

# Film-Tech

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# INSTALLATION AND OPERATION MANUAL

## EX500B EXCITER-MONITOR



P.O. BOX 80361

3856 GREEN INDUSTRIAL WAY

ATLANTA, GA 30341

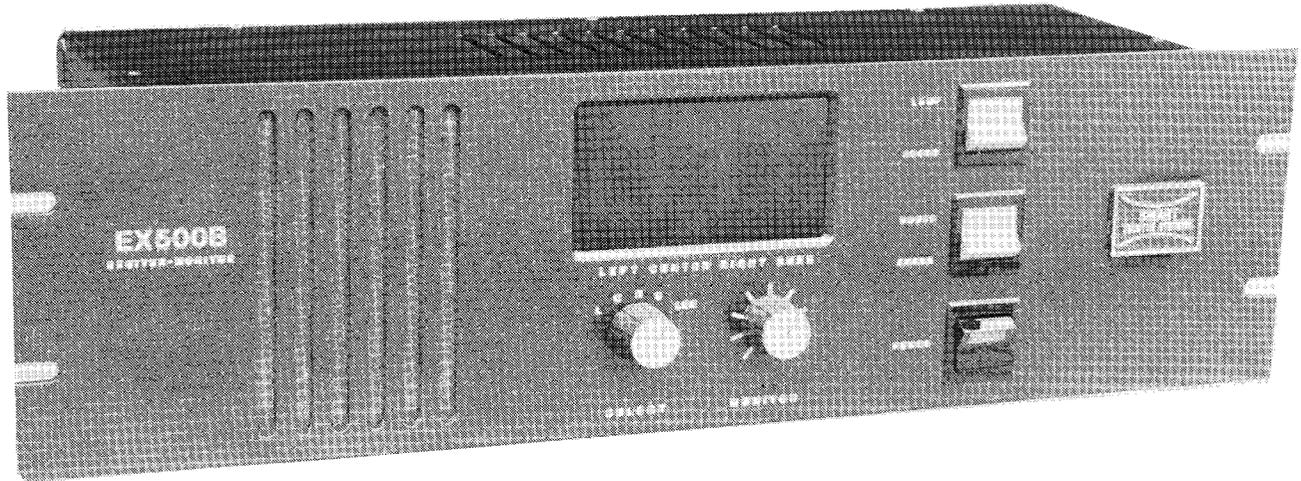
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Made

# EX500B

## MONITOR-EXCITER SUPPLY PACKAGE



**A UNIQUE BOOTH PRODUCT THAT COMBINES AN ACTIVE BOOTH MONITOR WITH A REGULATED EXCITER SUPPLY IN ONE UNIT**

### FEATURES

**FULLY REGULATED DC EXCITER SUPPLY**

**SPECIAL "KILL" CIRCUIT**

**4 CHANNEL LED DISPLAY**

**HIGH QUALITY SPEAKER**

**MONITOR AMPLIFIER**

**AC EXCITER BACKUP**

**EMERGENCY SOUND BACKUP**

**EFFICIENT TOROIDIAL TRANSFORMER**

The SMART EX500B Monitor-Exciter Supply is a sensible combination of two vital booth accessories that are necessary in any theatre stereo installation. This special product incorporates features into one compact unit that are not even found in products that separately cost more.

**FULLY REGULATED EXCITER SUPPLY** The pure DC supply is a computer type high frequency switching supply that runs cool and delivers high current to an exciter bulb with very low ripple. The removable supply module is easily changed from the back of the EX500B for field service. An AC BACKUP supply is ready with the flip of the front panel switch. A special "KILL" circuit in the supply lets you reduce the bulb voltage to a pre-heat condition during show intermissions and is controlled by the booth automation system. The supply output is continuously variable from 4.5 VDC to 10 VDC with adjustment of a multi-turn pot. The regulation of the supply is amazing! The DC output will not vary more than 1% when the AC line voltage changes from 108 to 130 VAC. This stiff regulation is necessary for stereo systems where the film reference level is calibrated and any variance in exciter brightness will affect the tracking of the level sensitive noise reduction circuits. The exciter supply has a soft turn on so that a cold bulb does not suffer thermal shock that will shorten its operating life.

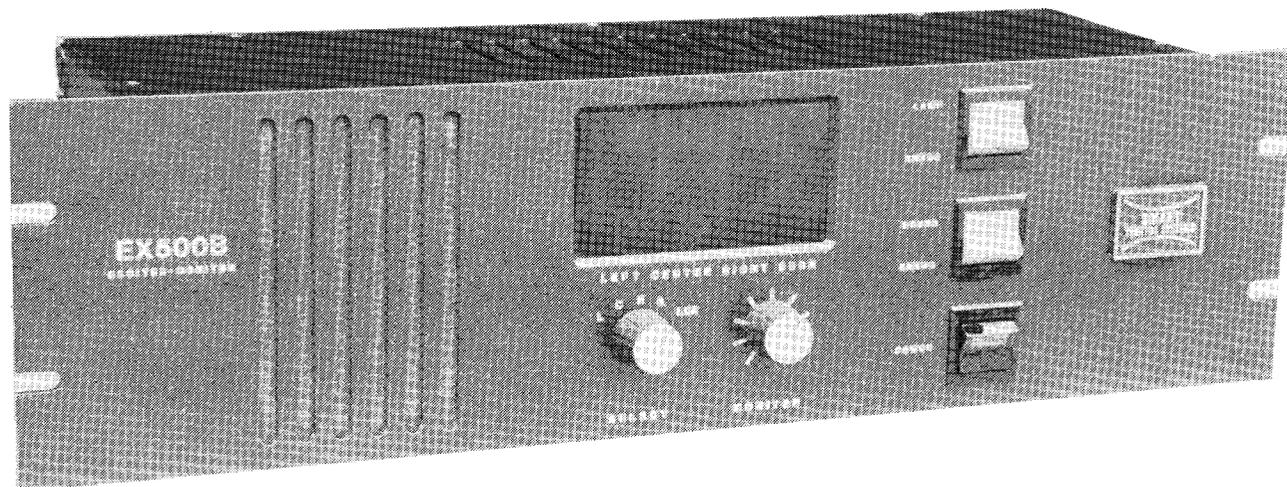
**BOOTH AUDIO AND VISUAL MONITOR** The EX500B Monitor display section incorporates a 5 watt integrated circuit power amplifier, a high quality monitor speaker, and four wide range LED visual displays to monitor each channel of a stereo system. A front panel selector switch allows the operator to listen to each channel, or ALL front channels. Hidden controls on the rear of the chassis allow level sets for each channel during installation. The monitor can be fed from the stereo decoder, or directly from the output of each channel power amplifier by clipping an internal jumper.

**EMERGENCY AMPLIFIER** The built in monitor power amplifier can act as an emergency stage speaker monitor in the event of a failure of the main amplifier. A switch on the front of the EX500B selects either the internal monitor speaker or directs the sound to the stage speaker.

