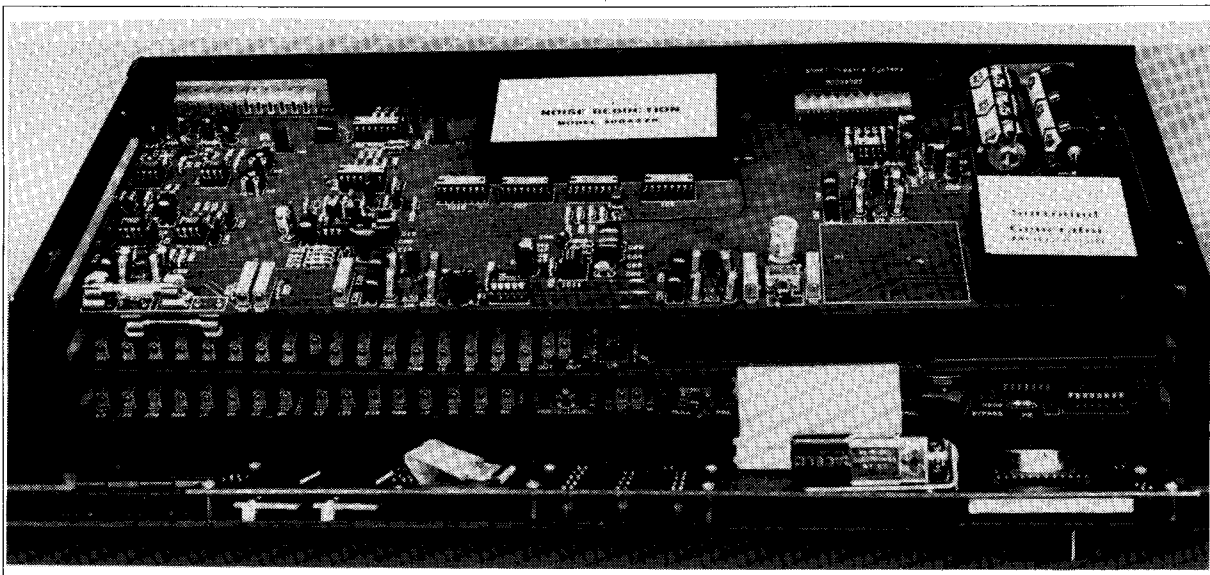

The top of the card cage chassis has been removed for this photo to show the top PC board. All low-level audio circuits are on this board.

The main circuit boards are easily removable for maintenance if it should become necessary. The display card which contains all the visual status monitors is also quite easily removed for repair or replacement.

The circuitry used in the MOD III is time tested and proven in many SMART products, and has been shown to be capable of premium performance in the most demanding applications. In addition, new circuitry has been developed to enhance the performance of the MOD III in many respects.

Control logic inputs and outputs are provided for sound format and music/film changes. Connections are provided for the SMART SR-1 Plus SR adaptor if that capability is needed. A standard feature of the MOD III is the built-in three event sequencer which allows pre-programming of up to three sound format changes during a show. These changes are triggered by cues from the automation. Also, control inputs are provided for direct format selection either from an automation or from the SMART UNIVERSAL SHOW-grammer. The sequencer's non-volatile circuitry remembers the desired events when the power is turned off.

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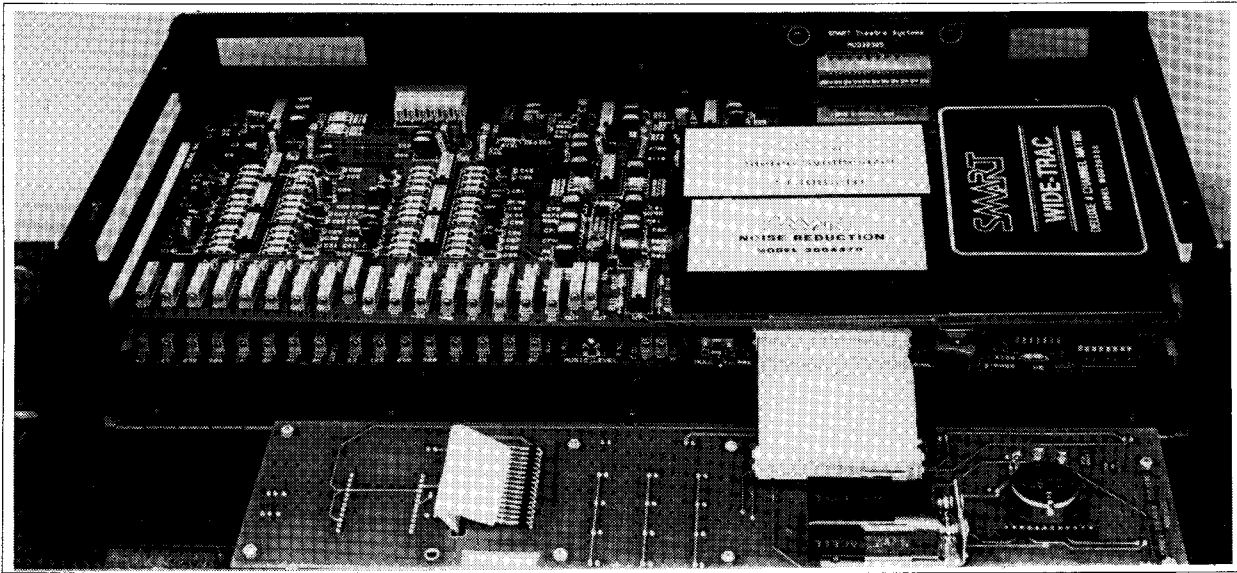
The middle board (top board removed for photo) is the 4-channel board. It contains the matrix, stereo generator, and other circuits for 4-channel operation. This board is not necessary for Front-Surround systems and may be added later to expand the system to full capability.
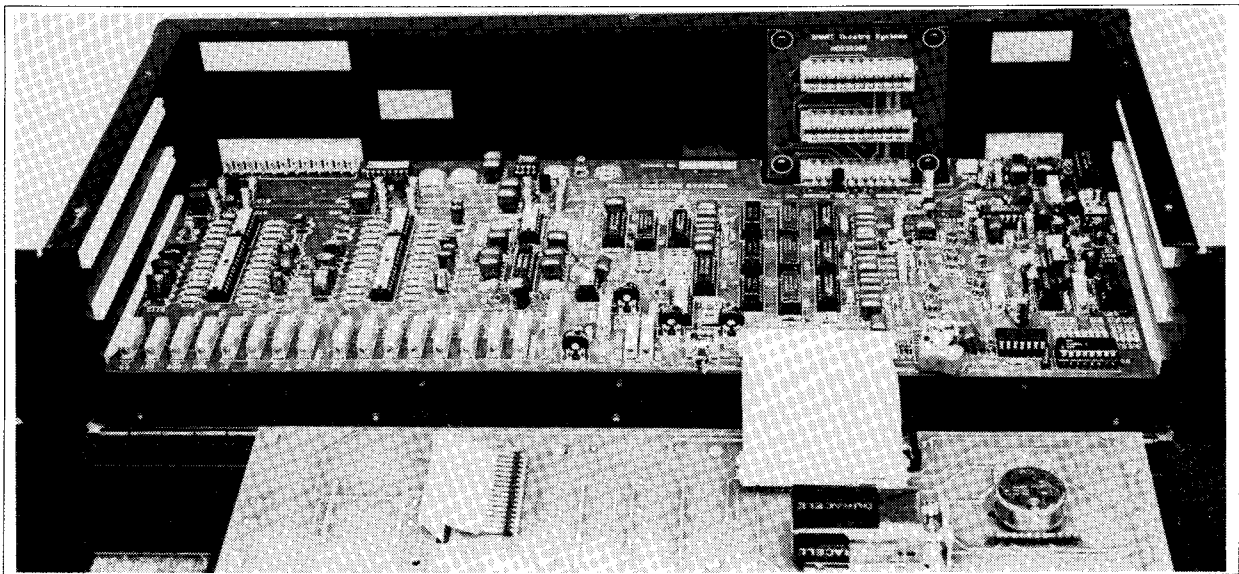
The bottom board contains all the High Level audio circuits and digital control logic. This board plus the top board are necessary for Front-Surround systems.

Front panel controls and indicators include a large Volume Level knob, the SMART SoftSwitch function controls, the SMART AudiLevel auditorium volume LED's, left and right preamp level LED's, and a number of function LED's indicating the operational status of the MOD III.

The front panel is hinged at the bottom and pulls down easily from the side-mounted magnetic latch. This panel is a full 19 inches wide and hides the rack mounting screws so that the result is a panel that appears to be floating slightly away from the front of the unit.

Behind the front panel are several controls and switches used in the initial setup and normal operation. To streamline the front panel in looks and functionality, less-used operator controls and switches are placed behind this panel. These less-used items are quickly available by simply flipping down the front panel to

gain access to them. Notably, the mono level, music level pot and bypass switch are placed behind this panel. Controls and switches that need more immediate attention are, of course, placed on the front panel. Behind the panel are all calibration controls and test switches including EQ controls and pink noise generator channel switches. The built-in pink noise generator is used for setting house levels and room EQ, and helps to simplify the entire setup procedure for the installer.

The MOD III has octave-band equalizers (8 bands) which are used for adjusting the house equalization to the normal theatre playback frequency response. Equalizers are provided for all channels.

The MOD III is 3 1/2" high by 19" wide by 6 1/2" deep. The back panel has quick-disconnect terminal strips for ease of service.

INSTALLATION

The first step in installing the MOD III is to choose a suitable location away from intense magnetic fields or high current AC circuits. Although this unit is well shielded from normal amounts of magnetically and electrically induced noise due to its circuit design and all-steel cabinet construction, it is best to not invite unnecessary problems by improper placement. Also, do not place in areas of high temperatures. This unit should operate normally in temperatures of up to 90 degrees F. ambient room temperature.

When mounting the unit , take care not to put too much strain on the front panel assembly. The hinge is quite strong but could be broken if undue force is exerted on the front panel. You may want to have someone support the back of the unit until the rack screws have been run in most of the way.

Attach the power supply connector to the power supply terminal strip on the left rear of the unit

(back view). Note that the connector is polarized, and it will only plug in one way. Plug the UL listed power packs into a 120 volt AC ($\pm$ 10%) grounded outlet. There are three power packs attached to the power supply connector. Two are the main supply, and the third (smaller) is the emergency bypass supply.

If a SMART pre-wired custom rack has not been ordered, it will be necessary to interconnect the outputs of the MOD III to the inputs of the power amplifier(s) being used in the system. Use a high grade of shielded audio cable such as Mogami or Canare for interconnection. Remember that good audio practice requires connection of the shield to ground at ONE end of the cable only. Connection of the shield at both ends could result in difficult-to-trace hum and noise problems.

Next, connect the solar cell and music source to the appropriate inputs, again, using high grade shielded audio cable. The music inputs are left, right, and ground in an unbalanced configuration. The solar cell inputs are a quasi-balanced configuration and require two runs of two-conductor shielded cable OR one run of three-conductor shielded cable. The inputs are left hot, right hot, neutral (NOT GROUND), and ground (for the shield). Connect the shield at the MOD III end only, NOT at soundhead end. Make certain that no strands of the shield wire are exposed at the soundhead which could short to the case and cause hum.

If it is desired to have the booth automation system control the music/film switching and sound format changes, then the appropriate connections must be made between the MOD III control terminals and the automation. Normally, these connections can be made using unshielded wires, but from the standpoint of noise immunity and functional reliability, it would be best to use shielded cable, grounding the shield only at the MOD III end. The shield should NOT be used as a conductor, only as a shield.
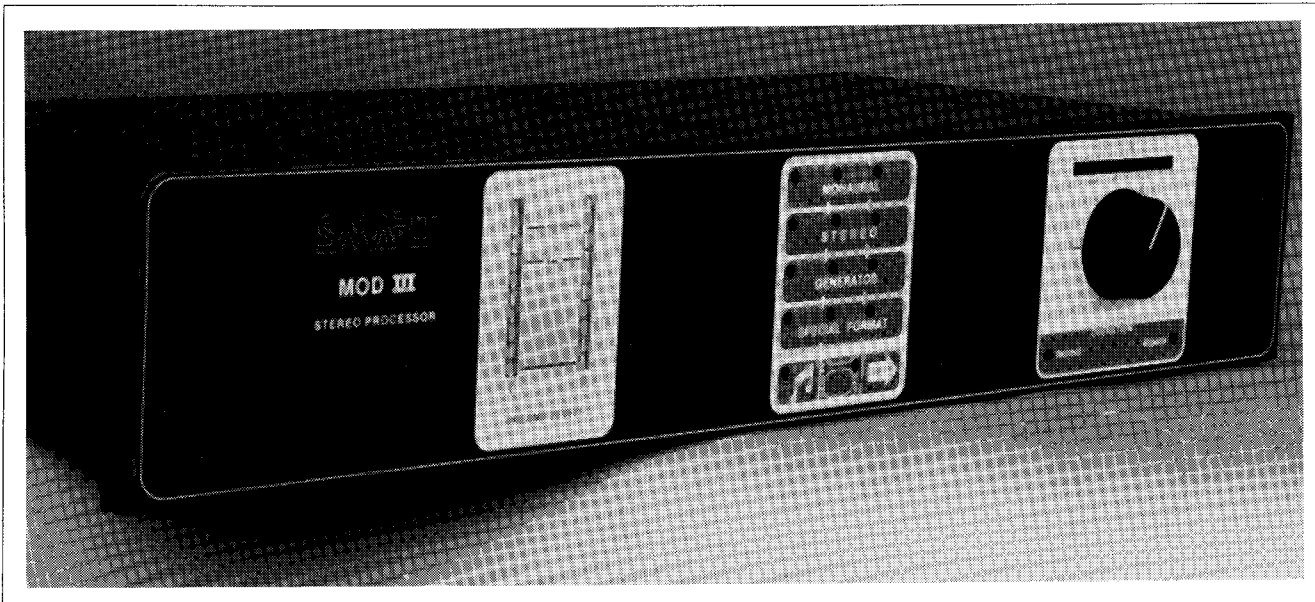
Operating controls on front panel

The control logic terminals on the MOD III must be connected to ISOLATED relay contacts on the automation . THERE MUST BE NO OTHER EXTERNAL SOURCE OF VOLTAGE ON THESE CONTACTS AS SERIOUS DAMAGE TO THE MOD III COULD RESULT. The control logic terminals are normally at a high logic level (15 vdc) and must be grounded to activate a particular function. The following list explains the purpose of each logic terminal:

1) COM - When grounded, turns on non-sync music, turns off film sound. When un-grounded, turns on film sound, turns off non-sync music. The MOD III normally powers up in FILM mode so that an automation attached to this terminal can control film/music changes. If the MOD III is not attached to an automation system, this terminal can be permanently grounded so that the MOD III will power up in MUSIC mode. MUSIC and FILM can then be selected manually with the front panel controls.
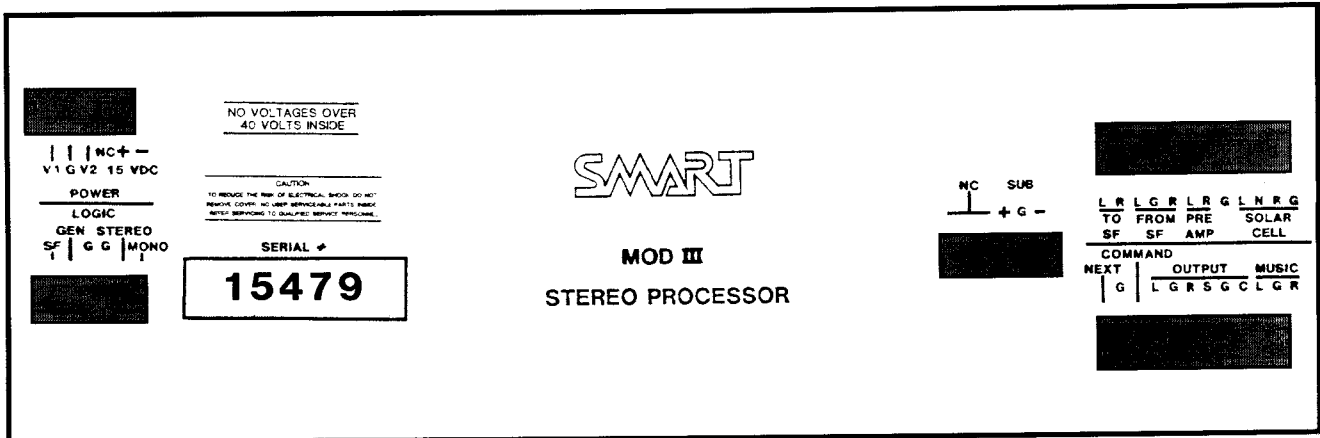
Input, output, and power connections are made to the MOD III with plug-in connector/terminals. Wire the connector first before attaching to the processor. If PC board removal is necessary, the connector must be unplugged before the board can be pulled from the chassis.

