Film-Tech

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INSTALLATION AND OPERATION MANUAL

EX510 EXCITER - MONITOR

American Made

SMART THEATRE SYSTEMS

P.O. BOX 80361

3856 GREEN INDUSTRIAL WAY

ATLANTA. GA 30341

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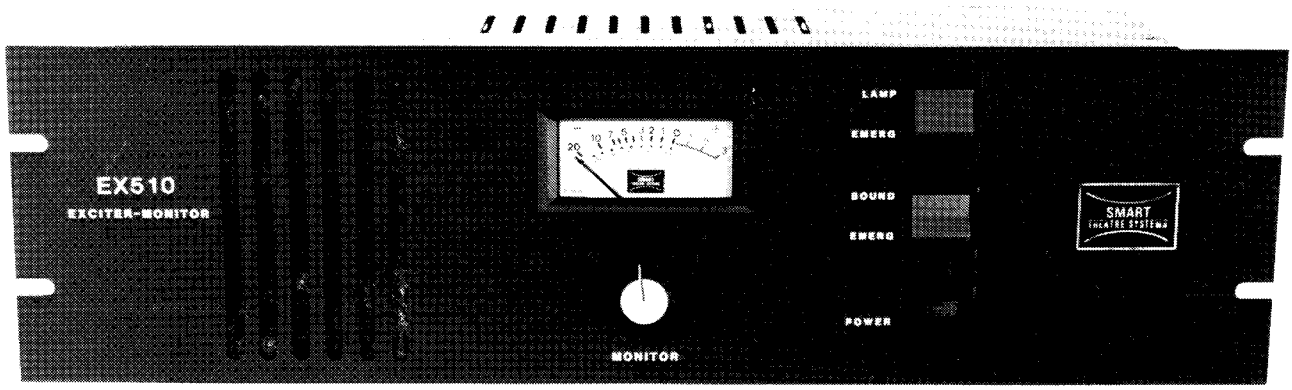
EX510 MONITOR-EXCITER SUPPLY



A SPACE SAVING, HIGHLY EFFECIENT PACKAGE.

FEATURES

ACTIVE MONITOR AMPLIFIER
DC EXCITER SUPPLY
EMERGENCY BACKUP
HIGH POWER SPEAKER
RICH SOUND QUALITY
PROGRAM METER
TORIOD TRANSFORMER
RACK MOUNTED

The SMART EX510 Monitor-Exciter Supply is another industry first in state-of-the-art design and effective packaging. This combination product incorporates features not found in more expensive separate units. This special product is intented for use in quality monaural custom theatre systems. A heavy Toriod transformer powers the unit and is capable of handling two exciter lamps at the same time, while supplying the separate power for the built in monitor amplifier. High or low voltage for the lamps is easily selected to drive virtually every type of bulb on the market. AC backup is readily available via the large front panel emergency switch.

The active booth sound monitor section of the unit drives the high quality monitor speaker, and acts as a backup power amplifier to the main stage speaker amplifier in the event of failure. A front panel switch lets the operator quickly substitute the booth monitor to keep sound in the house. The large PROGRAM METER on the front panel monitors the soundtrack level from the system preamplifier and acts as a visual indicator so that relative loudness in the auditorium can be estimated. A hidden control on the rear of the unit allows the monitor amplifier and meter to be calibrated to various system components.

The rugged steel chasis helps shield the unit against RF and Hum pickup, and the front panel occupies only 5¼ inches of rackspace. The EX510 is also available in a 230 volt version for export or special applications.

SMART
THEATRE SYSTEMS

SMART THEATRE SYSTEMS

3856 Green Industrial Way, Atlanta, GA 30341 (404) 452-1820

TEA

EX510 INSTALLATION

CRASH COURSE

Here is a quick explanation of the hook-up instructions for the EX510 Monitor-Exciter Supply. If you have installed this unit before, then this can be your check list. If not, then consider the following as a brief overview of the installation requirements.