**SMART**

3856 Green Industrial Way, Atlanta, Ga 30341 (800)-45-SMART

## EX500B INSTALLATION AND SERVICE MANUAL



**THE EX500B IS A COMBINATION 4-CHANNEL BOOTH MONITOR AND REGULATED EXCITER LAMP SUPPLY IN ONE COMPACT 19" RACK MOUNTED UNIT.**

### INTRODUCTION

**DESCRIPTION.** The SMART EX500B is a combination four channel active booth monitor, emergency power amplifier and fully regulated single lamp exciter supply packaged in a single 5 1/4 inch rack mount chassis. The circuitry which goes into the EX500B actually consists of two different and independent sections, both of which rely on the large toroidal transformer which is mounted to the side.

The audio section, besides working as a 4-channel booth monitor and indicating (with the front panel bar graph LED arrays) the actual output signal level, also doubles as an emergency amplifier. If the center channel amplifier output is connected through the EX500B, the front panel SOUND/EMERG switch disconnects the regular center stage amplifier from the stage speaker and connects the EX500B's monitor amplifier to the auditorium speaker. In case of this emergency, the

monitor speaker will of course be disconnected. This section is independently fused. Should the monitor amplifier fuse blow, the exciter supply will continue to operate.

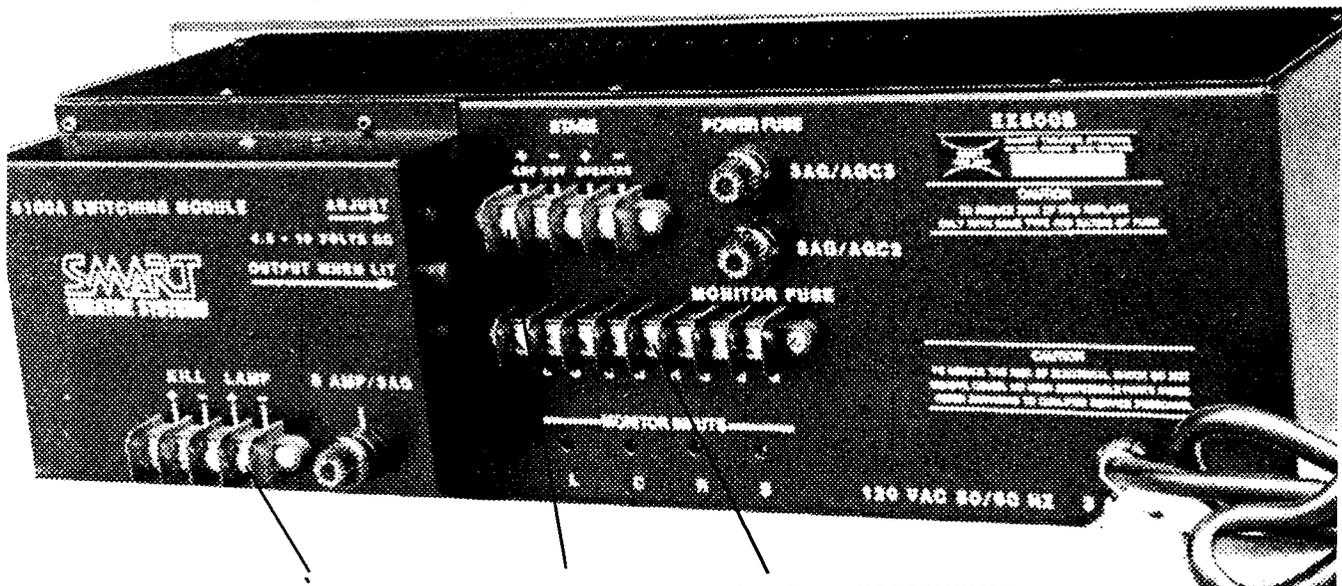
The single lamp, fully regulated exciter supply section is fully adjustable from about 4.5VDC to about 10VDC. An AC backup and separate fuse provides protection in case of an unexpected malfunction of the regulated DC supply. The exciter supply section is easily field replaceable (you unscrew four phillips screws and unplug the heavy current connector) and runs relatively cool due to its high-tech switching topology. Built in current limiting prevents self destruction due to unexpected shorts and a special "KILL" circuit prolongs bulb life and operating stability by keeping the lamp preheated when the lamp is not in use. When the "KILL" circuit is disengaged the voltage supplied to the lamp is ramped up slowly, also to preserve bulb life.

The EX500B incorporates a special "kill"

circuit in the regulated supply which provides an easy way to turn off the exciter lamp between shows and during fault conditions, such as a film break. The exciter lamp does not go completely off in the kill mode, but it is maintained in a pre-heat condition, with about one volt applied to the lamp. This keeps the filament warm so that it does not experience the thermal shock of being turned on from a cold start. This will extend the life of the lamp. The kill mode is activated by closing a set of dry relay or switch contacts across the KILL terminals. The contacts carry only a few milliamps, so the switch or relay can be a very low power type. You no longer need high current contacts to directly switch the lamp current. The KILL terminals are labeled + and -, and the - terminal can be grounded to a system

The high-tech exciter supply module in the EX500B uses the latest generation SMART 5100A SWITCHING MODULE. The circuit topology incorporated into the design of this supply is inherently more efficient, runs much cooler than previous linear supplies, and provides even better regulation.

Conventional exciter supplies vary how much a pass transistor is turned on or off according to the demands of the load which turn the transistor into a variable voltage divider, with the total voltage delivered by a DC supply split between the transistor and the exciter lamp. At low currents this is no problem. However, exciter lamps are high current devices. The voltage across the transistor multiplied by the



REGULATED EXCITER SUPPLY OUTPUT AND "KILL" TERMINALS

EMERGENCY AMPLIFIER OUTPUT

MONITOR INPUT TERMINALS

ground PROVIDED that the exciter lamp leads are NOT grounded.

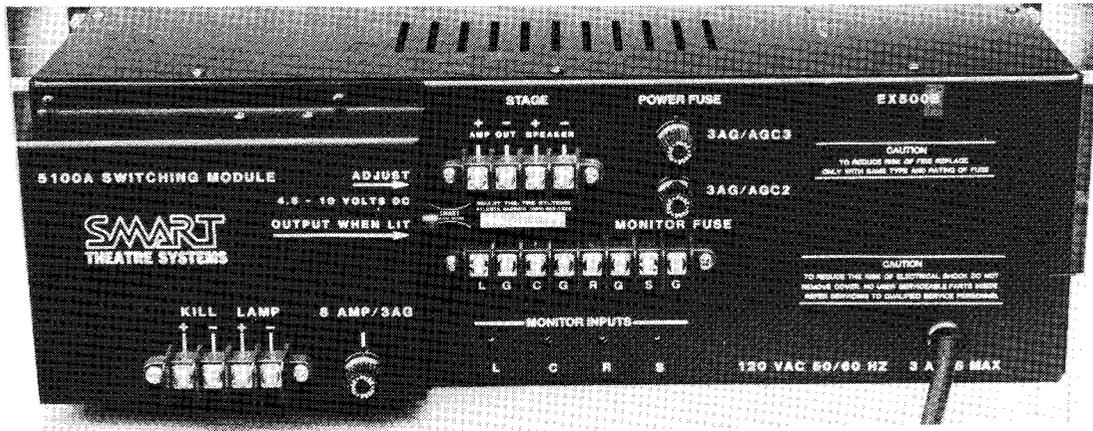
In SMART systems, the "MUSIC COMMAND" control line from the automation to the processor can be also connected to the KILL terminals. This will kill the exciter lamp any time the system is put into music mode, either manually or through automation.

current being drawn is the power dissipated by the transistor. This power is turned directly into heat. If you have ever held on to the "business end" of a thirty watt soldering iron you have an idea of just how hot this can be.