2) NEXT - A MOMENTARY ground on this terminal advances the sequencer to the NEXT sound format change which has been pre-programmed by the operator. (Used only if the automation is controlling the sound format changes.) If direct selection of sound formats is desired using either an automation system or the SMART UNIVERSAL SHOW-grammer, this terminal should be permanently grounded.

Normally, COM and NEXT are the only two control logic terminals needed for most situations. These two terminals are located on the right-hand terminal strip of the bottom PC board near the output terminals.
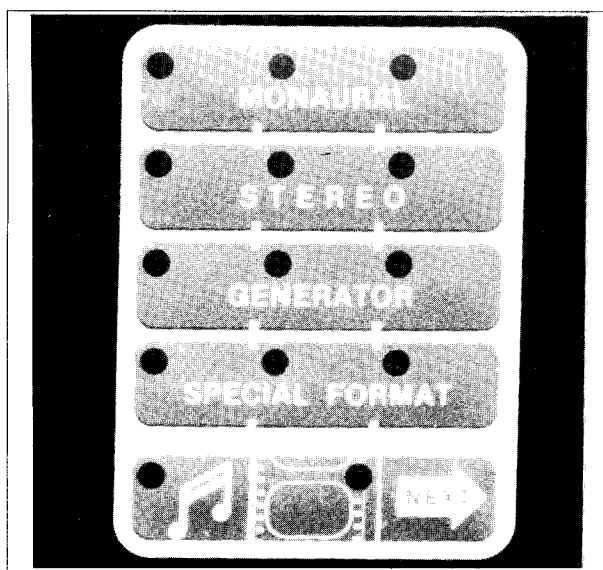
Front panel programming controls may be remotely operated by connecting remote terminals to a suitable automation.

The following terminals are used for direct selection of the sound format. These terminals are located on the left-hand terminal strip of the bottom PC board.

3) MONO - A MOMENTARY ground on this terminal directly selects MONO sound format.

4) STEREO - A MOMENTARY ground on this terminal directly selects optical STEREO sound format.

5) GEN - A MOMENTARY ground on this terminal directly selects GENERATOR sound format.

6) SF - A MOMENTARY ground on this terminal directly selects SPECIAL FORMAT sound format.

Please note that the word "ground" in the above descriptions refers to closing a set of normally open relay or switch contacts connected to the terminal in question and any one of the several ground terminals on the back of the MOD III. These ground terminals are marked with a "G". The word "MOMENTARY" refers to a contact closure of between 100 milliseconds and 1 second duration.

CALIBRATION

Calibration consists of setting the internal controls and switches to achieve prescribed operating characteristics for the system. Certain test equipment and test films are required for proper setup of the system. Included are such such items as the following: oscilloscope, real time analyzer, voltmeter, sound pressure level meter, Dolby tone test film, left/right test film, buzz track test film, and etc. Some of the test films are used only for soundhead adjustment and will not be covered here. It is sufficient to say, at this point, that the MOD III can only work with the signal it receives from the soundhead. The soundhead setup must be done as perfectly as possible in order to give the processor a good, clean signal with which to work.

B CHAIN

The B Chain is generally considered to be the signal path from the master fader to the speakers. Calibration consists of setting the house equalization and output level balance of the MOD III. Also, the auditorium level LED's and non-sync music levels are adjusted at this point. If a system is bi-amped or tri-amped, then the electronic crossover must be set, too. (NOTE: the electronic crossover is not part of the MOD III.)

Use the built-in pink noise generator for setting house EQ and output level balance. The pink noise generator is on the top board and is operated by the five-position DIP switch located on the front center of the board. The DIP switches are marked 1 through 5. The #1 switch turns on the pink noise generator. The #2 through #5 switches are Left, Center, Right, and Surround and are used for selecting which channel the pink noise signal feeds. Pushing the switch down turns the selected channel on. Generally, only one of the channel switches is on at one time, although two or more may be turned on simultaneously for checking speaker phasing.
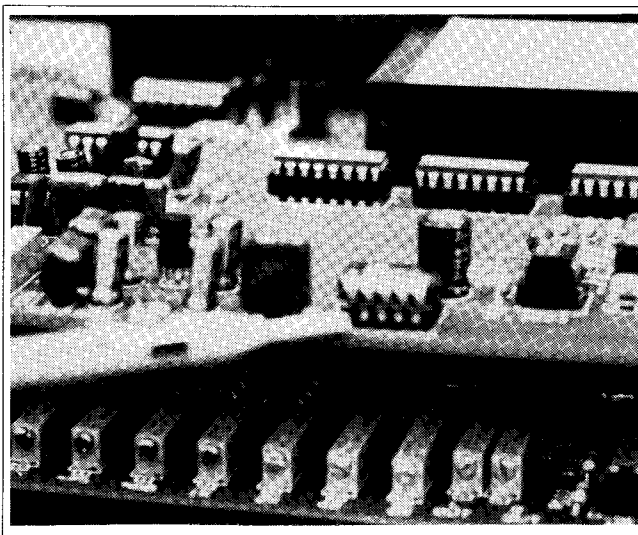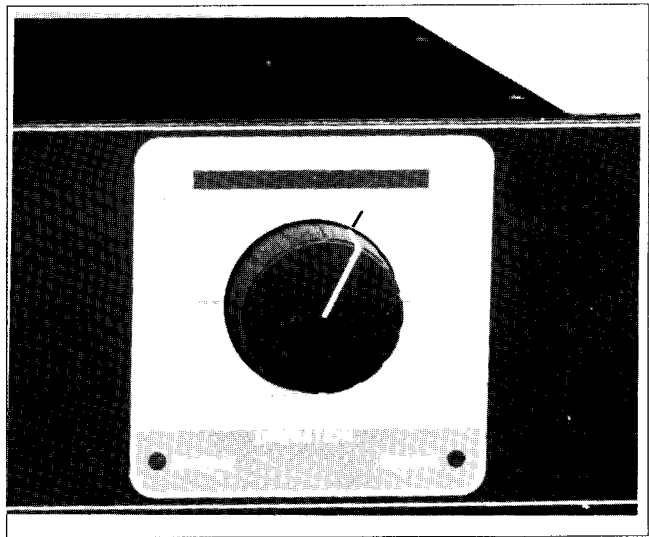

The Pink Noise Generator has 5 switches. The first switch (on the left) turns the generator on and off. The 2nd through 5th switch puts pink noise on each channel (Left, Center, Right, Surround) Be sure to turn the pink noise generator OFF when you are through (Switch #1).

Turn the volume knob to the CAL mark on the front panel and leave it there until told otherwise. Press the film pushbutton (indicated by the picture of a frame of film) to activate film mode. Press the STEREO buttons on all three program banks . All STEREO LED's should be lit, one bright and two dim.

EQUALIZATION AND CHANNEL BALANCE

1) Turn on the pink noise generator by pushing the #1 DIP switch down. Push the #3 DIP switch down to feed pink noise to the center channel.

2) Using your real time analyzer (RTA), set the house EQ for the center speaker to the ISO-2969 curve (flat to 2kHz, then down 3dB per octave at the higher frequencies). Next, adjust the center output trimpot to achieve 85dBc spl near the rear of the auditorium.
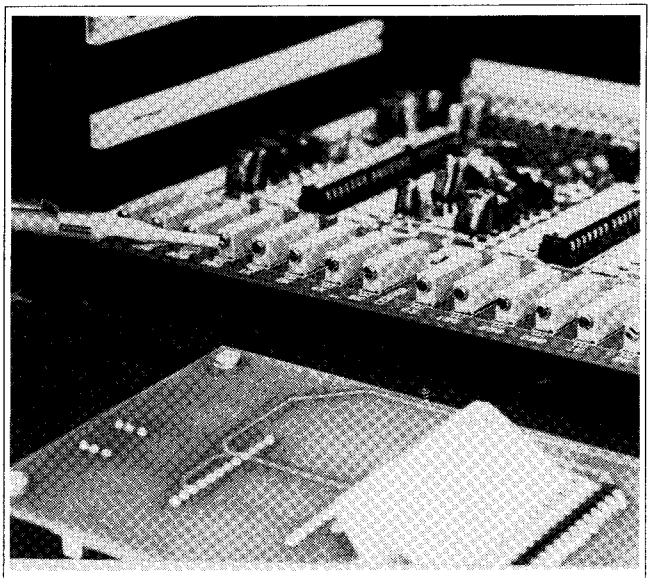

The Center and Surround channel equalizers are on the bottom PC card. The Left and Right equalizers are on the middle card, if the MOD III is equipped for 4-channel operation.

3) Adjust the EQ and house levels as in step 2 for the other channels using DIP switches to select the appropriate channel. Remember to turn off the pink noise on all channels except the one you are adjusting.

AUDITORIUM LEVEL LED CALIBRATION

Turn on pink noise in the center channel, and adjust the Auditorium Level Cal trimpot (A single turn trimpot located just behind the C OUT trimpot on the bottom board) to light up the LED at the 85 mark on the front panel (just above and to the left of the volume knob). Turn on the Center channel pink noise source and measure 85 dB SPL in the auditorium with your sound pressure meter. Adjust the auditorium level display to show 85 dB on peaks.
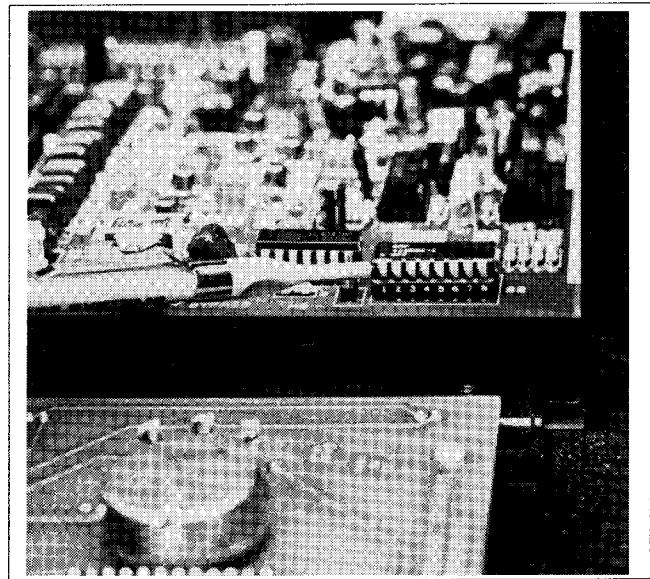
The Time-Delay DIP switch sets the auditorium for both SVA stereo and Stereo Generator modes of operation.
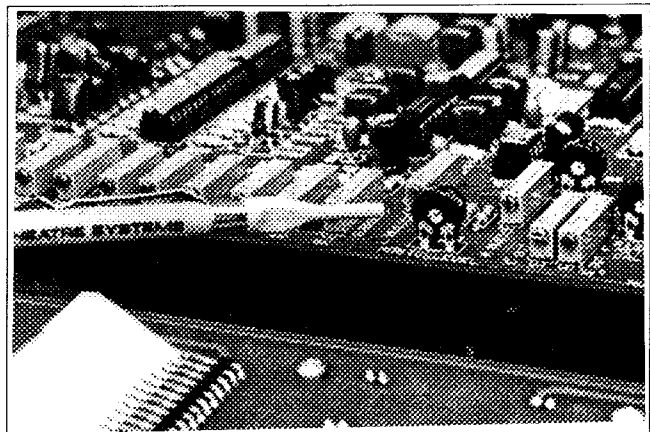

Auditorium Level Indicator
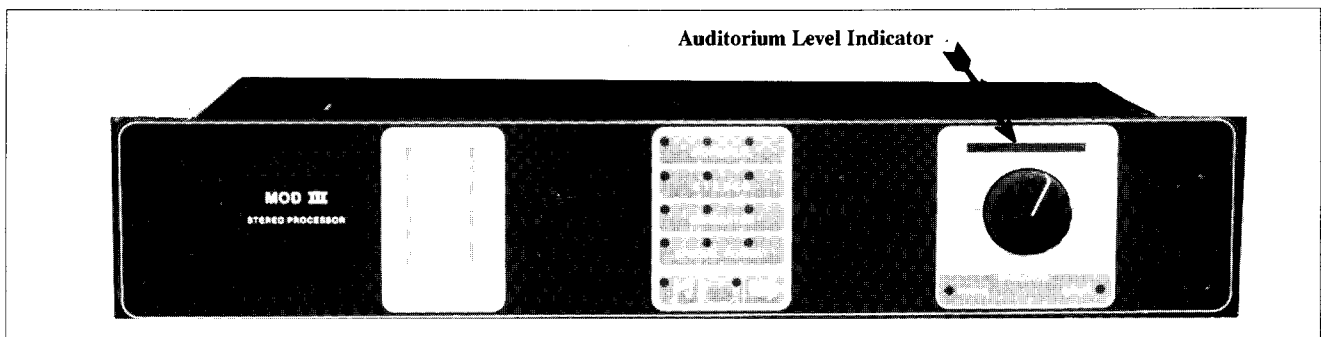
SURROUND TIME DELAY

The time delay for the surround channel is set by an 8 position DIP switch located on the right end of the bottom board. All switches down gives a delay time of 35 milliseconds. For each switch pushed up, 10 milliseconds is added to the delay time. For example, 4 switches up = $35 + 10 + 10 + 10 + 10 = 75$ milliseconds. The maximum is 115 milliseconds with all switches up.

MUSIC LEVEL

The intermission music level is set with the Music Level trimpot located near the front center of the bottom board. Normally this pot should be set to the 2 o'clock position. Then the

Left and Right music trimpots are adjusted to yield the desired intermission music volume in the house. These Left and Right levels should be about equal and can be checked by playing

The music trim pot sets proper auditorium non-sync music level. Individual Left and Right music trim pots are right behind this pot.

music with vocals, and adjusting either Left or Right music trimpot to minimize the amount of voice in the surrounds. You can monitor the surround channel on the booth monitor for this check.

SUBWOOFER

The MOD III four channel version has a sub-woofer crossover located on the MOD3x320 four channel board. The subwoofer response is from 25 Hertz to 80 Hertz at the -3 dB points and has a 12 dB/octave rolloff on the bottom end and an 18 dB/octave rolloff on the top end. This is the normally required response for subwoofer speakers such as the JBL, Electrovoice, and others.

The MOD III subwoofer outputs consist of a positive output, a negative output, and ground. The positive and negative outputs are equal level but opposite polarity. They can be used to drive a standard two-channel stereo amp (such as the SMART TA-242) in a bridged mono configuration. Simply connect the positive sub-woofer output to one of the amplifier inputs, and connect the negative subwoofer output to the other amplifier input. Connect ground as usual. Then, the two speaker leads are connected to the amplifier's two HOT outputs. In this mode, NEITHER SPEAKER LEAD IS CON-NECTED TO GROUND. For the SMART TA-242, this will produce about 350 watts into an 8 Ohm load. As with other stage speakers, it will be necessary to check, and correct if needed, the phasing between the subwoofer and the stage speakers.

Adjust the subwoofer level using the SUB LEVEL trimpot, located between the LEFT and RIGHT EQ trimpots on the four-channel board. To obtain an initial setting, turn on the LEFT channel pink noise, and observe the left channel auditorium level on a real time ana-lyzer. Turn the SUB LEVEL trimpot up until the extreme low frequencies come up to the same level as the left channel. Play some film

with a good soundtrack that has a lot of low frequency material. The subwoofer should add the bass you want, BUT it should not be so loud as to add boominess to male voices. Also, it should not be so loud as to bleed over into other houses. You may have to experiment with the subwoofer level to optimize it for your audito-rium.