- Using shielded audio cable, hook the sound system preamplifier output † to the MONITOR INPUT terminals.
- Connect the system main power amplifier output to the terminals marked MAIN OUT. Observe Amplifier ground.
- Hook the stage speaker line to the STAGE SPEAKER terminals.
- Connect the exciter lamp wires to the LAMP OUT terminals.
- Select the appropriate voltage range for bulbs with HI-LO strap on barrier strip.
- Calibrate the PROGRAM METER with test film or trailers using the special "tuning wand" through the METER control hole in the rear of the chassis.
- Plug devices that are to be switched by the front POWER SWITCH into the CONVENIENCE OUTLETS on the rear of the EX510.
- Check the fuse rating for the proper value when using either one or two exciter bulbs simultaneously.

† There is an *alternative input hookup method* to allow monitoring from the output of the sound system power amplifier output. See the appropriate section of this manual for precautions and hookup procedure.

The installer should make the owner or operator aware of the proper operation and features of the SMART EX510 to avoid an unnecessary service call. Be sure the theatre is armed with spare fuses for emergency use.

A more complete description of the installation and adjustments of the EX510 Monitor-Exciter Supply is included in this manual.

EX510 INSTALLATION AND SERVICE MANUAL

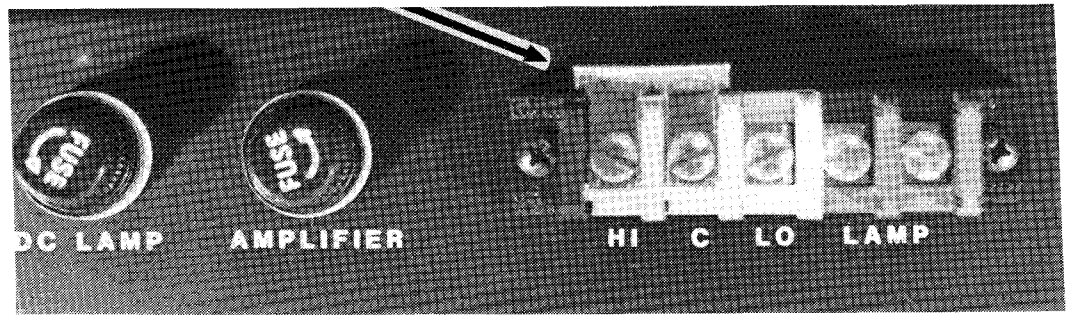
The SMART EX510 is a space saving product that combines a high power DC exciter lamp supply and an active booth monitor system into one rack mounted 5¼ inch package. When installing this product, keep in mind that there are two sections that are *independent* in their functions, but powered by the large toroid transformer. Refer to the schematic diagram for details on the internal wiring.

VENTILATION. The lamp supply is capable of supplying 8 amperes of current to drive *two bulbs simultaneously.* The 25 amp diode bridge is mounted on the chassis at the rear to help cool it during heavy current draw. To assure long life and cool operation, it is necessary to assure that there is adequate air flow across the rear of the unit. Do not rack mount the EX510 directly above heat generating equipment (power amps, other supplies, etc.) without a spacer or vent panel to separate the distance.

PROTECTION. There are three fuses accessible from the rear of the product to protect the circuits. The main AC line fuse is a 3 amp 250 volt 3AG type. The monitor power amplifier fuse is a 2 amp 3AG type. However, the DC lamp fuse should be 12 amp if *two bulbs* are used simultaneously, and 8 amp if a *single bulb* is used. Make sure the proper fuse is installed to avoid a possible hazard or service call. Extra fuses are included with the EX510. Please alert the theater owner or operator as to where they are stored.

RACK MOUNTING. The EX510 should be mounted in a position in the rack where it is easily accessible to the operator. The monitor FADER control should be conveniently available, and the PROGRAM METER easily visible. We suggest that the unit be mounted in the upper half of the rack space, near the main preamp fader. Use a vent panel above and below the unit for proper air circulation. Four rack mounting screws are furnished with the product.

EXCITER BULB RANGE. Before wiring the exciter lamps in the projector(s), determine what voltage range you wish to use. A three terminal barrier strip on the rear of the chassis allows selection. A movable metal jumper must be placed between the HI-COMMON or COMMON-LO terminals to provide a permanent and positive lamp voltage output. American bulbs should run in the HI POSITION. Many foreign projectors have low voltage bulbs and should run in the LOW POSITION selection. You can readily determine which setting is proper by examining the label on the bulb. Bulbs that range from 4.5 volts to 6 volts should be run in the LO range, and bulbs that like 7.5 volts to 10 volts should run on the HI range. **DO NOT HOOK THE EXCITER LAMP(S) TO THE RANGE SELECTION TERMINALS.** Also, a metal jumper *must be installed* in either the HI or LO position, or there will be *no output* at the output terminals.