In sharp contrast, the pass transistor in the SMART computer-type switching supply is operated just like a switch as it is turned on and off at the rate of 25,000 times a second.

The control circuitry determines how long, not how much, the transistor stays on during these on - off cycles. This pulse-width modulated voltage is converted to an ultra stable regulated DC voltage for the exciter lamp output.

position will connect the theatre loudspeaker to the EX500B's amplifier and keep the show going until the problem is fixed. The booth volume control then becomes the auditorium volume control and the internal booth monitor speaker is disconnected. The use of this feature is not recommended in bi-amped or tri-



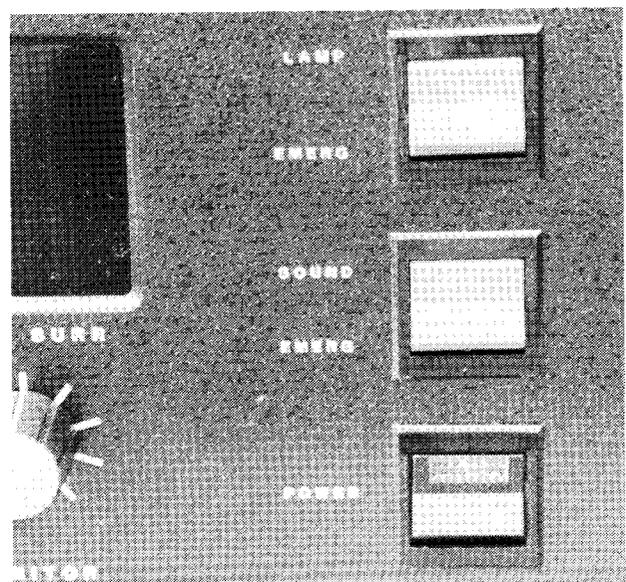
MODEL 5100A FIELD REPLACEABLE EXCITER SUPPLY MODULE

INDIVIDUAL TRIM POTS FOR MONITOR AND LED DISPLAYS

## OPERATING INSTRUCTIONS

For normal operation, the EX500B is one of the simplest pieces of booth equipment to use. The monitor section has only three controls. The knob on the far left allows the operator to selectively listen to any of the four main program channels independently, or listen to a combination of all front (L C R) channels. The knob to the right of it is the booth volume control. It is labeled "MONITOR." On the far right of the EX500B's front panel is a row of switches. The middle switch (the bottom red one) is used in case the auditoriums main amplifier should fail. If the center channel amplifier has been connected through the EX500B, moving this switch to the "EMERG"

amped houses. The moving dots on the front panel display change to solid lines to indicate which channel is being monitored.



LAMP-EMERGENCY, SOUND-EMERGENCY, AND POWER SWITCHES ARE ON THE FRONT PANEL OF THE EX500B.

## OPERATING PROCEDURE

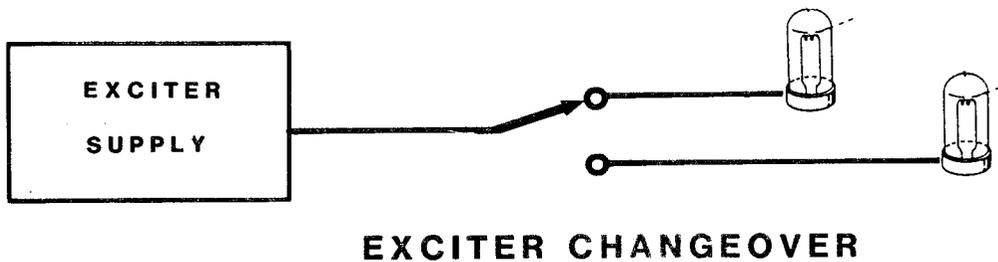
- 1) Turn the power switch on.
- 2) Choose the audio channel(s) you wish to listen to (Left, Center, Right, SURROUND, or a combination of the three front channels ( L C R ). NOTE: ( L C R ) may not be available if the EX500B has been wired to monitor the Front-Surround amplifier outputs through two of the monitor inputs and also monitor the Front-Surround outputs of the stereo processor through the two other monitor inputs.
- 3) Set the volume level you wish with the "MONITOR" control.

EX500B will be connected to the auditorium loudspeaker. Set the select knob to the "C" position. The "MONITOR" control now functions as the auditorium volume level.

Please note that this feature will only work if it has been hooked-up during installation. It is never used in bi-amped or tri-amped sound systems. Some installers prefer to install a completely separate emergency amplifier system.

## EXCITER SUPPLY / LAMP FAILURE

The exciter lamp section has only one switch on the front panel. This is the top red switch labeled "LAMP / EMERG ." Should the