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 in-cludes preamps, filters, matrix decoders, and etc. Of course, the soundhead alignment must be done before any meaningful adjustment can be made to the MOD III. This is frequently not done as well as it should be and results in poor system performance. After soundhead adjust-ments have been made, proceed to the MOD III preamp levels.

PREAMP

Locate the NULL/PRE toggle switch on the bottom board, and put it in the PRE position as labeled on the board. This feeds the right preamp signal to the right preamp level LED array on the front panel. The NULL position allows the right LED array to be used for accu-rately setting the left/right preamp balance for minimum crosstalk on the surround channel.
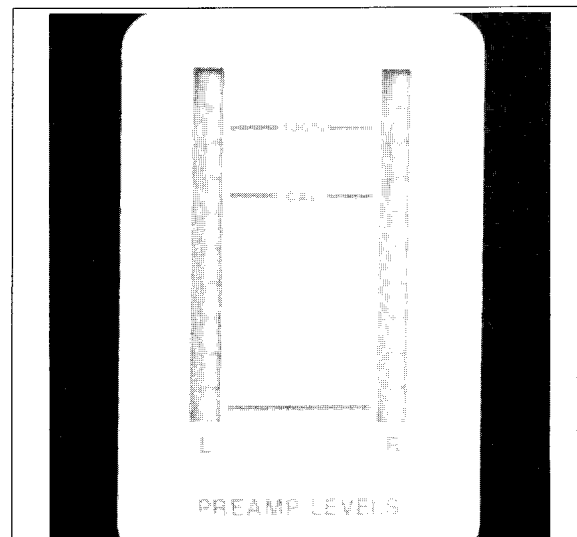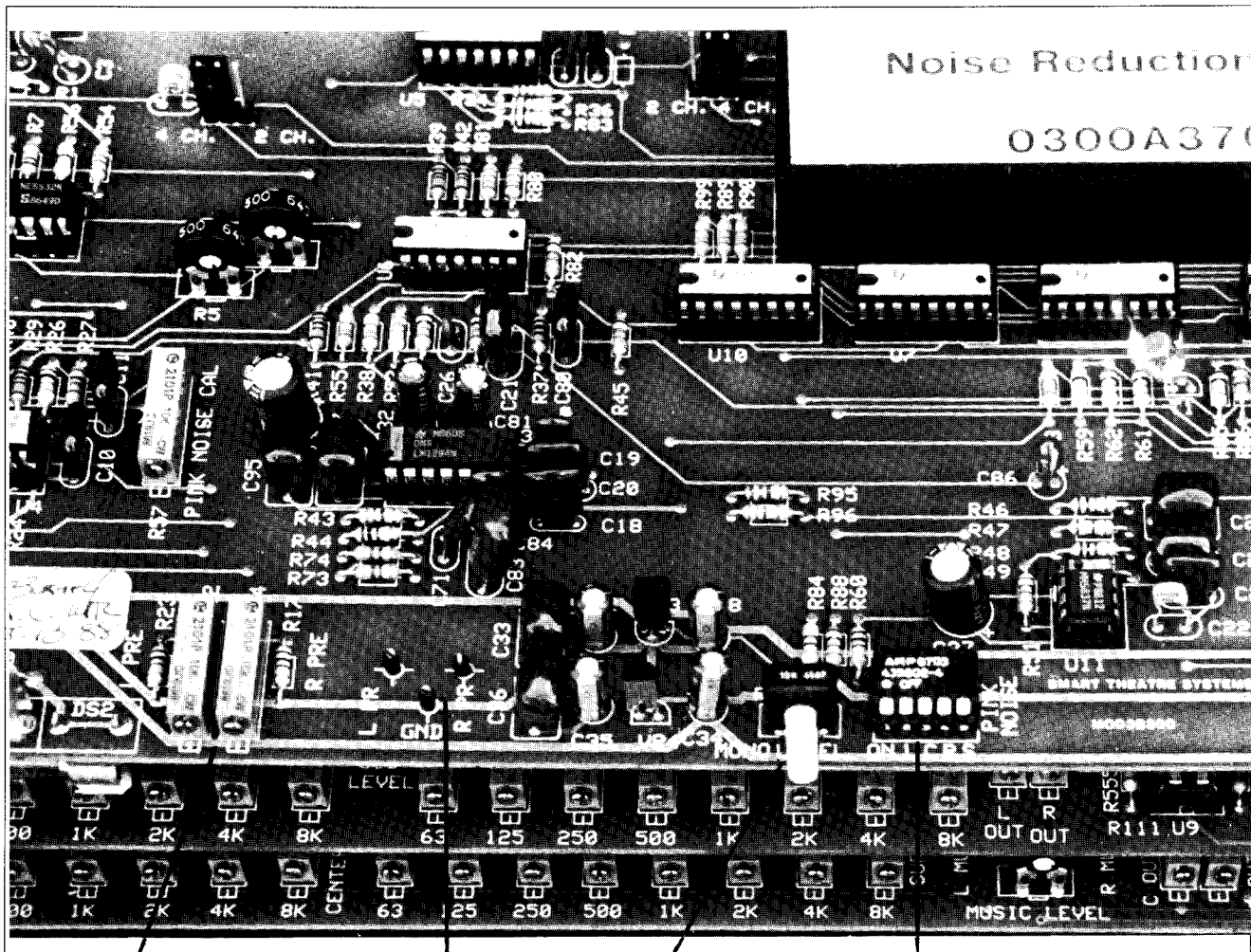
L & R INPUT TRIM POTS

MONO LEVEL ADJUST

PREAMP OUTPUT TEST POINTS

PINK NOISE GENERATOR

Thread a Dolby CAT.#69 test loop, Dolby tone side, on the projector. On the top board near the left hand end, locate the left and right preamp level trimpots. With the tone loop running, adjust the preamp level trimpots until the front panel preamp level LED's are lighted up to, and including, the yellow CAL point LED. Turn the trimpots clockwise slightly until the next higher LED just starts to light, and then back off the adjustment until the next higher led just turns off. This is the proper preamp calibration point.

A more precise Dolby tone level adjustment is made with an analog meter. Just to the right of the preamp level trimpots, you will find three test points labeled L-PR, GND, amd R-PR. Connect an accurate analog voltmeter to the

test points. You should read 707 mV (0.707 volts) when the preamps are properly calibrated, with Dolby tone running.

Put the NULL/PRE toggle switch in the NULL position. For a Front-Surround system, adjust the right preamp level trimpot VERY slightly until you get minimum reading on the right LED array. Almost all the right LED's should be out. If you have more than 5 or 6 LED's lit, re-check the soundhead slit lens azimuth as this will cause an insufficient null if not accurately aligned.

For a 4-channel system, adjust the Roght NR trimpot on the 4-channel board for the best surround null. The NR pot is located just to the right of the R OUT trimpot. Do not adjust the

preamps for best null in the 4-channel system.

MONO LEVEL

The MONO level trimpot located on the top board is a user adjustable control which is used to match levels of mono material to stereo material. Normally this will be set to about the 11 o'clock position, but it may be adjusted by the operator so that trailers and other pre-show film will be about the same level as a stereo print.

NORMAL/BYPASS switch is in the NORMAL position. You may have to switch between NORMAL and BYPASS several times to properly match the levels.

SURROUND GENERATOR LEVEL

The SURROUND GENERATOR level is preset at the factory, but may require minor readjustment in the field. Thread a reel of mono or stereo film with a lot of dialogue on the
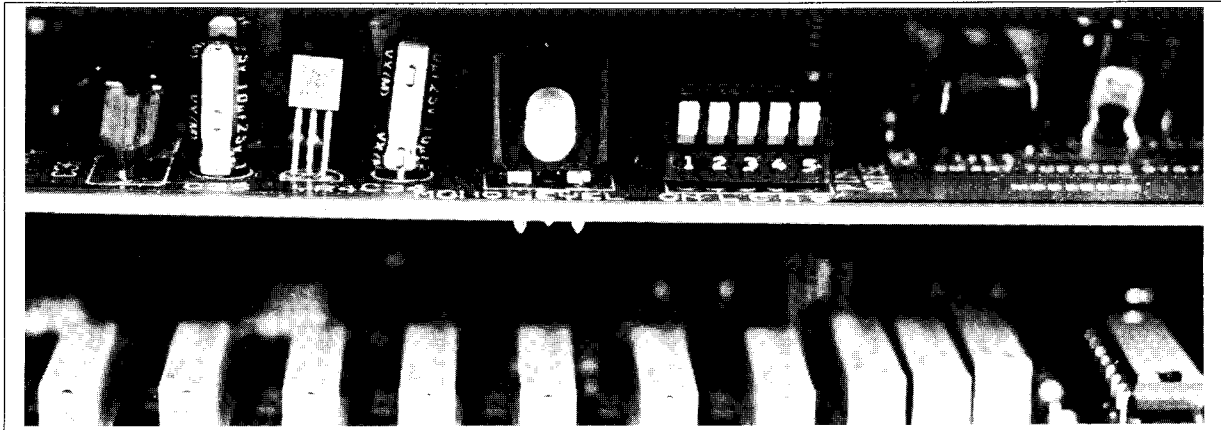

Mono trim pot is for setting mono soundtrack playback level. This does not affect stereo levels.

EMERGENCY BYPASS LEVEL

With DOLBY tone still running, monitor the center channel on the booth monitor. Locate the NORMAL/BYPASS switch on the bottom board, and place it in the BYPASS position. Find the Emergency Bypass trimpot on the top board, and adjust it so that the level is about equal to the center channel level when the

projector. Press the GENERATOR buttons on all three program banks. Find the RUN/TEST toggle switch on the top board, and place it in the TEST position. Locate the SURROUND GENERATOR level trimpot on the top board, and adjust it until the sound level from the stage speaker(s) is equal to the sound level from the surround speakers. This MUST be done in the auditorium and not by using the monitor.
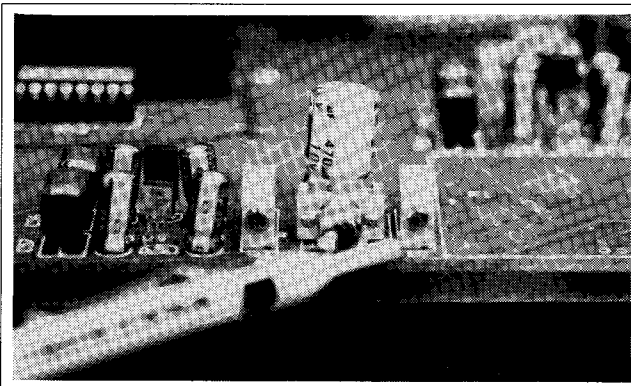
Set EMERGENCY preamp to the same level as the mono playback level by listening to a soundtrack through your booth monitor and switching between mono and emergency.
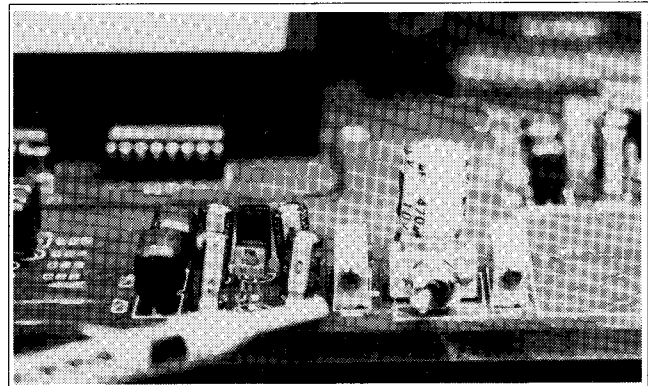
The Surround generator level is adjusted ONLY after the rest of the system has been fully calibrated. Use a 12 foot length loop of discarded trailer dialog to set level.

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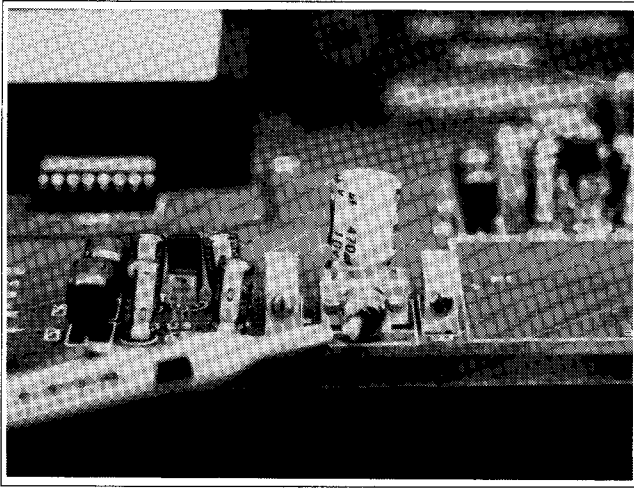
RUN-TEST switch turns the surround generator fully ON for testing. Be sure to return the switch to the RUN position when you are through testing.

OPERATION

The versatility of the MOD III is not readily apparent from the simplicity of the front panel. The volume control and switches on the front panel are only those that are needed for routine operation. Less used switches and controls are accessible behind the front panel which swings down on a hinge. There are access holes at the top left and right of the front panel which can be grasped with a finger to pull the panel down.

FRONT PANEL FEATURES

The most prominent feature of the front panel is the SoftSwitch pushbutton array. This group of switches control all the major modes of operation of the MOD III. Function indicator LED's are positioned around the switches to show the current status. There are two major sections of the pushbutton array, the sequencer section and the film/music section.

The FILM/MUSIC section consists of the two lower left pushbuttons. They are marked with pictures of musical notes for MUSIC mode and a film frame for FILM mode. The LED's in the upper left of each pushbutton indicate the currently selected mode. To change modes, simply press the pushbutton for the desired mode. If the automation system should fail and lock up in MUSIC mode, simply press the FILM pushbutton to regain control of the MOD III. Then you can manually select FILM and MUSIC modes as needed.

The sequencer section allows you to set up a sequence of up to three events (sound format changes) which can be triggered manually by
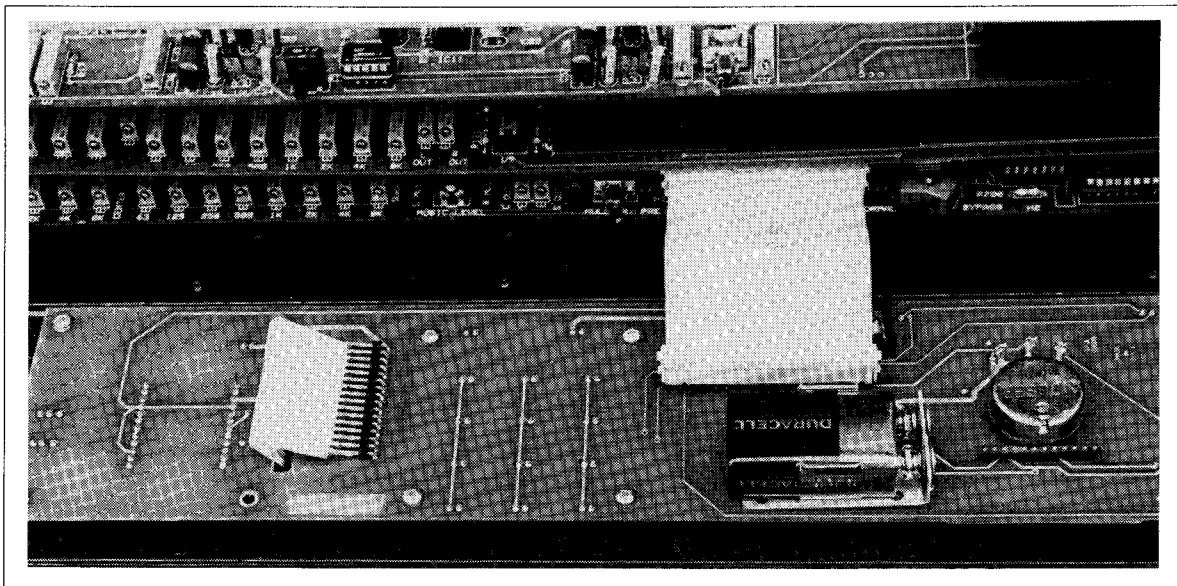
The 9 volt battery will last over a year (typically 2 years). It is used to keep the computer memory awake when power is removed from the MOD III processor. Memory is powered by unit when on.

pressing the NEXT pushbutton or automatically from your booth automation system. This group of pushbuttons is arranged in four rows denoted by the function names - MONAURAL, STEREO, GENERATOR, and SPECIAL FORMAT. From left to right in each row, there are three pushbuttons corresponding to event 1, event 2, and event 3. Each pushbutton has a corresponding LED in its upper left corner which lights to indicate that function has been selected. There will only be one function selected per event column. For example, event 1 might be MONAURAL (mono), event 2 might be STEREO, and event 3 might be GENERATOR. Only three LED's will be lit in the sequencer group of pushbuttons corresponding to these selections. Of these three LED's, one will be brightly lit, and the other two will be dimly lit. The brightly lit LED indicates the current function and event. If you press the NEXT pushbutton (or if automation triggers the NEXT function), the brightly lit LED will go dim and the LED for the next event will light brightly. As you repeatedly press the NEXT pushbutton, you will see the LED's sequentially go from bright to dim and back to bright again indicating that the MOD III is stepping from one event to the next. You can select any sequence that you desire up to three events. If your booth automation system is controlling the MOD III, the sequencer will reset to event 1 whenever the automation selects MUSIC mode. If you are manually controlling the MOD III, selecting MUSIC will <u>not</u> reset the sequencer.