METAL LINK MUST BE INSTALLED IN EITHER HI OR LOW POSITION

DC LAMP SUPPLY. Because the DC supply is unregulated, the actual voltage output may vary according to the instantaneous AC line voltage in the building. You may measure slight variations on the lamp output terminals at different installations. Also, because of wire resistance between the rack mounted supply and the projector, a further drop of voltage will occur. Make your voltage measurements at the *bulb end of the wire.* A suitable wire gauge must be used to minimize voltage losses. For a short distance run, a number 12 AWG or 14 AWG is recommended. Number 10 AWG or larger should be used for very long runs to minimize voltage drop due to wire resistances. Smaller gauge wire may be dangerous and not meet the electrical code in your area.

LAMP OUTPUT. Two RED terminals are located on the same rear barrier strip as the RANGE SELECT terminals. These are the lamp output terminals. If two bulbs are used in the booth system, *two runs of wire* are recommended (one pair to each bulb) so that each bulb receives equal voltage. If you run a single pair of wires to the first bulb, and then extend wires to the second, a further voltage drop will appear on the second bulb, thereby reducing its brightness. This practice is satisfactory if you are wiring an exciter light changeover where only one bulb is on at a time and is controlled by a changeover switch near each projector. The single pair of wires can be run to the switch system and a "branch" extended to each bulb.

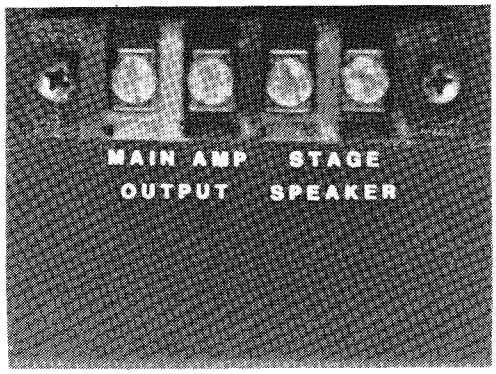
BOOTH MONITOR AND PROGRAM METER

MONITOR WIRING. Connect a shielded audio cable from the output of the device being monitored, to the two amplifier input terminals on the rear of the EX510. The input terminals are on barrier strips on the rear of the chassis. The shield of the audio cable *plus* the low side of the audio cable from the preceding piece of equipment should be tied to circuit ground. Do not ground the shield of the audio cable at BOTH ends. Keep this audio cable away from AC lines or speaker lines when routing from the sending device to the monitor input.

MONITORING A PREAMPLIFIER OR STEREO PROCESSOR. The EX510 has been designed for universal use with almost every brand or type of Stereo processor or preamplifier on the market. The "bridging" impedance of the input circuitry can safely be connected to the output of the sending device without serious loading of the device. SMART products have an extra output on most processors or preamplifiers labeled "DIRECT OUT". This extra output is not affected by the master fader setting and therefore will provide a continuous sound level to the input of the EX510 monitor amplifier. Connecting the processor/preamplifier output to the input of the EX510 is the preferred method of installation because the EX510 internal monitor amplifier has provision to act as an emergency backup amplifier if the main power amplifier fails. However, the booth monitor must have a *continuous audio input in order to function as a backup system.* If you have connected the output of the main power amplifier to the input of the EX510, there will be no reliable signal to the EX510 should the main amplifier fail or become noisy.

MONITORING THE OUTPUT OF A POWER AMPLIFIER. Some sound engineers like to monitor the output of the main house amplifier rather than the output of the processor or preamplifier so that a failure of the main amplifier will be detected by the operator. The EX510 will perform this function nicely, but you *will lose the important backup feature* in the monitor. If the main amplifier stops operating, the input signal to the EX510 will also stop and the monitor amplifier cannot be used to backup the main system without extra external switching. To monitor the main amplifier output, a resistive pad must be used to reduce the input sensitivity of the EX510 to avoid input overdrive.