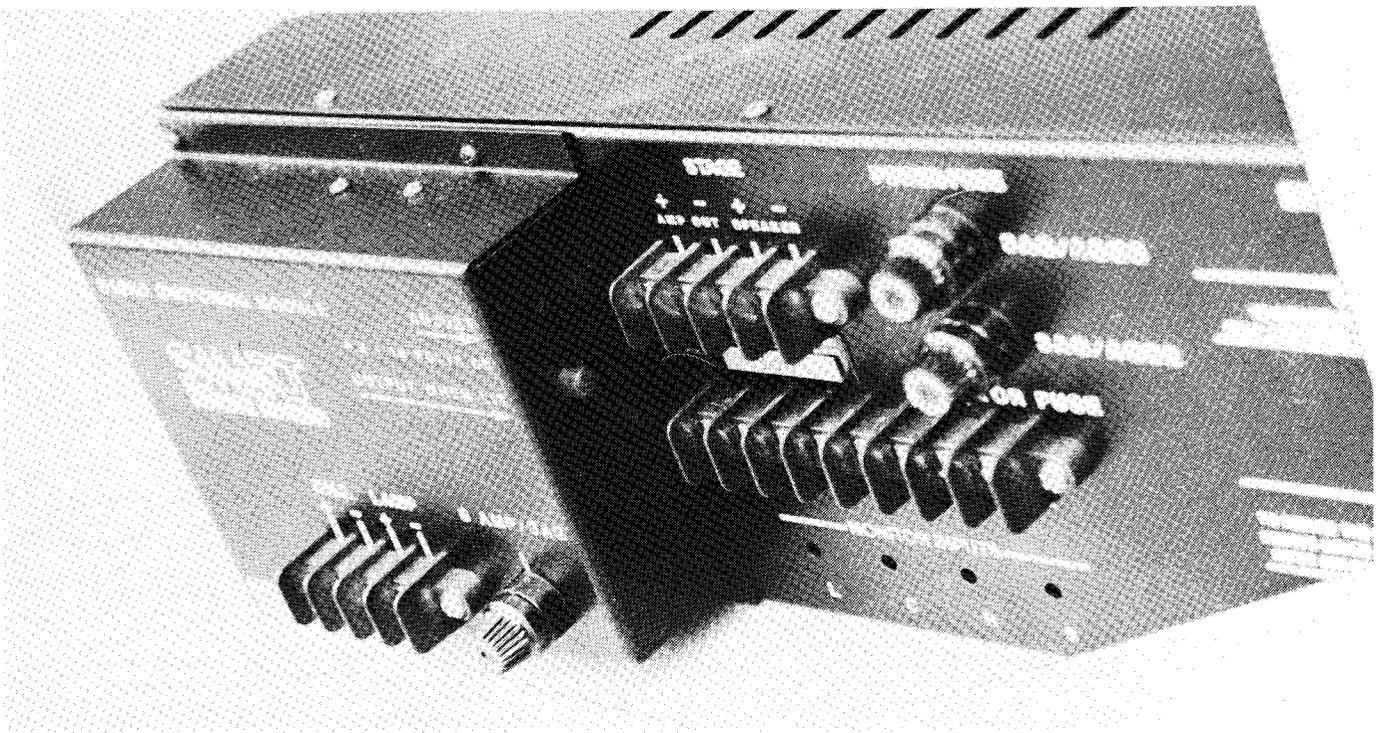
**INSTALLATION OF AN EXCITER CHANGEOVER. MAKE SURE THE SWITCH OR AUTOMATION CAN HANDLE 5 AMPERES. THE EX500B EXCITER SUPPLY WILL NOT POWER TWO EXCITER LAMPS AT THE SAME TIME.**

- 4) Make sure all three switches on the right are in their normal position (up)

## CENTER CHANNEL AMPLIFIER FAILURE

Should the center auditorium fail the EX500B can serve as an emergency backup. Simply move the bottom red switch ( SOUND / EMERG ) to the "EMERG" position. The booth sound will be disconnected and the

exciter supply fail, this switch connects the bulb directly to taps on the main transformer and provides an AC voltage to the bulb. Some 60 Hz hum will be apparent through the sound system when AC backup is used. There is another control point for the exciter supply which is accessible on the rear panel of the unit. This is the remote "lamp kill" terminals. When these terminals are shorted together the exciter lamp is placed in a pre-heat stage. That is, it is essentially off but a small current is



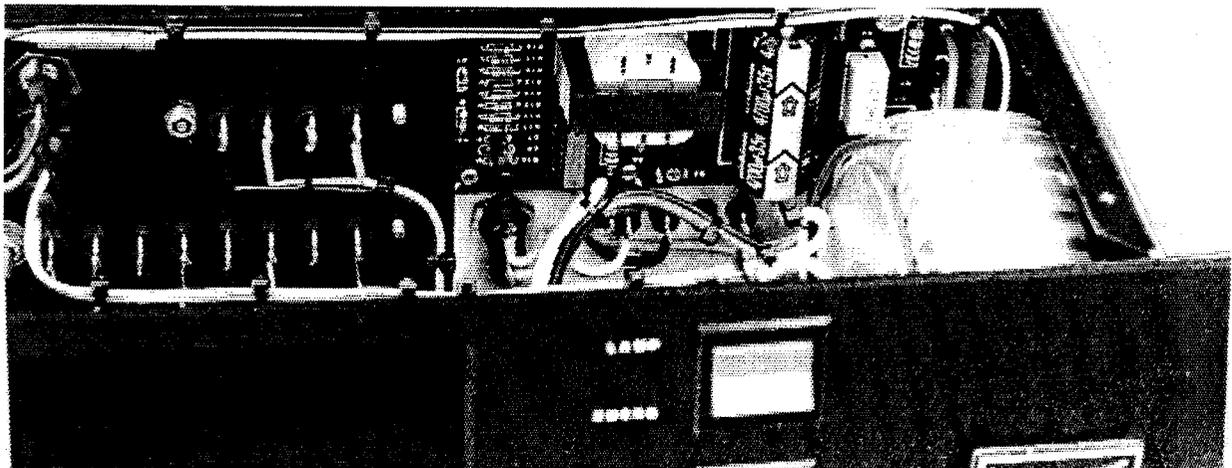
**CONNECTIONS TO THE REAR OF THE EX500B SHOULD BE MADE WITH TERMINAL SPADE LUGS OR A FANNING STRIP CONNECTION.**

kept flowing through it to keep the bulb warmed to prolong bulb life. These terminals may be connected to a small external remote manual switch, or in automated booths, it may be connected to the automation system.

### **FUSES**

If the front panel power switch doesn't light and you know you have checked the appropri-

ate circuit breakers and power cord going to the EX500B, chances are that the "POWER FUSE" has blown. Check the other two fuses on the back panel to see if either of those two have also blown. If so, do not replace this second fuse. Replace only the "POWER FUSE" (3 AMP / 3AG). If after doing this, the fuse does not blow then attempt to replace the other fuses (either the "MONITOR FUSE" or the lamp fuse). If doing this blows a fuse, do not replace the secondary fuse. Replace the



**THE 5100A EXCITER SUPPLY MODULE CAN BE SEEN WITH THE TOP COVER REMOVED.**

POWER FUSE only. If the other fuse which has blown goes to the exciter supply use the LAMP / EMERG switch to power the lamp.

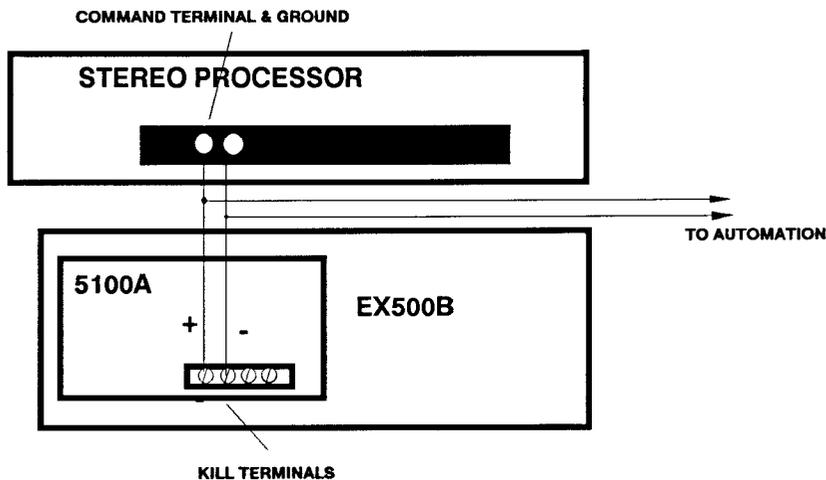
If the monitor amplifier fuse is blowing do not attempt to use the "SOUND / EMERG " switch to keep the sound going in the booth as this may adversely affect the auditorium sound. Under normal circumstances, having the monitor section of the EX500B inoperative will not affect the auditorium sound unless the exciter lamp supply is also affected.