NOTICE!

If you fail to return the Pink Noise Generator DIP switch #1 to the OFF position, the processor will stay in the Stereo SVA mode and the programming controls will not let you change modes. Please make sure the switch is OFF after you are finished with your calibration so the processor can operate normally.

HOUSE LEVELS

The house volume control is the only control knob on the front panel of the MOD III. It is used to adjust the volume level in the auditorium. In normal operation, it should be set to the point marked CAL (about the one o'clock position).

Above the volume control knob, there is an LED array marked AUDITORIUM LEVEL. This is a visual indicator of the actual sound pressure level in the auditorium. It is calibrated in dB spl from 73 to 100. The 85 dB spl point is marked as a reference level. In most cases, normal dialogue should cause the indicator to light up to the 85 point or a little less. After some experience with volume levels in your auditorium, you can use this indicator to assist you in setting the volume control for different films.

OPERATION STATUS

Under the volume control is a section with two LED's marked OPERATION. The LED's indicate the current operating mode, either NORMAL or BYPASS. As the name implies, NORMAL is the normal mode of operation which will be used almost all the time. An internal switch will change to the BYPASS mode, which is used in case of a failure in the MOD III. If the sound should suddenly stop, going to BYPASS will activate the emergency circuits and will restore the sound IF the MOD III is at fault. If this does not help, return to the NORMAL mode and activate other emergency switches which may be present in your particular sound system.

INTERNAL FEATURES

There are other operator controls and switches behind the front panel of the MOD III. These are necessary, but seldom-used items. Simply flip down the front panel to gain access to these features.

NORMAL/BYPASS SWITCH

The *RED* NORMAL/BYPASS switch is located near the right-hand end of the bottom circuit board. It is a red rocker switch and is marked NORMAL and BYPASS on the circuit board. Push the left or right hand end of the switch to select the desired operating mode.

MUSIC LEVEL CONTROL

This is a small volume control located at the front center of the bottom circuit board. It is used to set the non-sync music volume level in the auditorium. Normally, this is set at installation to about the two o'clock position but may be changed as needed. This is a screwdriver adjustment to discourage unauthorized changes.

MONO LEVEL CONTROL

This is a small volume control located to the left of center on the top circuit board. It is used to set the MONAURAL (mono) mode volume level so that mono trailers will play at about the same volume as stereo features. It is set at the factory to the "average" mono film level but may be changed as needed. To set this control, first set the house volume control for your feature, and then adjust the MONO LEVEL control to give about the same volume on trailers.

LOGO LAMPS

There are two lamps on the left end of the top circuit board. These are used to illuminate the SMART logo on the front panel, and they also serve to light up the interior of the MOD III to help you find your way in a darkened booth. THESE LAMPS LOOK JUST LIKE FUSES BUT THEY ARE NOT FUSES. DO NOT PLACE A FUSE OF ANY KIND IN PLACE OF THESE LAMPS. Replacement lamps are available from SMART through your theatre equipment dealer.

BATTERY BACKUP

There is an alkaline type 9 Volt battery on the front panel circuit board. This is used to keep the event sequencer memory alive when the MOD III is turned off. The battery should last for a minimum of one year. The only indication of a bad battery is a loss of sequencer memory; that is, the sequence of events you have programmed for a show is no longer being maintained during power off conditions. If that happens, replace the battery.
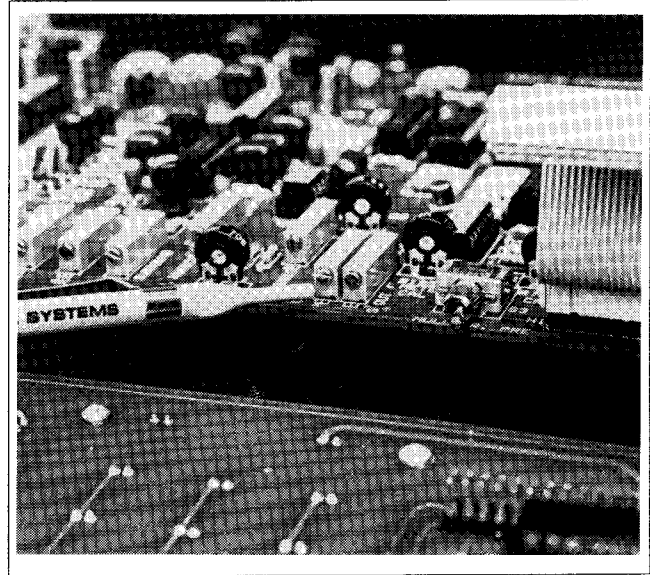
The Center-Surround Output Level pots are on the bottom PC board. The pots are used in both the Front-Surround and 4-channel systems.
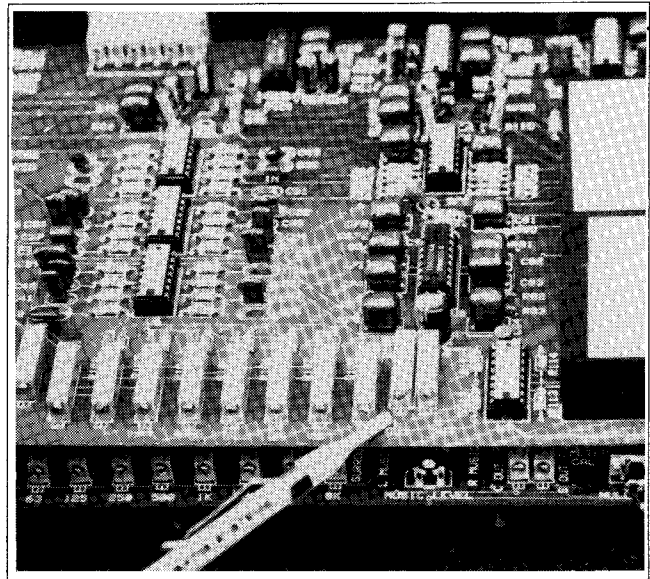
The Left and Right Output trim pots are on the middle board in 4-channel systems.

TECHNICAL TIPS

There are several ways to wire the solar cell to the projector input of the MOD III processor. One way is to use a high quality three conductor plus shield cable so that the Left cell, Right cell, and Neutral conductors are wired directly to the inputs. The shield of this cable must be grounded ONLY at the processor end of the cable. Cut the shield OFF at the projector end. Wrap the cable jacket with electrical tape or heat shrink tubing so that no strands of the cut-off shield can touch the projector metal parts.

Another way to wire the stereo cell is to use two individual twisted pair plus shield cables. Assign the Left, Right, and Neutral leads and make sure you have the same coding on the receiving end of the cable. Again, ground the shield at the processor end ONLY.

The third way is to use special audio cable, such as Neglex, that has each active conductor in the cable twisted around a ground conductor. This type of cable minimizes hum pickup and is the best quality cable available.
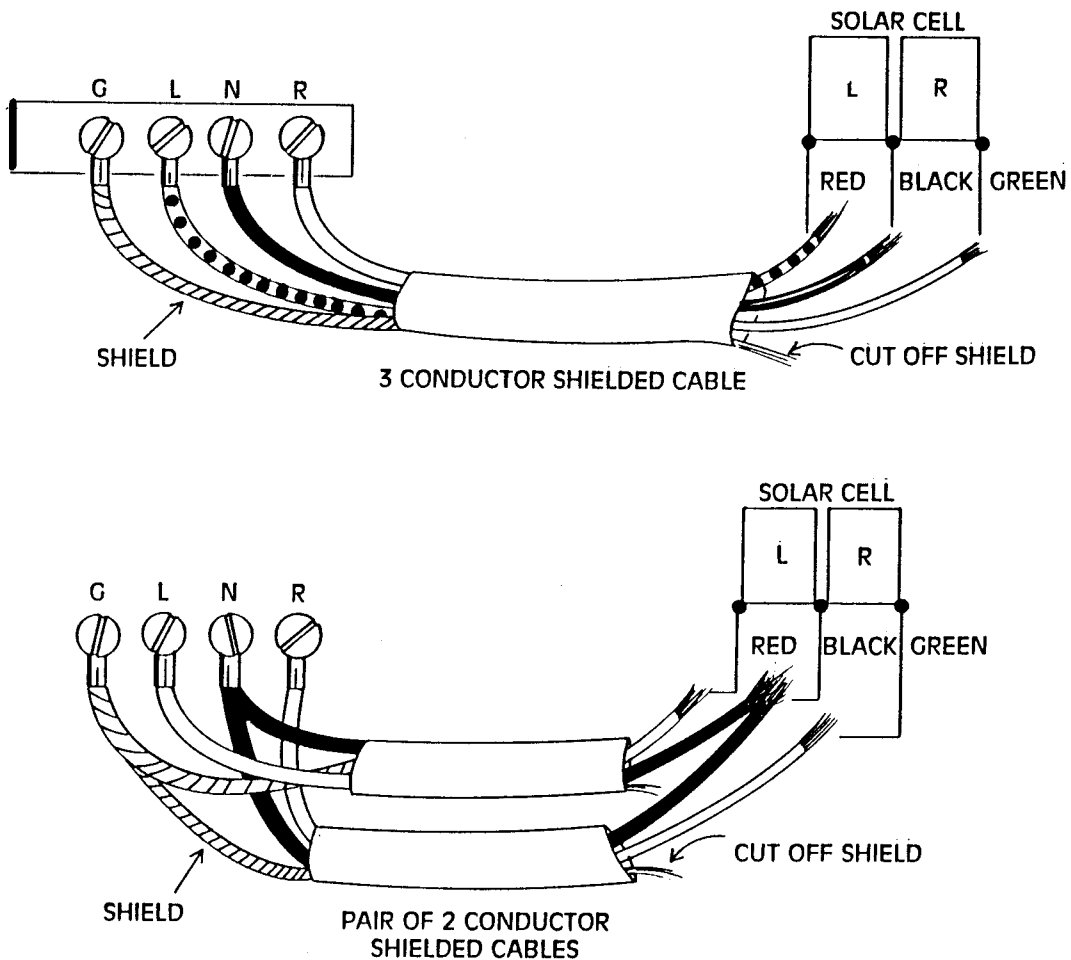
SOLAR CELL

G L N R

L R

RED BLACK GREEN

SHIELD

3 CONDUCTOR SHIELDED CABLE

CUT OFF SHIELD

SOLAR CELL

G L N R

L R

RED BLACK GREEN

SHIELD

PAIR OF 2 CONDUCTOR SHIELDED CABLES

CUT OFF SHIELD

Fig. 1

CONVERTING FROM 2-CHANNEL TO 4-CHANNEL

If the MOD III was purchased as a Front-Surround system, you may upgrade to 4-channel processing at any time by adding the 4-channel matrix board, and moving 4 shunt jumpers on the existing boards. this will reconfigure the system without the need for rewiring or field modification.

Install new power amps, stage speakers, cross-overs, etc. as needed. Add a wiring harness from the MOD III LEFT and RIGHT outputs to the other new equipment in the rack.

Before installing the new 4-channel board, remove the top board. Be sure to unplug the wiring harness connectors first. Locate the three shunts on the top board. There are two near the Noise Reduction module and one about 3 inches to the left of the Noise Reduction module. They are marked H1, H2, and H3. Place the H2 and H3 shunts in the 4CH position as marked on the board. Next, examine the new 4-channel board, and determine if a FRONT GENERATOR MODULE has been installed. If so, it will be located behind the right channel Noise Reduction module and beside the WIDE-TRAC Matrix module. If there is NO Front Generator module, then leave shunt H1 in the 2
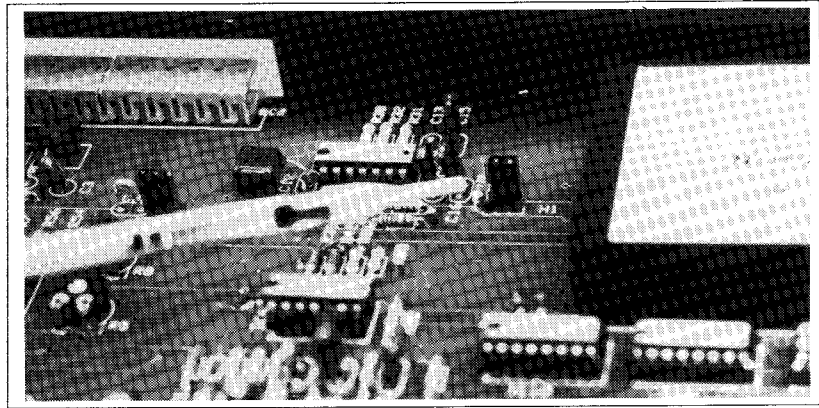

One of the 2-4 channel shunt jumpers used to reconfigure a Front-Surround system to full 4-channel operation.
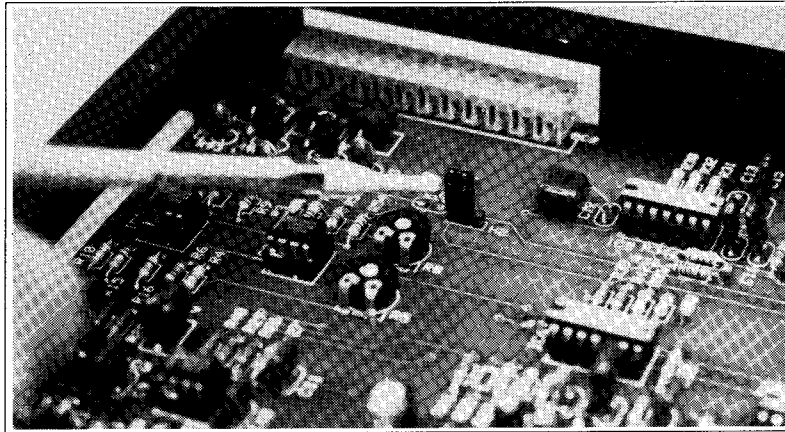
Another 2-4 channel shunt (on the top board) is near the motherboard at the rear of the card cage.

16
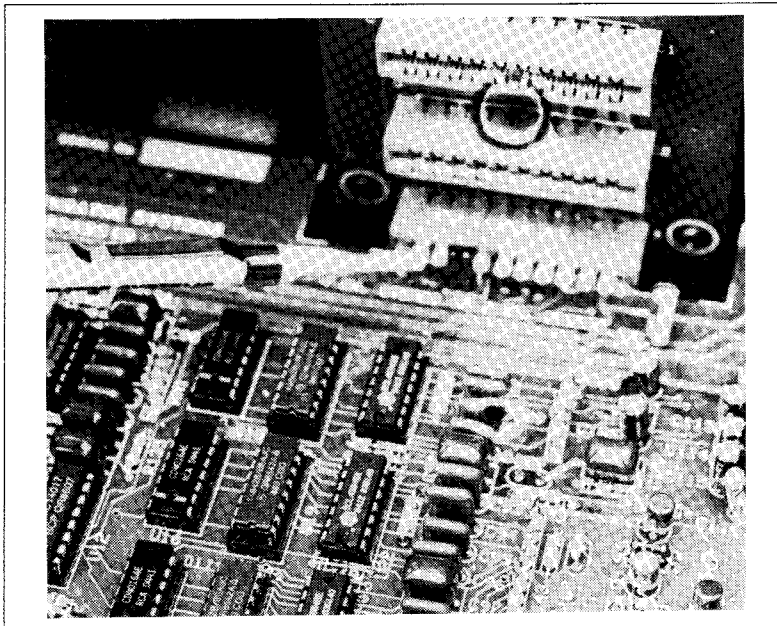
The shunt near the Noise Reduction module on the Low-Level board must be moved to convert the system to 4-channel operation.

CH position. If there IS a Front Generator module, move shunt H1 to the 4 CH position.

There is a shunt on the bottom board which must also be moved to the 4 CH position. It is located near the back edge of the board, directly in front of the motherboard edge connector.

Install the new 4-channel board, and then the top board. Re-install the wiring harness connectors. Perform all B chain calibration procedures for left and right channels. Then the preamp level and null adjustments should be done.

Play a reel of good stereo material for a listen test. This completes the 2 channel to 4 channel conversion.

SERVICE

It may be necessary to remove the printed circuit boards at some time for service. The top and middle PC boards are easily removed. The bottom board (the HIGH level card) is slightly more difficult due to its close physical relation with the display board mounted on the front panel door.

To remove any board, TURN OFF THE POWER, and unplug the connectors on the rear of the chassis. Remove the board retainers on the sides of the chassis and pull the board forward.
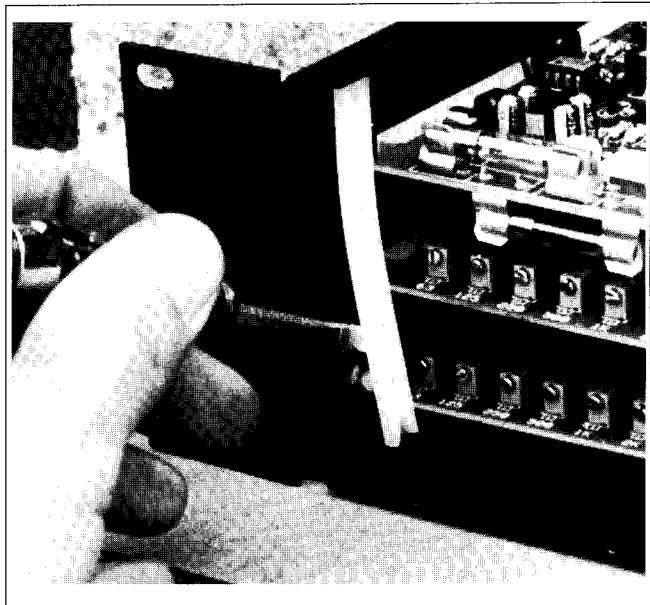

PC board retainer clips keep boards from migrating due to vibration. Remove clips on both sides of the chassis before attempting to remove a PC board.
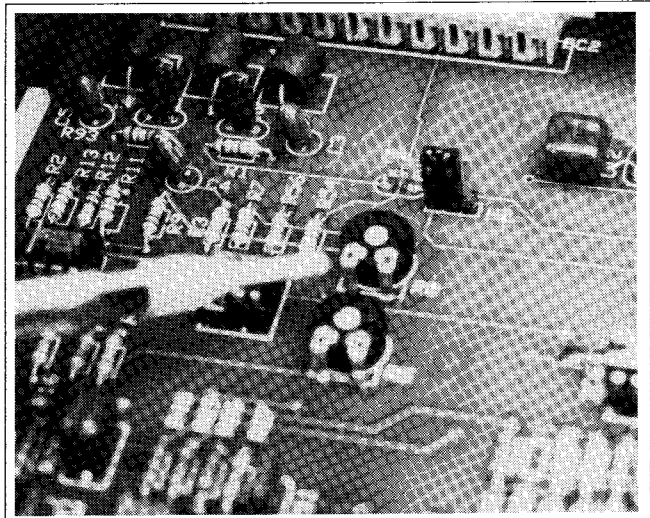

CMR (common mode rejection) pots should not be touched. These are factory adjust pots and are difficult to reset in the field.

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The High Level board may be removed two ways. First clear the way by removing the front panel display board first. There are two ribbon connectors that must be unplugged on the display board, then, remove the 10 phillips screws that hold the display board to the front panel. The high level board may then be removed.

Another way to remove the High Level board is to remove the board above it (the 4-channel board or sub-woofer board) and slightly flex the center of High Level board upward until it pops out of the card rails. The card can be replaced by reversing the process.
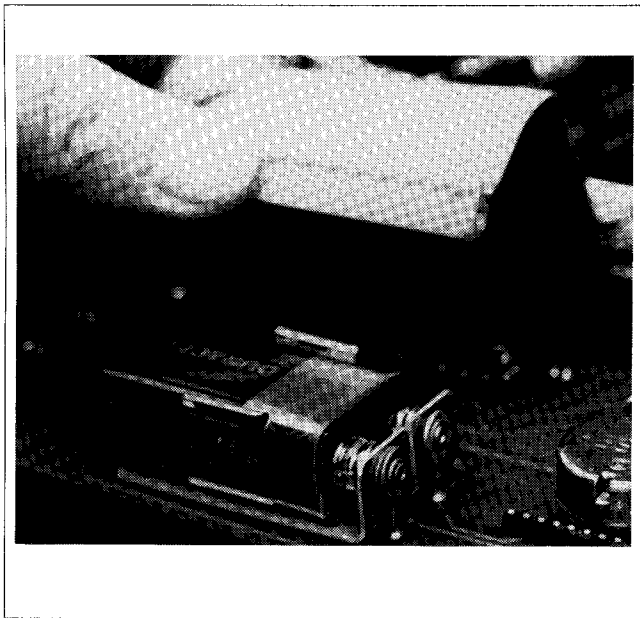
This is one of two ribbon connectors that must be unplugged before removing the display board from the front panel door. The other connector is at the other end of the display card, on the same side of the board.
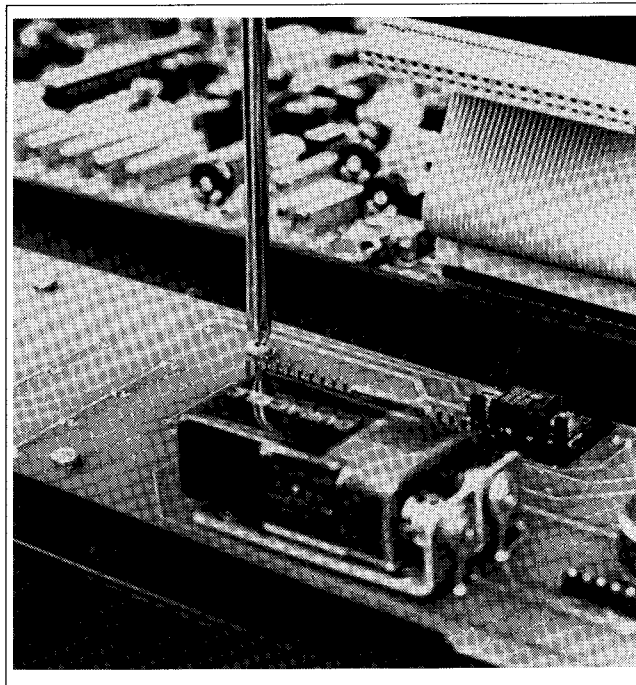
10 Phillips screws hold the display board to the front panel door. Unplug both ribbon connectors before removing the board.
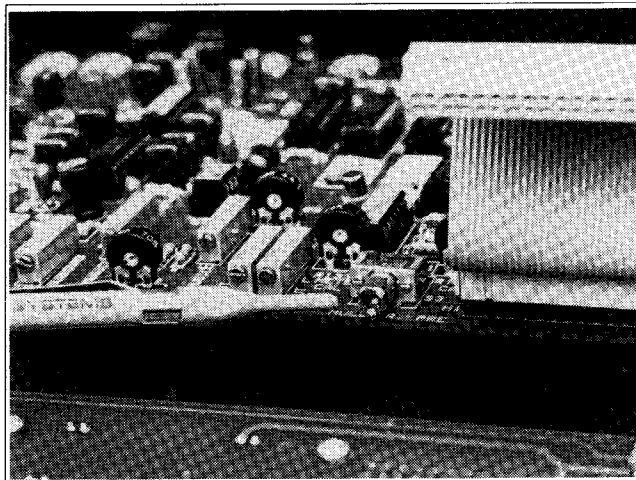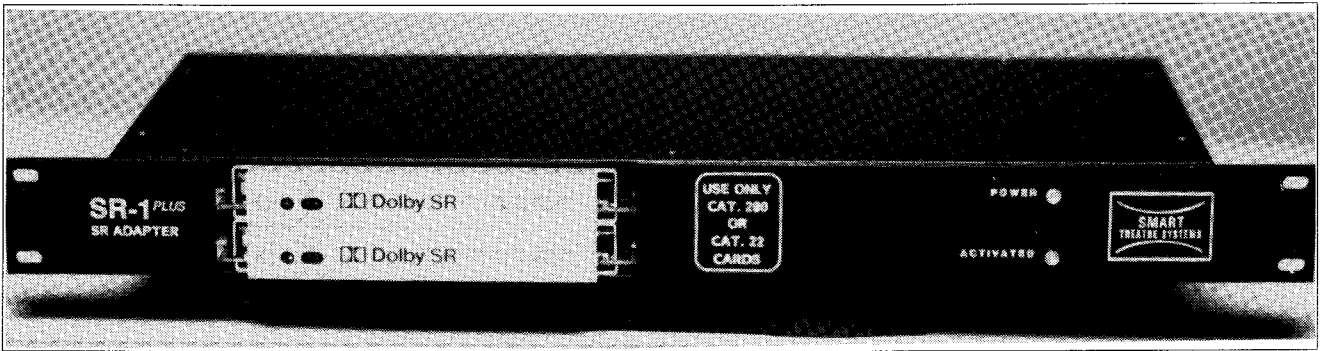

PRE-NULL switch on Low Level board is used to switch the second front panel meter to a null meter or film level meter.
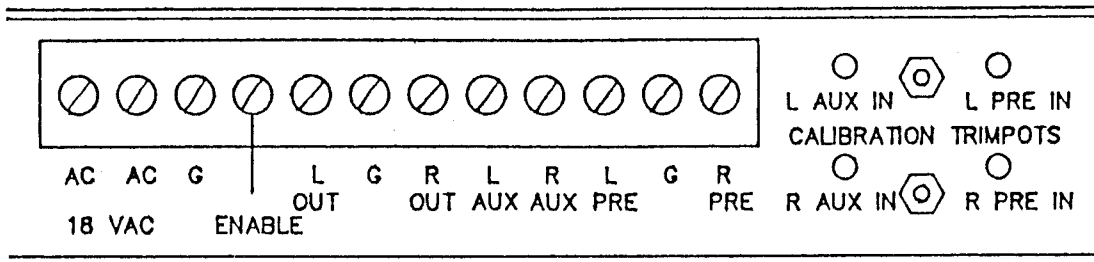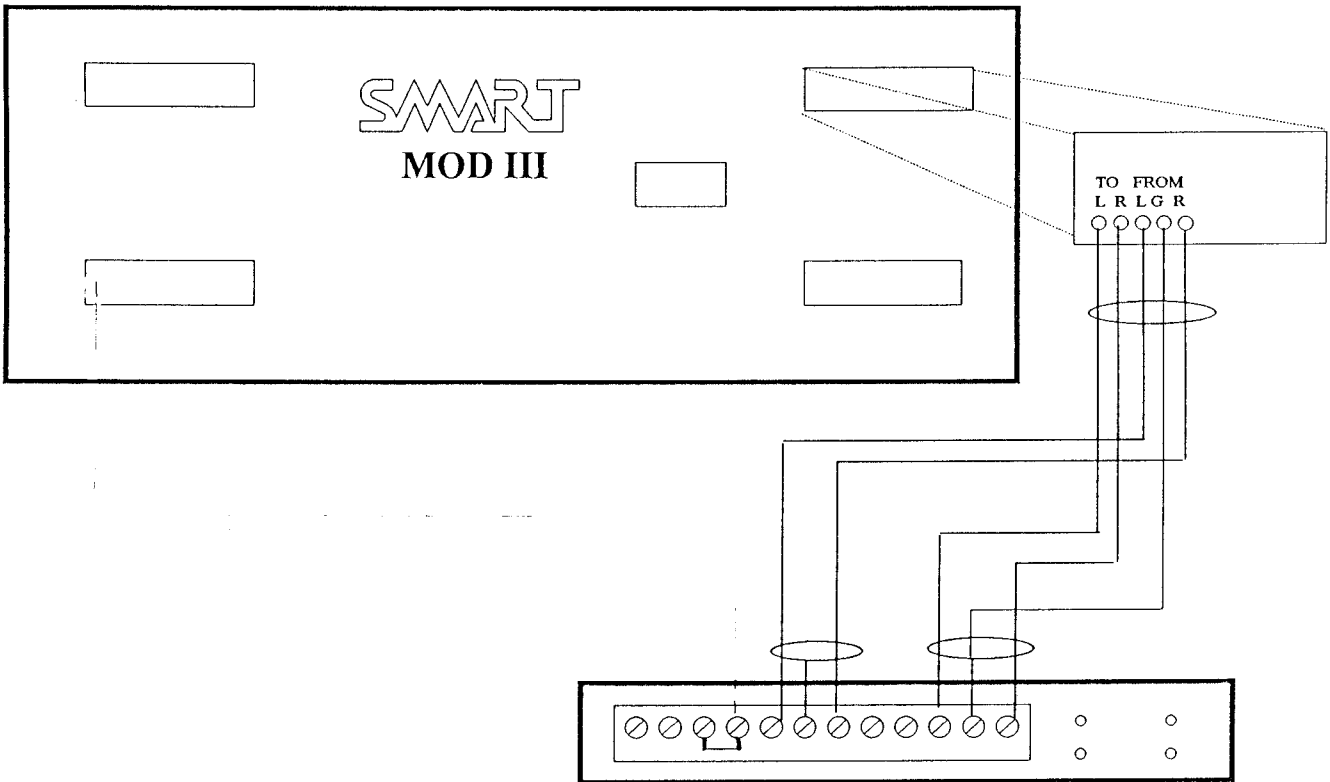
SPECTRAL RECORDING (SR) PLAYBACK ADAPTER.

Expansion to the new Spectral Recording noise reduction format is easy with the MOD III processor. This capability was designed into the unit from the beginning. Only two pair of shielded audio cables are required to hookup the SMART SR-1 adapter to the MOD III.

Place the SR-1 adapter near the processor in the rack to keep audio leads short. Connect the units together as shown in the diagram. When "SPECIAL FORMAT" is selected on the programming panel, the SR is activated. SVA can be selected directly without changing noise reduction cards. See the SR-1 manual for complete installation instructions and the signal balance adjustments.

SMART SR-1 PLUS ADAPTER FOR MOD III PROCESSOR AND OTHER BRANDS

SMART

MOD III

TO FROM
L R LG R

L AUX IN   L PRE IN

CALIBRATION TRIMPOTS

R AUX IN   R PRE IN

AC   AC   G   L   G   R   L   R   L   G   R
              OUT   OUT AUX AUX PRE   PRE
18 VAC   ENABLE

CONNECTING THE SR-1 TO A SMART MOD III STEREO PROCESSOR

PROGRAMMING THE MOD III SOUND FORMAT CONTROLLER

The MOD III sequencer allows up to three sound format changes to be entered and then recalled during a show. The format changes can be manually selected by using the NEXT pushbutton, or they can be selected by the booth automation system if so equipped.

Programming these changes is very easy and will only take a few seconds to do. Look at the MOD III, and find the pushbutton switch section in the middle of the front panel. There are four rows of pushbuttons marked MONAURAL, STEREO, GENERATOR, and SPECIAL FORMAT. These four rows are divided into three columns which correspond to event 1, event 2, and event 3. The sequence starts at event 1 and ends with event 3.

1)Determine the format you want for event 1. This may be MONAURAL, STEREO, GENERATOR, or SPECIAL FORMAT. Push the button in column for the format you want.

2)Determine the format you want for event 2, and push the proper button in column 2.