If only one section of the EX500B fails, see if replacing its respective fuse solves the problem.

NOTE: When a fuse blows repeatedly, it is not good practice to continue to replace it. When fuses blow because of a fault in the connections going to and from the equipment, replacing the fuse(s) repeatedly can in many cases lead to further damage. If you are unable to distinguish what the exact cause of a malfunction call a qualified technician.

### !!!! REMEMBER !!!!

The failure of the monitor amplifier section



CONNECT THE (+) TERMINAL OF THE "KILL" TERMINAL TO THE "COMMAND" TERMINAL OF A SMART PROCESSOR, AND THE (-) TERMINAL TO A NEARBY GROUND TERMINAL OF THE PROCESSOR. EXTEND THE PAIR OF WIRES TO THE AUTOMATION SYSTEM NON-SYNC CONTROL. THE EXCITER WILL GO TO A PRE-HEAT CONDITION DURING INTERMISSION.

does not, by itself, constitute a critical malfunction. In almost all cases the movie can continue to run indefinitely, completely unaffected by the booth monitor.

## TROUBLESHOOTING

If the exciter lamp does not come on when the show is started, check the following.

- 1) Is the bulb good? Replace the bulb with a good one. There have been cases where a dead bulb was replaced with another bad bulb resulting in a service call.
- 2) If the "Kill" circuit is wired to the automation, see that the automation has not locked the kill circuit into a pre-warm state.
- 3) Check the exciter lamp wires and bulb socket for a short circuit. If switching to AC backup does not light the lamp, disconnect the wires from the terminals of the EX500B and measure the output voltage at the terminals.

## INSTALLATION

If you wish to monitor the outputs of the amplifiers as they go out to the auditorium speak-

ers, you will need to cut the four jumpers inside of the unit before installing the EXCITER/MONITOR in the rack. Examine the drawing below.

We highly recommend that, unless you are installing the unit in a bi-amped or tri-amped system, you should NOT monitor the output of the center channel amp(s). Instead, monitor the center channel output of the film processor. This will allow you to use the EX500B as a backup if the center amplifier fails.

### TECHNICAL TIP

The "KILL" terminals may be hooked to the non-sync COMMAND terminal of a SMART processor so that the excited bulb automatically goes to a pre-heat standby condition when the pre-show or intermission music is playing. Run a wire from the (+) terminal of the KILL circuit to the COMMAND terminal of the processor. Run another wire from the (-) terminal of the KILL circuit to the GND (Ground) terminal of the processor. The wires

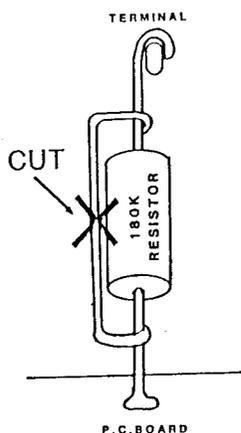
that are normally connected between the COMMAND and automation non-sync relay will actuate both functions simultaneously.

The KILL terminals are not grounded inside the 5100A exciter module. However, the (-) terminal may be grounded if necessary.

### MODIFYING THE EX500B TO MONITOR AMPLIFIER OUTPUTS

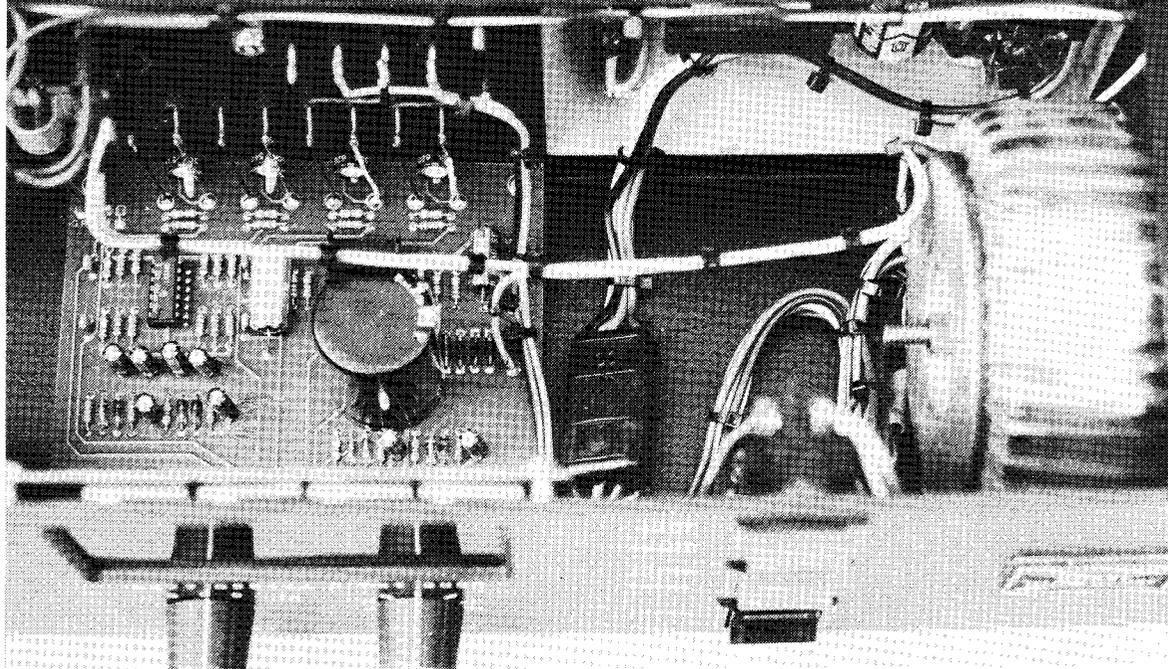
In cases where you wish to monitor the outputs of the sound system power amplifiers, instead of the low level outputs of the stereo processor, a simple installer change inside the chassis will allow monitoring high level signals.

Locate the 180K resistors that lead from the amplifier PC board (mounted on the bottom of the chassis) to the input terminal barrier strip. By cutting a jumper on each resistor, the resistor is inserted in series with the input of each channel. **DO NOT CUT THE GROUND WIRE THAT CONNECTS THE TERMINAL TO THE BOARD.**



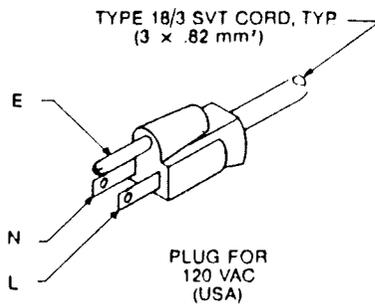
CUTTING THE WIRE JUMPER WILL INSERT AN AUDIO PAD INTO EACH INPUT

**A 220-240 50/60 HZ VERSION OF THE EX500B IS AVAILABLE ON SPECIAL ORDER. THE PRICE IS SLIGHTLY HIGHER. PLEASE ALLOW 2 WEEKS DELIVERY FOR THIS SPECIAL PRODUCT.**



A VIEW OF THE INSIDE OF THE CHASSIS WITH THE TOP COVER REMOVED. NOTICE THE PLUG THAT ALLOWS THE EXCITER SUPPLY MODULE TO BE REMOVED QUICKLY. REMOVE 4 SCREWS ON THE OUTSIDE OF THE 5100A MODULE TO REPLACE THE MODULE.