3)Select the event 3 format in the same way for column 3.

The LED's corresponding to the selections you have made will be lit, one brightly and two dimly. The bright LED indicates which event is currently selected. Pushing the NEXT button will advance the sequence to the next event. Likewise, a cue from the automation will advance the sequence to the next event. If an automation is controlling the FILM/NON-SYNC MUSIC switching, then the MOD III will reset to event 1 whenever MUSIC is activated.

20
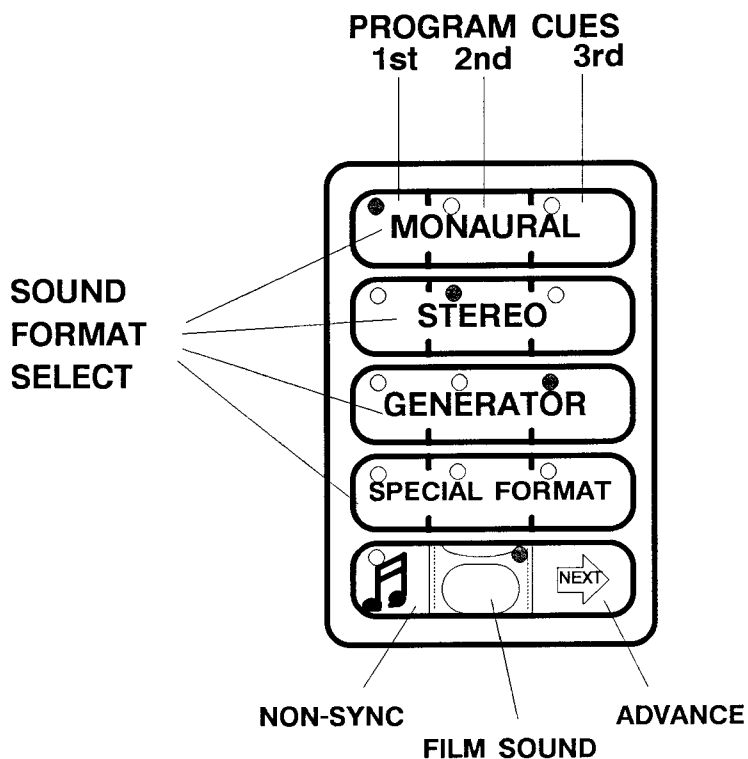
220-240 Volt Operation. The MOD III is able to operate in almost every country when equiped with the proper power supply. The domestic version is supplied with (2) 117 50/60 Hz. power supplies. When the product is shipped to 220-240 VAC countries, a different power supply is furnished (at a higher price). Be sure to let the factory know the power requrements when ordering the processor.

The power pack consists of a specially wound toroid transformer that features two 15 volt AC windings that connect to the power inputs of the MOD III. Both windings must be used to develop the +15 and -15 volts needed in the processor. The power pack also has a 2:1 winding to feed 117 VAC to the (4) AC outlets on the chassis of the power pack. One outlet may be used for the 117 VAC emergency supply furnished with the MOD III. The other outlets may be used to power any low current 117 VAC device such as lamps, soldering iron, test equipment, etc.

The power pack is designed to be secured to the inside wall of the sound equipment rack, or inside the projector lamp console.
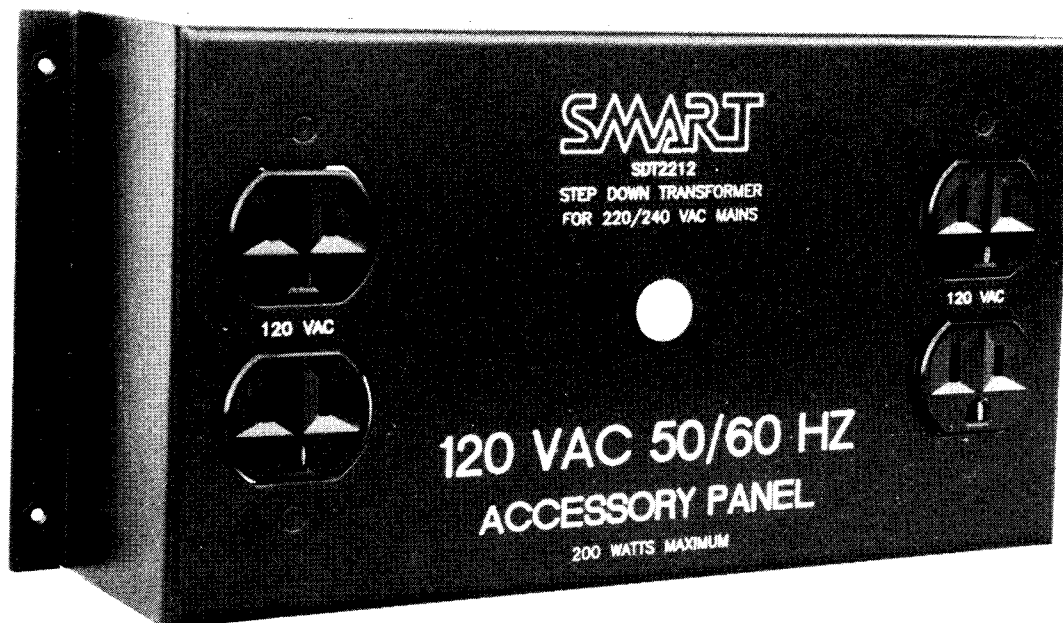
Special Power pack used for export models of the MOD III.

Sub-Bass Expander/Crossover for MOD III/FS
MODEL MOD3A330

The MOD3A330 SUB-BASS EXPANDER/CROSSOVER is designed to be installed in the SMART MOD III Front/Surround processor. It fits into the middle card position which is not normally occupied on the MOD III F/S. This special sub-bass processor adds subwoofer capability to the MOD III F/S and offers the following features:

1. Band-limited 1.5:1 expander circuit which helps to eliminate dialogue in the subwoofer and also increases the dynamic range for dramatic effect on loud passages.

2. VCA control to track properly with master fader setting.

3. 25 Hz to 80 Hz subwoofer crossover with 12 and 18 dB per octave slopes.

4. Electronically balanced outputs to provide proper drive to a dual channel amplifier in a bridged mono configuration.

INSTALLATION

1. Make sure sound system power is OFF.

2. Open MOD III door, remove the board retainers at each end of the chassis, and slide the Sub-Bass card into the unoccupied middle position.

3. Re-install the board retainers.

4. Connect the SUB+, GROUND, and SUB- outputs on the back of the MOD III to the the inputs of the sub-bass power amp. SUB+ will feed one HOT input, and SUB- will feed the other HOT input. The GROUND will connect to the input ground on the power amp.

5. Connect the subwoofer speaker to the two HOT outputs of the dual channel power amplifier. NOTE: neither speaker lead can be connected to ground.
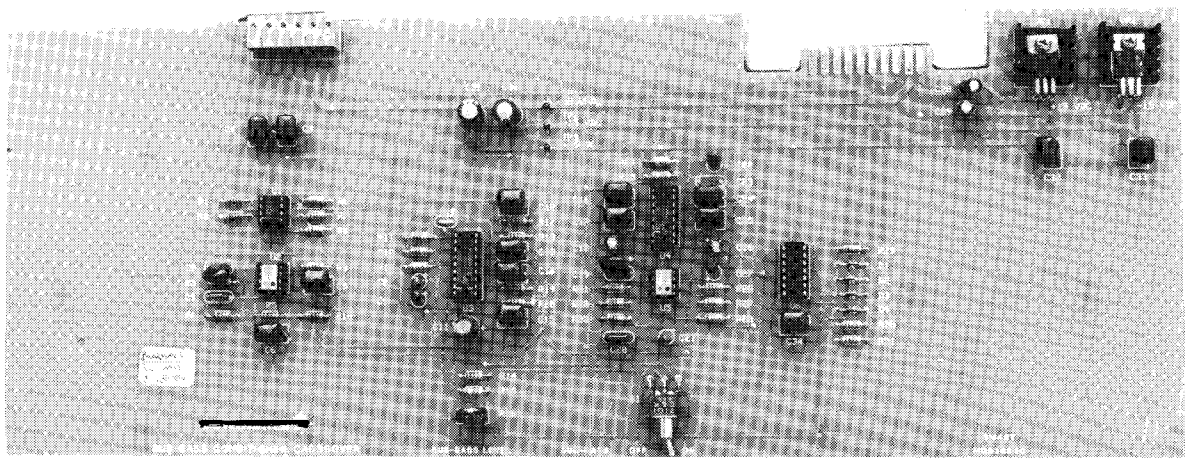
CALIBRATION

1. Turn on the MOD III pink noise switches 1, 2, and 3.

2. Make sure the SUB-BASS switch on the new card is in the OFF position.

3. Check the center channel frequency response on your RTA and adjust as needed for flattest low frequency response. Note where the low frequencies are on the RTA.

4. Turn the CENTER channel amp OFF.

5. Turn the SUB-BASS switch on the new card to the ON position.

6. Adjust the SUB-BASS LEVEL trimpot on the new card until the subwoofer level at the maximum peak is the same level on the RTA as the CENTER channel low frequencies were.

7. Check for proper speaker phasing by turning the CENTER channel amplifier back ON and observing the overall low frequency response on the RTA. The overall low frequency level should INCREASE by about 3dB. If it decreases, then the phasing is wrong, and you must correct it by reversing the subwoofer speaker leads at the power amp outputs.

8. Turn off Pink Noise switches 1, 2, and 3.

CHECKOUT

Play a reel of some known good material with deep bass on it. The LISTEN print from Dolby will be good if you don't have a well recorded feature film to use. The sub-bass response should have no effect on male voices. If it does, then the level is too high and should be re-adjusted down slightly. On loud low frequency passages, the subwoofer should definitely be audible. There should be no abnormal rattling or distorted sounds from the subwoofer on loud peaks. If so, the sub-bass level may be set too high and should be reduced.

CAUTION!

The Bass Expander section of this product can develop a very large output that may possibly damage the subwoofer speaker if set too high. If you do not set the system balance with a real-time analyzer, set the bass output pot at the mid position (12 o'clock) for a general setting. You may later adjust the output more precisely with the proper instruments. Set the amplifier for the desired bass in the auditorium. NOTE: the sub-bass output is automatically disabled when the MOD III is in the mono mode of operation.


If you encounter any problems in the installation, calibration or checkout, please call SMART at 1-800-45-SMART.

MOD IIIB Installation
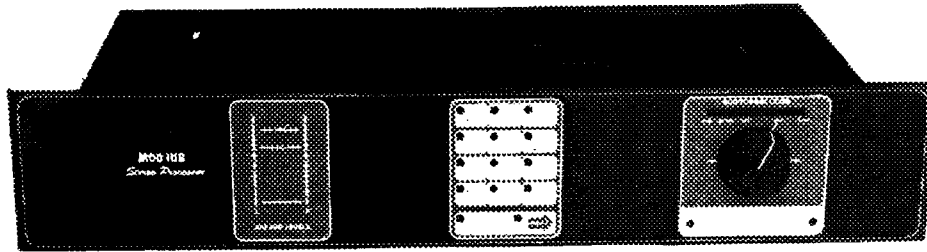
The MOD IIIB is an expanded version of the single projector MOD III Stereo processor. With 2 projector stereo inputs, electronic changeover and slit loss correction, this product can be easily identified by the colors used on the front panel and the additional terminals on the back of the unit. The MOD III has a brown color scheme on the front, and the MOD IIIB uses various shades of gray-green on the front panel.

The wiring and calibration of the MOD IIIB is identical to the MOD III for both the 2-channel Front-Surround version and the 4-channel version. The additional stereo preamplifiers for projector two must be wired and balanced in the exact same manner as projector one.
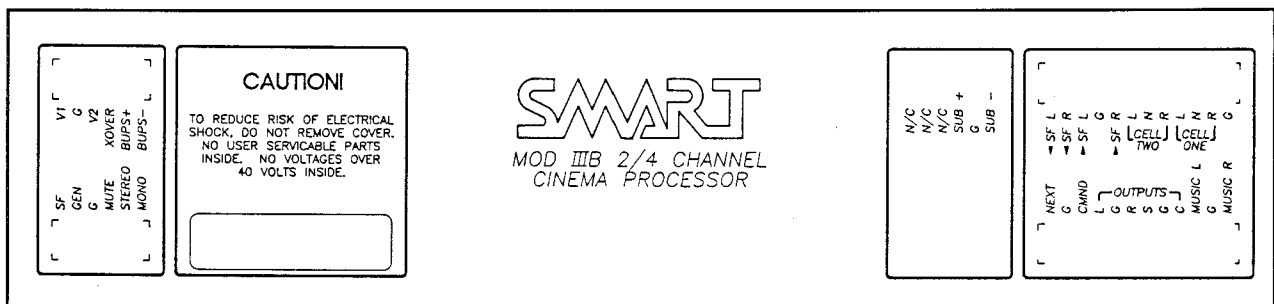

Terminal Legends on back of MOD IIIB
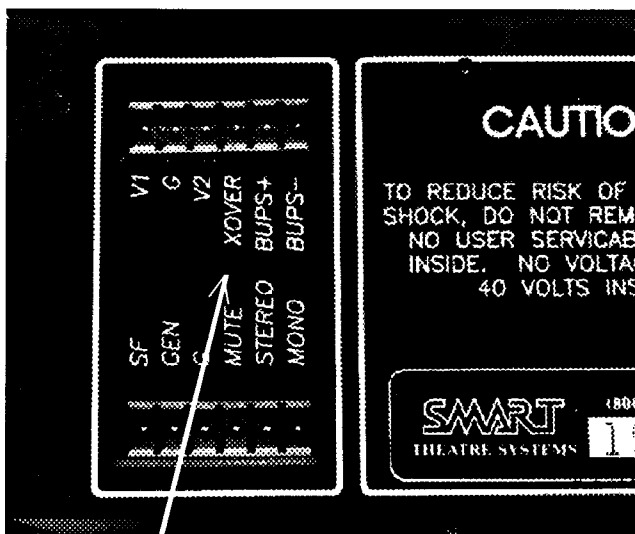
Use the XOVER terminal and G (Ground) for Changeover

Changeover between projector one and projector two is accomplished with external switching from a manual switch (furnished by user) or by connecting the changeover terminal (XOVER) to an automation system that has the capability of maintaining a contact closure during the entire time that projector two is active. Connect a pair of wires from the XOVER terminal and nearby Ground (G) terminal to the external switch or automation using a twisted pair of non-shielded wire. The contact closure must be DRY, with no voltage present from the switch. A voltage sent into the XOVER terminal can damage the electronic switch circuit in the MOD IIIB.

Slit loss correction for the 4 preamplifier channels in the MOD IIIB should be adjusted after a complete "A" chain alignment is completed. A Real Time Analyzer should monitor each preamplifier output during the while the sound lens is being focused in addition to a dual trace scope to monitor azimuth of the lens. A normal slit width lens supplied with the projector should have a frequency response out to 6 kHz. A narrow slit premium sound lens should respond to better than 8 kHz. Do not attempt to compensate for a lens that is improperly aligned, or defective.
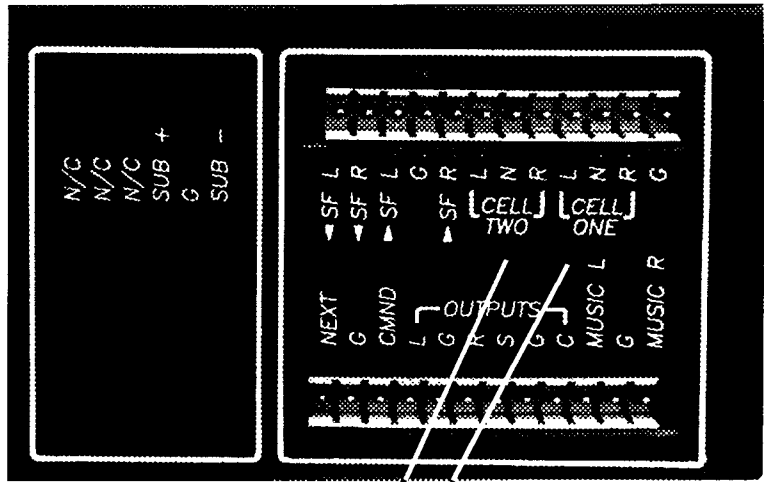
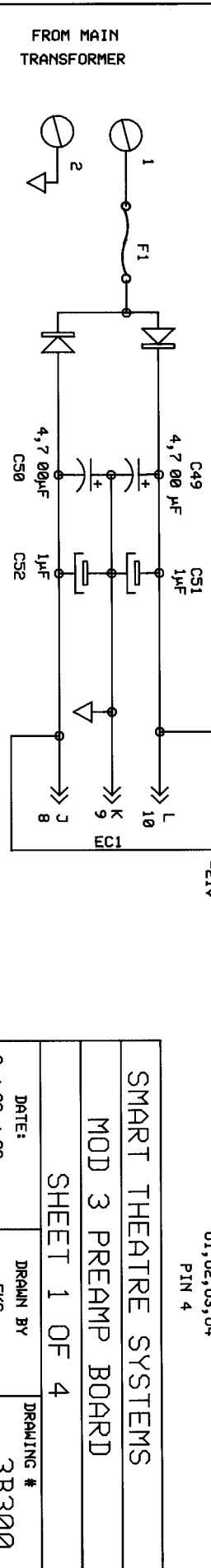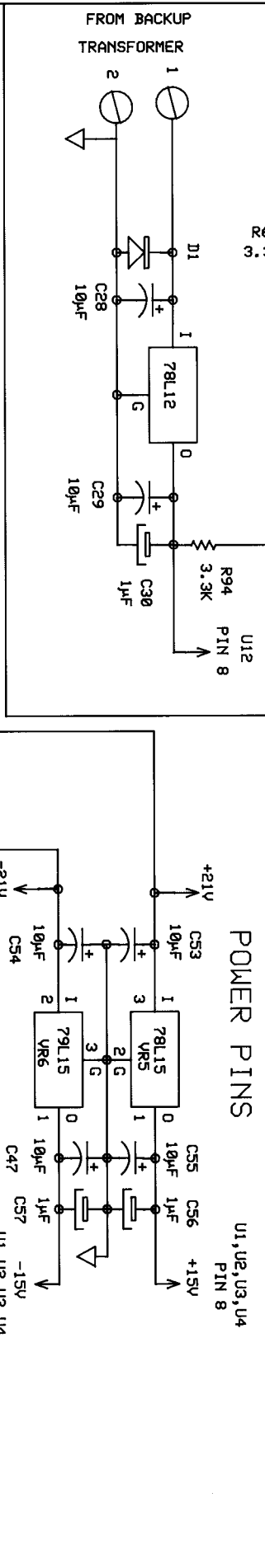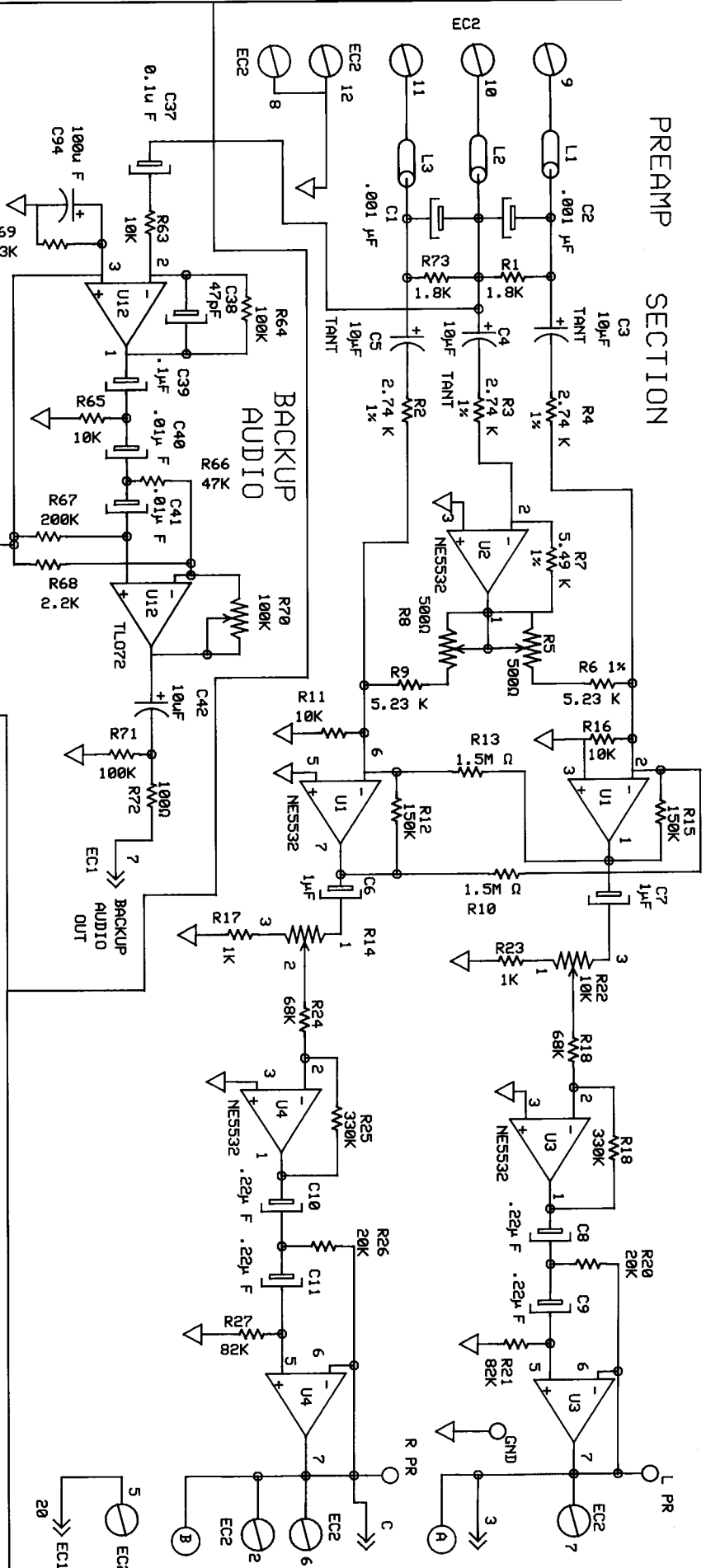Stereo Solar Cell Inputs for Projector 1 and 2 are on top connector.
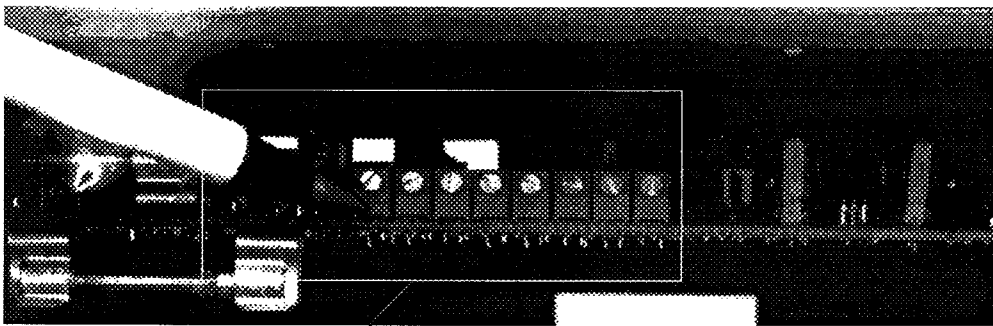
Preamplifier Level controls and silt-loss correction for each channel.

After the alignment of the sound lens is complete, adjust the slit loss correction (HF) control for the best high end frequency response on the real time analyzer. Repeat this procedure for each preamplifier channel. Notice that the HF controls for each channel is set slightly back from the gain control for that channel to minimize the chance of turning the wrong control.

L1	Left preamp gain Proj 1
HF	Slit-Loss Left preamp Projector 1
R1	Right preamp gain Projector 1
HF	Slit-loss Right preamp Projector 1
L2	Left preamp gain Projector 2
HF	Slit-loss Left preamp Projector 2
R2	Right preamp gain Projector 2
HF	Slit-loss Right preamp Projector 2

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SCHEMATIC DIAGRAMS

PREAMP SECTION

FROM MAIN TRANSFORMER

FROM BACKUP TRANSFORMER

EC2

BACKUP AUDIO

POWER PINS

BACKUP AUDIO OUT

1

This is a full-page electronic schematic diagram.

SMART THEATRE SYSTEMS

MOD 3 PREAMP BOARD

SHEET 2 OF 4

| DATE: 2 / 29 / 88 | DRAWN BY: EKS | DRAWING # 3B300 |

2

SEE SHEET 3

SEE SHEET 4

SEE SHEET 4

SEE SHEET 4
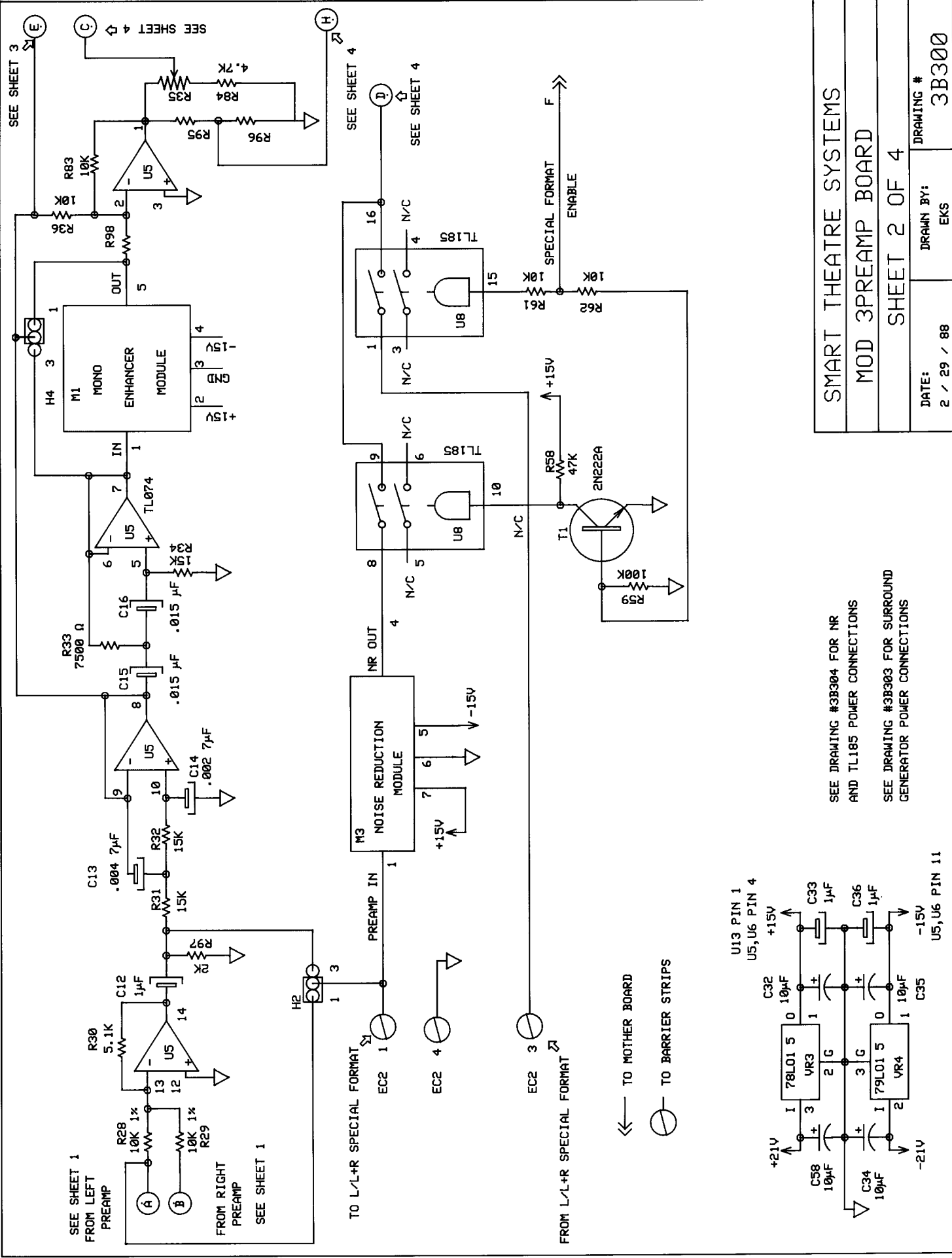
SEE DRAWING #3B304 FOR NR AND TL185 POWER CONNECTIONS

SEE DRAWING #3B303 FOR SURROUND GENERATOR POWER CONNECTIONS

SEE SHEET 1 FROM LEFT PREAMP

FROM RIGHT PREAMP SEE SHEET 1

TO L/L+R SPECIAL FORMAT

FROM L/L+R SPECIAL FORMAT

TO MOTHER BOARD

TO BARRIER STRIPS

2 CHANNEL STEREO SURROUND SECTION

SEE DRAWING #3B303 FOR POWER CONNECTIONS

SEE SHEET 4

SEE SHEET 1
FROM LEFT PREAMP

SEE SHEET 1
FROM RIGHT PREAMP

R80 68K
U6 TL074
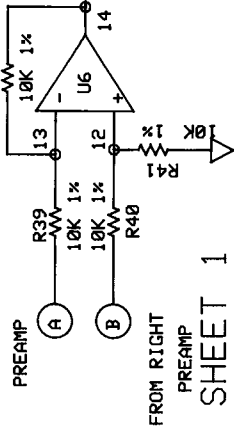R81 68K
R82 18K
C80 .22µF
R45 18K
C20 .22µF
C83 .1µF
C19 .003 9µF
U13 LM 1894
C18 .047 µF
R73 470Ω
R74 470Ω
C5 .001 µF
C70 100µ F
C81 1µF
+15V
C17 1µF
C71 .003 9µF
C82 1µF
N/C

C95 1µF
R44 1K
R43 5.6K
R42 10K 1%
U6
R41 10K 1%
R39 10K 1%
R40 10K 1%
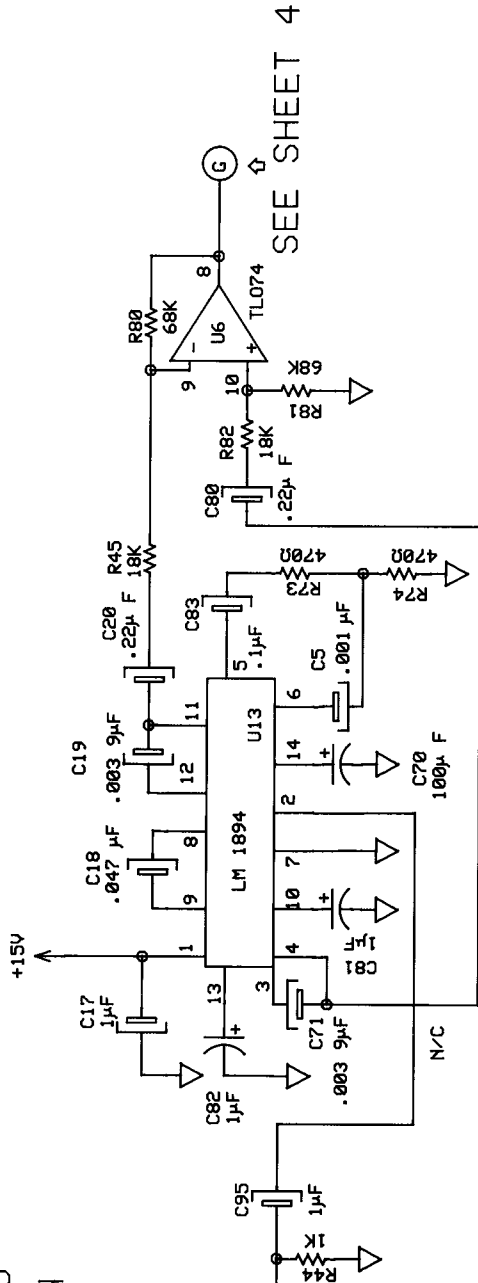
SURROUND GENERATOR SECTION