The power cord is terminated in a "U-Ground" plug to USA standards. The green/yellow wire, connected to the long prong, is electrically attached directly to the chassis. Some sound engineers will lift this ground to suppress ground loops with a three prong to two prong adapter plug, rather than damaging the power plug. It is not recommended that the ground be defeated because it eliminates the intrinsic safety feature of the three-wire system.



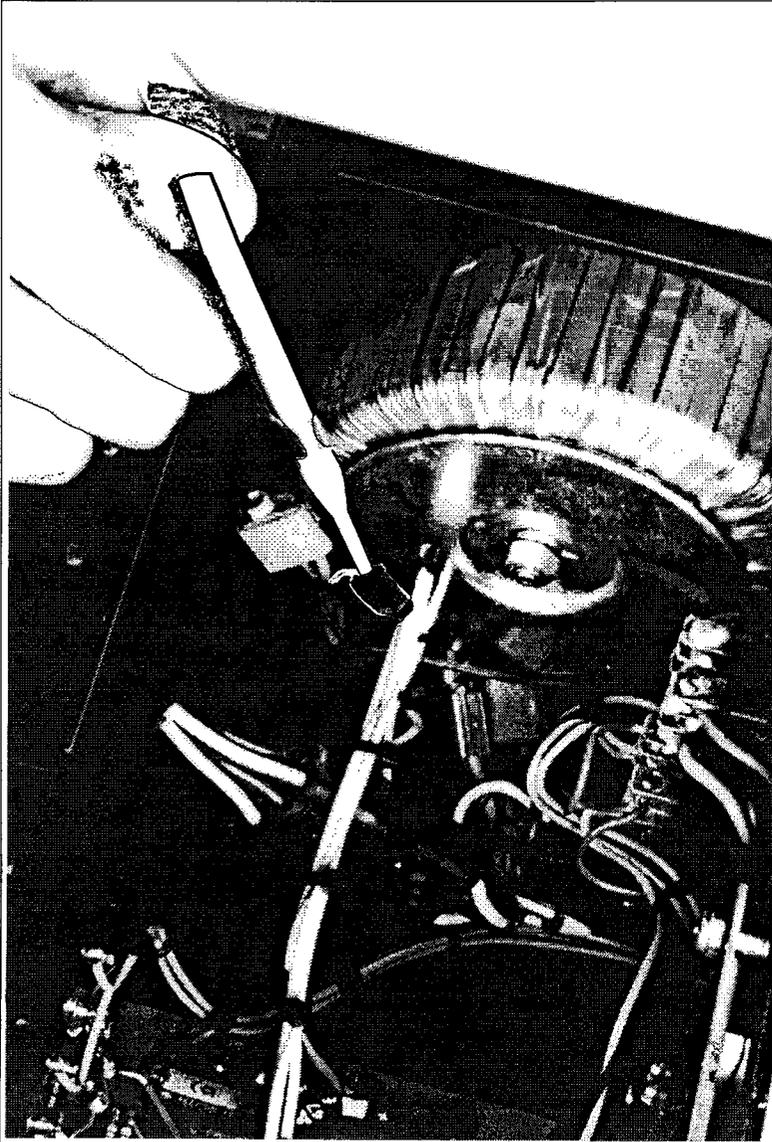
CONDUCTOR		WIRE COLOR	
		Normal	Alt
L	LINE	BROWN	BLACK
N	NEUTRAL	BLUE	WHITE
E	EARTH GND	GREEN-YELLOW	GREEN

#### AC MAINS LINE CORD DETAIL

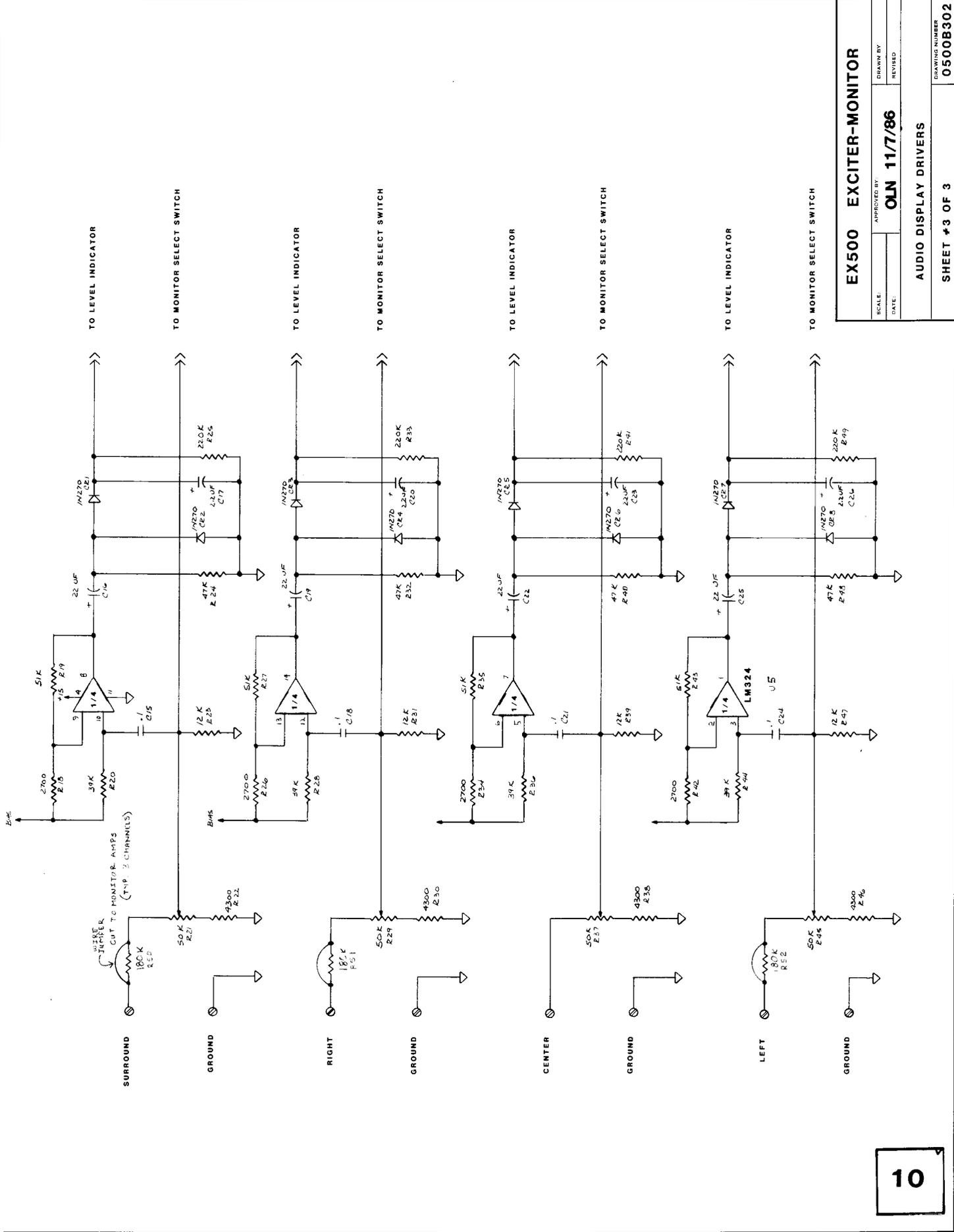
If the ground is defeated, certain fault conditions in the unit or system to which it is connected can result in the appearance of full line voltage between the chassis and earth ground. Such voltage is capable of causing electrical shock, possibly resulting in severe injury or even death!