SEE SHEET 2

GENERATOR TEST SWITCH
H5

R92 10K
U6
R37 1.8K
R38 47K

SEE SHEET 4

C90 470µ F
TEST
OUT
M2 SURROUND GENERATOR MODULE
DETECT
IN
R85 10K
R86 2.7K
E
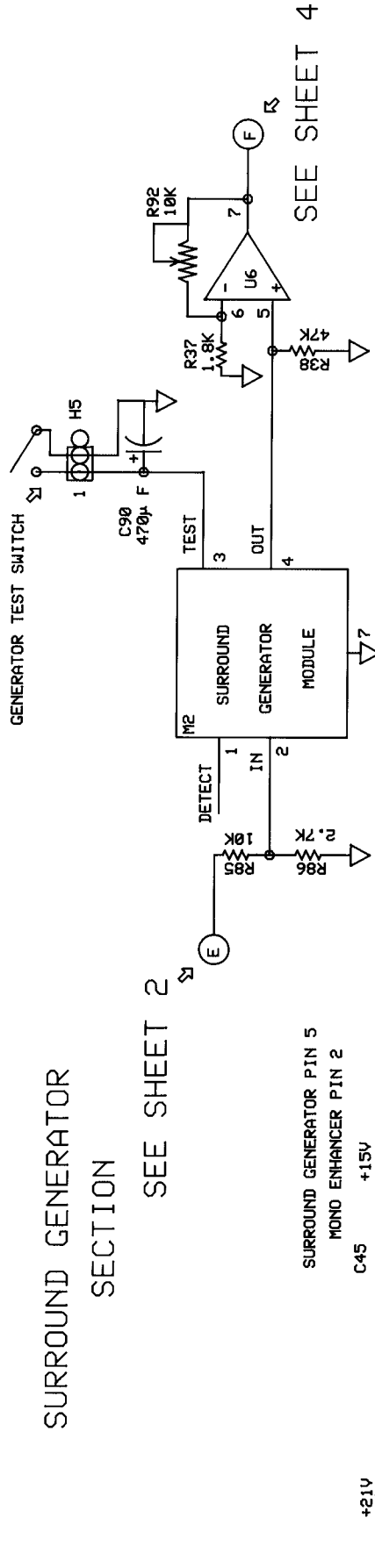
SURROUND GENERATOR PIN 5
MONO ENHANCER PIN 2
C46 1µF
+15V
C57 1µF
-15V
C45 10µF
C61 10µF
SURROUND GENERATOR PIN 6
MONO ENHANCER PIN 4
SURROUND GENERATOR PIN 4
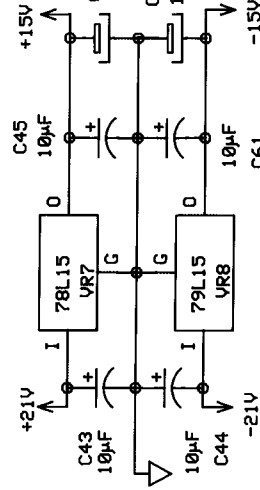
78L15 VR7
G
79L15 VR8
G
C43 10µF
+21V
10µF C44
-21V
I
I

OUTPUT SWITCHING SECTION

PINK NOISE LEFT
D

PINK NOISE RIGHT
4

B C BUS
2 S BUS

E MONO ENABLE
2 CHANNEL STEREO/ENHANCED
5 MONO ENABLE
F SPECIAL FORMAT ENABLE
GENERATOR ENABLE
6

SEE SHEET 2

U7 9 6 10
U7 16 4 15
U10 16 N/C 4
N/C 1 3
R89 47K

SEE SHEET 2 C
SEE SHEET 3

R57 10K

U2 NE5532
R56 5.6K
R54 5.6K
7 6 5 + -

S1 2
S1 3
S1 4
S1 5

R55 47K

U6 TL074
R53 100K
R52 10K
1 2 3 + -

C26 330p F
C86 10µF

R50 10K

U9 9 8 5 10
R87 47K
H3

U9 16 N/C 4
N/C 1 3 15
R99 47K
H1

U10 9 N/C 6
8 N/C 5 10

SEE SHEET 3 G
SEE SHEET 2 D
SEE SHEET 2 H
SEE SHEET 3 F

PINK NOISE SECTION

PINK NOISE SENSE
H 4

MM5837

R49 390Ω   C22 .1µF
R48 1K   C23 .27µ F
R47 2.4K   C24 .68µ F
R46 10K   C25 1µF

R51 22K

S1 10
R60
U11 3 4 2 1 +
C27 100µ F
S1 1

I.C. TYPES

U1, U2, U3, & U4   NE5532's
U5, U6   TL074's
U7, U8, U9, & U10 TL185
U11   MM5837
U12   TL072
U13   LM1894

C32 10µF +15V   C33 1µF
VR3 78L01 5 I G 0
+21V   C58 10µF

NOISE REDUCTION PIN 7

U7,U8,U9,U10 PINS 11 & 12

C56 1µF +15V
C57 1µF
C55 10µF
VR5 78L01 5 I G 0
+21V C31 10µF

C65 10µF -15V
VR6 79L01 5 I G 0
-21V C59 10µF

U7,U8,U9,U10 PIN 14
NOISE REDUCTION PIN 5

SMART THEATRE SYSTEMS

MOD III 4 CH. BOARD

SHEET 1 OF 2

DRAWING# 3B320

DATE: 3 / 15 / 88

DRAWN BY EKS

← — TO 20 POSITION EDGE CONNECTOR

◯ — TO BARRIER TERMINALS

ALL TL074

+15V −15V

MOD III
LEFT AND RIGHT
EQ SECTIONS

SMART THEATRE SYSTEMS
MOD III 4 CH. BOARD
SHEET 2 OF 2

DRAWING# 3B320
DATE: 3 / 15 / 88
DRAWN BY EKS

9
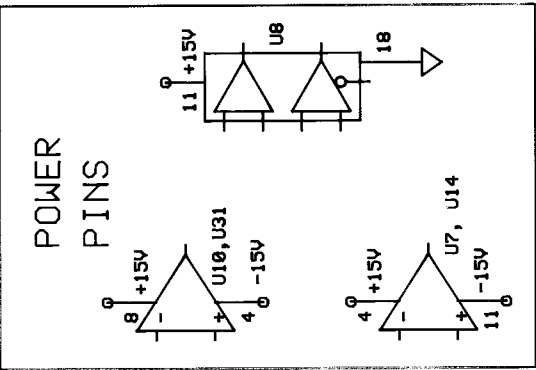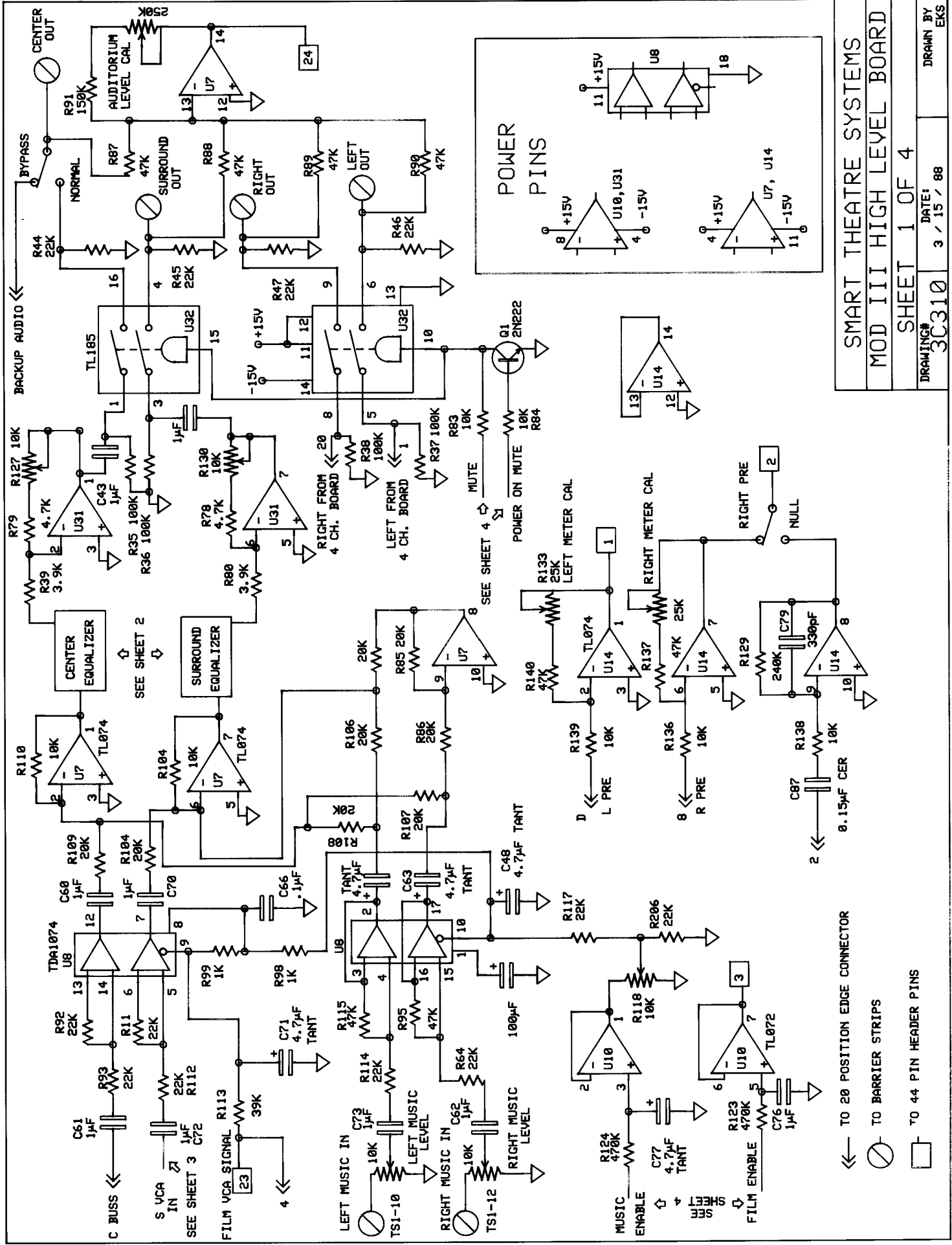
SMART THEATRE SYSTEMS
MOD III HIGH LEVEL BOARD
SHEET 1 OF 4
DRAWING# 3C310
DATE: 3 / 15 / 88
DRAWN BY EKS

MOD III CENTER/SURROUND EQ SECTIONS

EQ SECTION OUT

SEE SHEET 1

EQ IN

SEE SHEET 1

ALL TL074's

+15V   -15V

SMART THEATRE SYSTEMS	
MOD III HIGH LEVEL BOARD	
SHEET 2 OF 4	
DRAWING# 3C310	DATE: 3 / 15 / 88
	DRAWN BY EKS

CENTER / SURROUND
EQUALIZERS KEY
PART NUMBERS EXPRESSED AS
PREFIX CENTER#/SURROUND#

Op-amps: TL074 — U1, U2, U3, U4, U6

125Hz U2 (14, 13, 12)
R7/54 240K
R8/55 3.9K
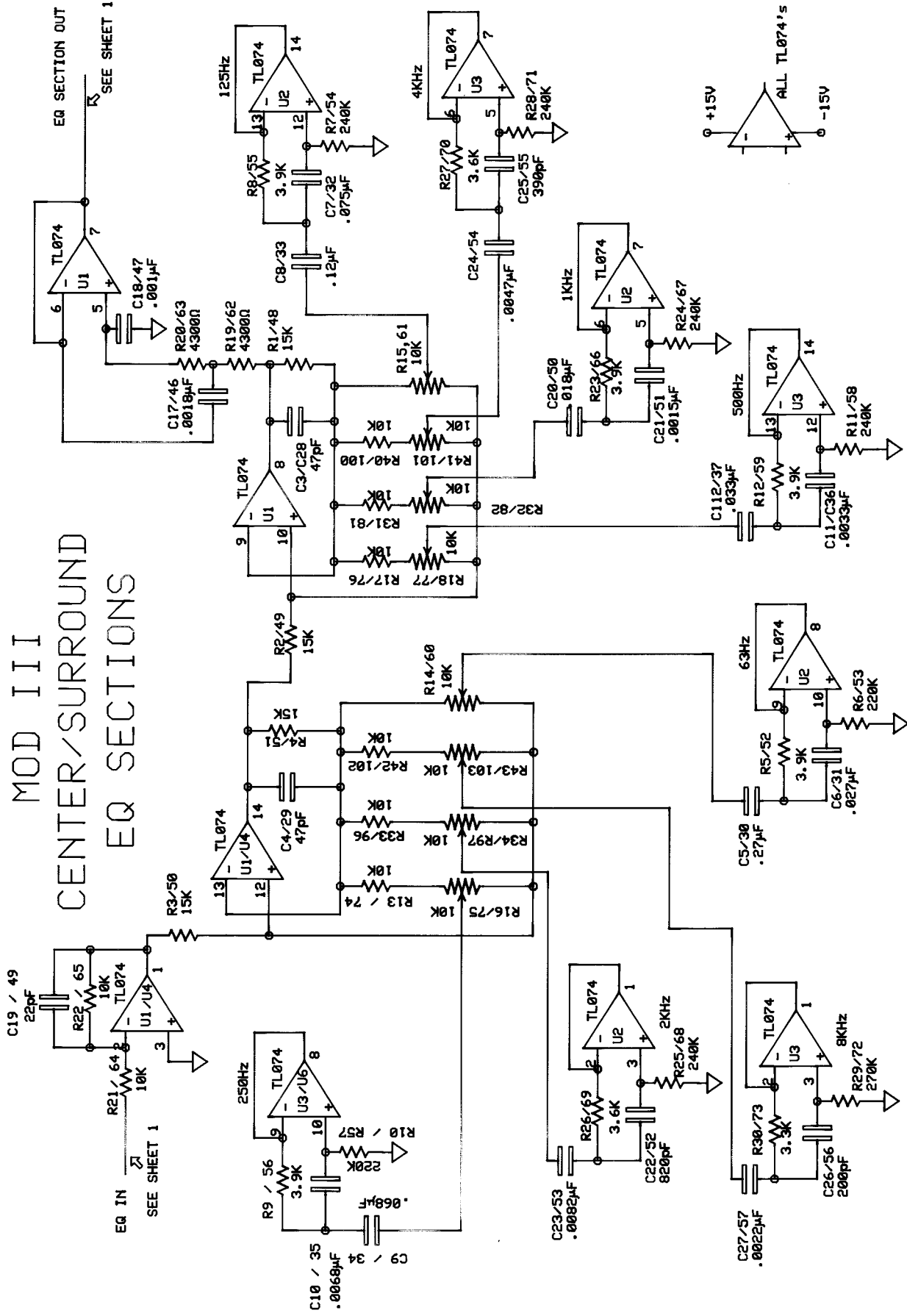C7/32 .075µF
C8/33 .12µF

4KHz U3 (7, 6, 5)
R28/71 240K
R27/70 3.6K
C25/55 390pF
C24/54 .0047µF

1KHz U2 (7, 6, 5)
R24/67 240K
R23/66 3.9K
C20/50 .018µF
C21/51 .0015µF

500Hz U3 (14, 13, 12)
R11/58 240K
R12/59 3.9K
C112/37 .033µF
C11/C36 .0033µF

63Hz U2 (8, 9, 10)
R6/53 220K
R5/52 3.9K
C5/30 .27µF
C6/31 .027µF

250Hz U3/U6 (8, 9, 10)
R10/R57 220K
R9/56 3.9K
C10/35 .0068µF
C9/34 .068µF

2KHz U2 (1, 2, 3)
R25/68 240K
R26/69 3.6K
C23/53 .0082µF
C22/52 820pF

8KHz U3 (1, 2, 3)
R29/72 270K
R30/73 3.3K
C27/57 .0022µF
C26/56 200pF

U1 (7, 6, 5)
C18/47 .001µF
R20/63 4300Ω
R19/62 4300Ω
R1/48 15K
C17/46 .0018µF

U1 (8, 9, 10)
C3/C28 47pF
R15,61 10K
R40/100 10K
R41/101 10K
R31/81 10K
R32/82 10K
R18/77 10K
R17/76 10K

R2/49 15K

U1/U4 (14, 13, 12)
C4/29 47pF
R4/51 15K
R42/102 10K
R43/103 10K
R33/96 10K
R34/R97 10K
R13/74 10K
R16/75 10K
R14/60 10K

R3/50 15K

U1/U4 (1, 2, 3)
C19/49 22pF
R22/65 10K
R21/64 10K