**SMART THEATRE SYSTEMS** reserves the right to improve or update models without prior notice. Changes may not be reflected in the current sales or technical literature. The **TECHNICAL SUPPORT DEPARTMENT** may be helpful in answering field technical problems of installation and service. Engineers are available during normal business hours (Eastern Time)

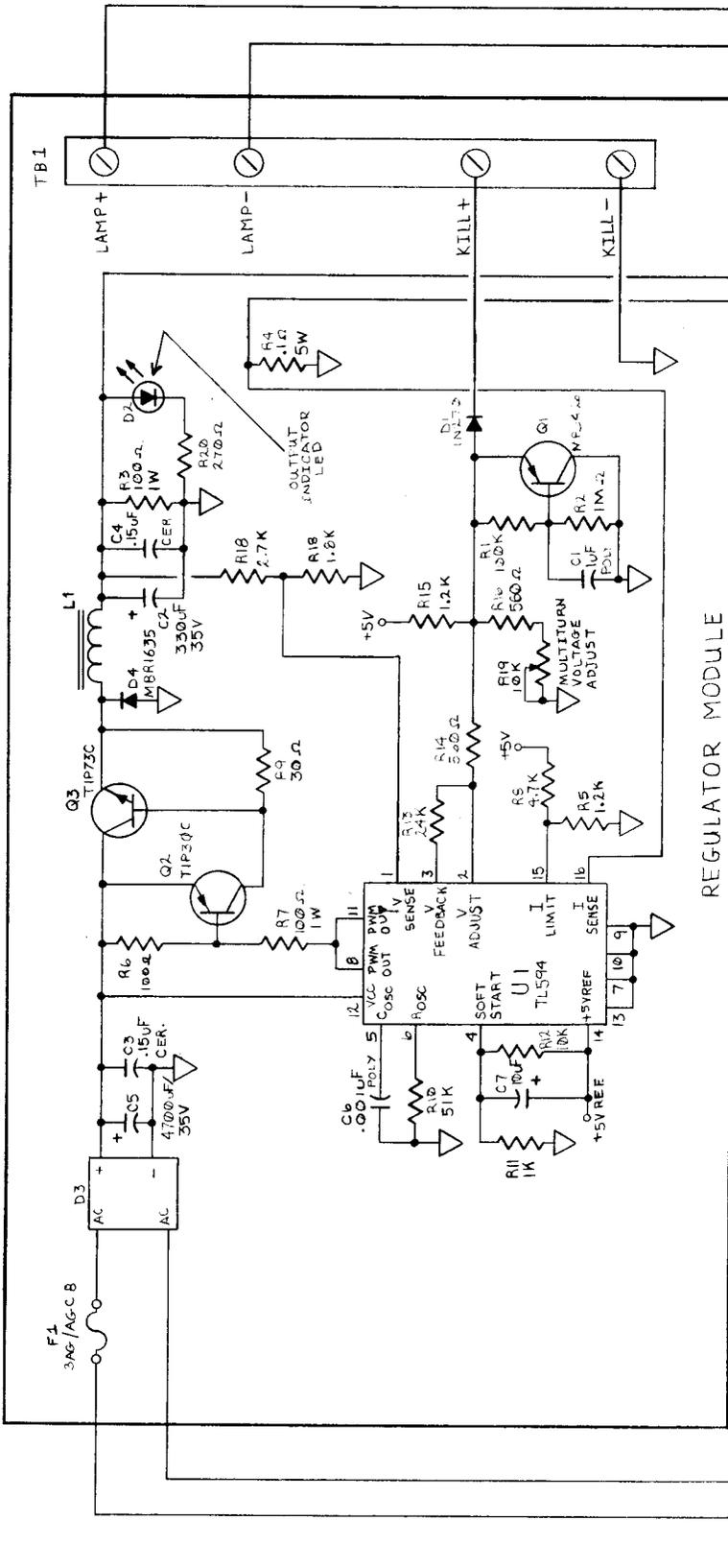
## EX500B 5VAC EMERGENCY BACKUP MODIFICATION



1. Remove TOP COVER of unit.
2. Locate a bundle of 3 wires, 2 RED, 1 BROWN, with a WIRETAP across the 2 RED wires. This bundle is normally located near the power transformer at the bottom of the unit.
3. Open wiretap and remove the RED wire that leads to the POWER TRANSFORMER. Doublecheck this step to insure you have located the *correct* RED WIRE.
4. Locate the BROWN wire in the same bundle as the RED one you have just removed. Insert BROWN wire into WIRETAP and secure.
5. Terminate the RED WIRE that you removed in STEP 3 in the same manner as you found the BROWN WIRE in STEP 2.



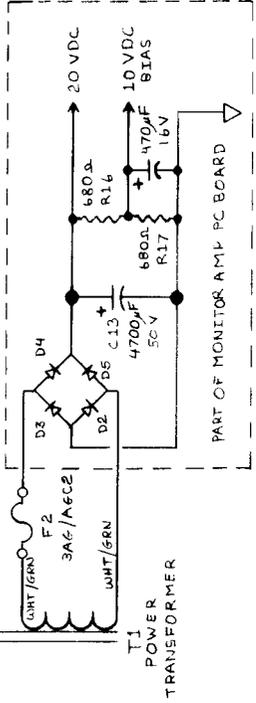
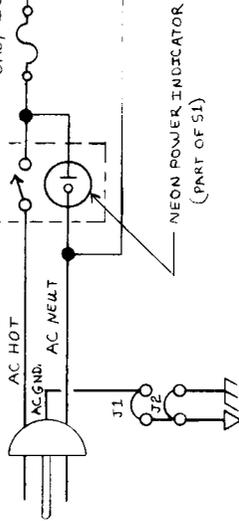
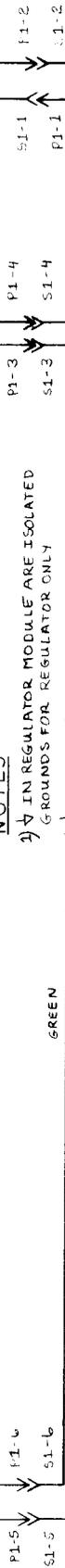
<b>EX500 EXCITER-MONITOR</b>	
SCALE:	APPROVED BY: <b>OLN 11/7/86</b>
DATE:	REVISED:
<b>AUDIO DISPLAY DRIVERS</b>	
<b>SHEET #3 OF 3</b>	
DRAWING NUMBER: <b>0500B302</b>	



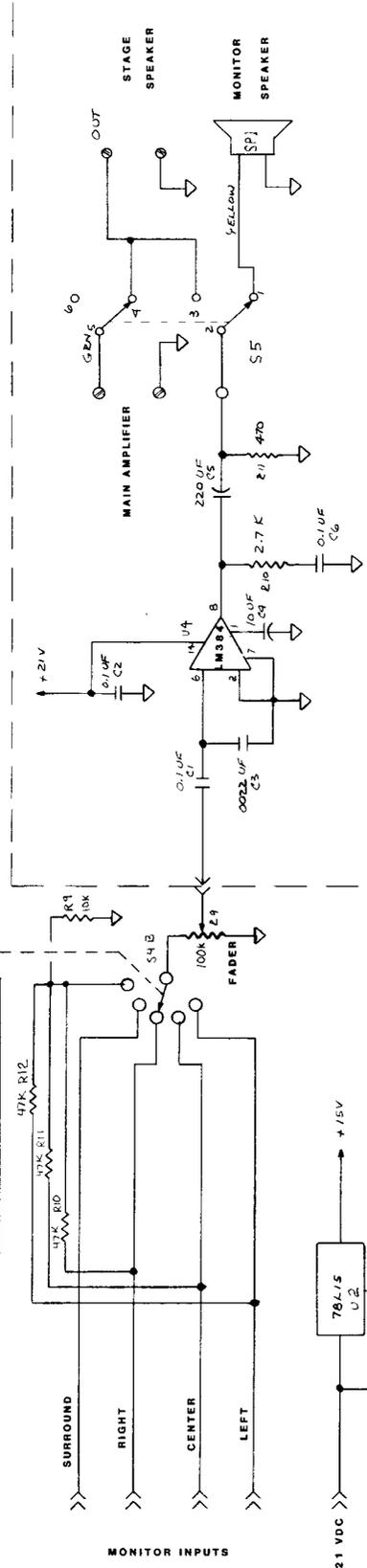
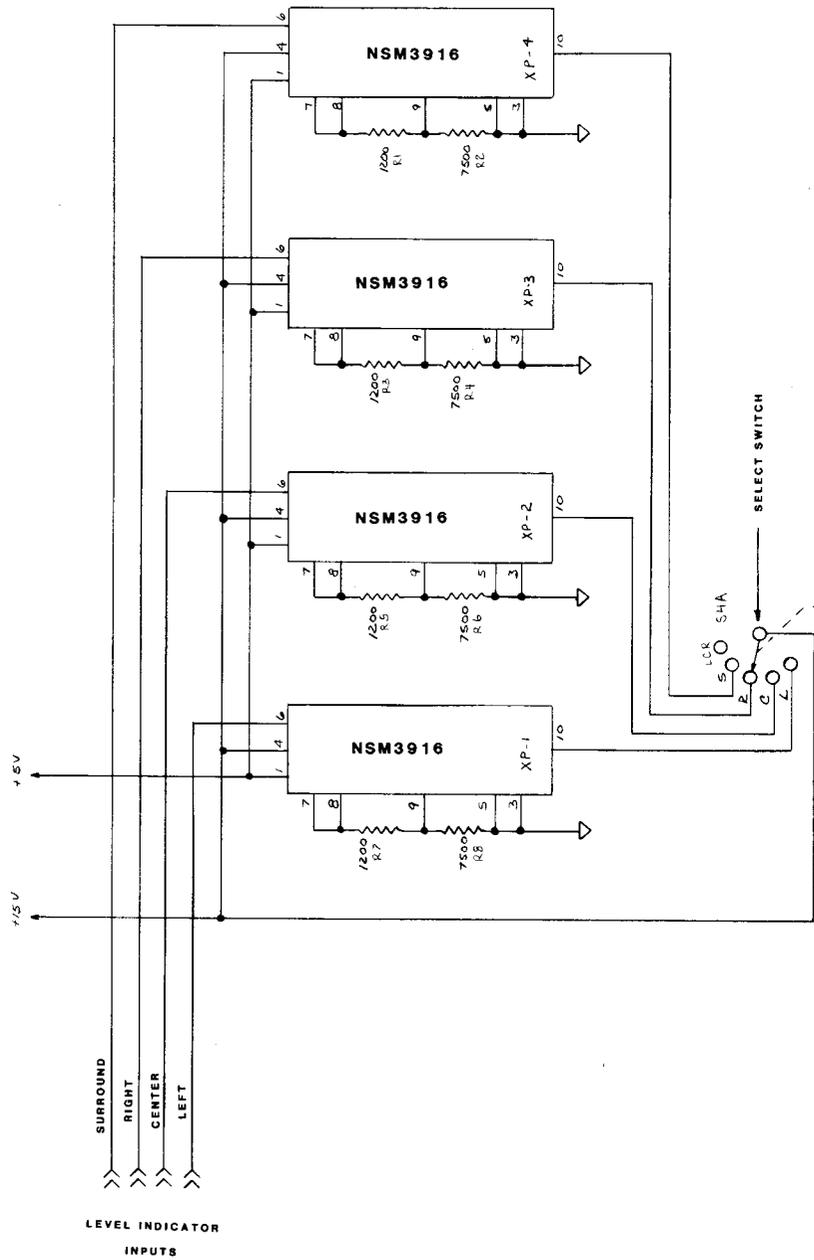
REGULATOR MODULE

NOTES

- 1) IN REGULATOR MODULE ARE ISOLATED GROUNDS FOR REGULATOR ONLY
- 2) IN OTHER CIRCUITS ARE CIRCUIT GROUND
- 3)  $\nabla$  = CHASSIS GROUND
- 4) D2-D5 ARE 1N4001
- 5) OPERATING VOLTAGE AND CURRENT 120 VAC  $\pm$  10% 50/60 HZ 3 AMPERES MAXIMUM
- 6) LAMP OUTPUT  $\sim$  4.5VDC - 10VDC, 5 AMPERES



<b>SMART THEATRE SYSTEMS</b>	
SCALE: NONE	APPROVED BY: OLN
DATE: 3/18/87	REVISED
<b>EX500B EXCITER SUPPLY/MONITOR</b>	
<b>SCHEMATIC SHEET #2 OF 3</b>	
DRAWING NUMBER: <b>0500D301</b>	



<b>EX500 EXCITER-MONITOR</b>	
SCALE:	APPROVED BY: <b>OLN 11/7/86</b>
DATE:	REVISED:
<b>LED ARRAY MONITOR BOARD</b>	
DRAWING NUMBER	<b>0500B300</b>
<b>SHEET #1 OF 3</b>	