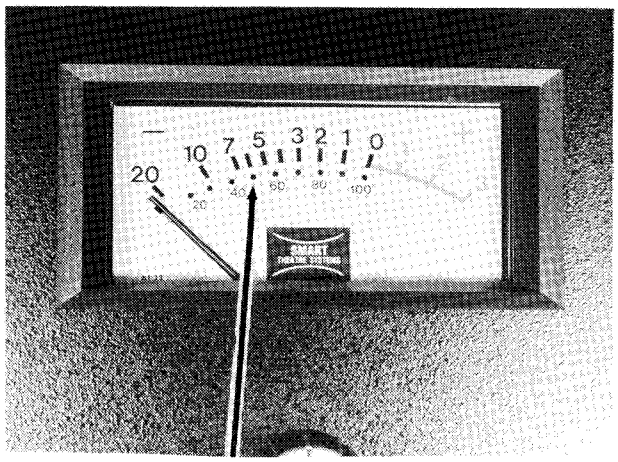
An installer option wire (jumper) is located on the monitor amplifier printed circuit board inside newer models of the product. Remove the chassis top panel and locate the jumper at the left rear quadrant of the PC board, and *cut* the jumper for the LOW SENSITIVITY position. You may now connect the output of the main power amplifier to the input of the EX510. If you have a model that does not have the jumper on the PC card, a minor modification will enable you to decrease the input sensitivity. Cut the wire that runs from the "HOT" input terminal that runs to the PC board. Insert a 180KΩ ¼ watt resistor in series with the wire. This will form an audio pad with the existing 50KΩ input pot to lower the input sensitivity.



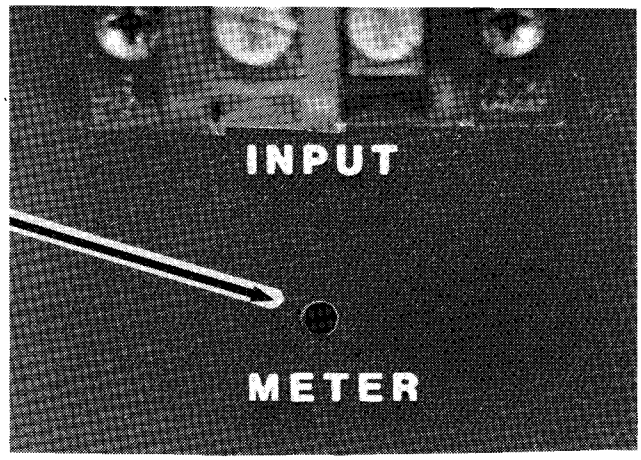
ONE TERMINAL OF THE MAIN AMP OUTPUT, AND ONE TERMINAL OF THE STAGE SPEAKER IS GROUNDED TO THE CHASSIS OF THE EX510. BE SURE THAT THE GROUNDED OUTPUT TERMINAL OF THE POWER AMPLIFIER FEEDING THE EX510 IS CORRECT. AMPLIFIERS IN "MONO-BRIDGE" CONFIGURATION WILL NOT WORK THROUGH THE EX510 BECAUSE NEITHER AMPLIFIER OUTPUT TERMINAL MAY BE GROUNDED.

EMERGENCY BACKUP MONITOR OUTPUT. In order to act as a backup to the main power amplifier, the EX510 switching circuits must receive the output of the main system amplifier. This power signal is passed through the front panel SOUND-EMERG (Emergency) switch, then sends the signal to the stage speaker. Wire the output of the sound system main amplifier to the terminals on the rear of the chassis labeled "MAIN OUTPUT". Then, wire the stage speaker line to the terminals labeled "STAGE SPEAKER". When the front panel switch is in the SOUND position, *the main amplifier will feed the stage speaker directly* and *the booth monitor amplifier will feed the internal monitor speaker.* If the operator moves the switch to the EMERG position, the *main amplifier is cut off from the stage speaker* and *the booth monitor amplifier feeds the stage.* The front panel FADER will then control the volume level in the auditorium. The internal *monitor speaker is disconnected* when the EMERG switch is activated to minimize the load on the monitor amplifier. This scheme assumes that you have not fed the input of the EX510 with the output of the main power amplifier as a signal source.

PROGRAM METER. A large illuminated modulation meter on the front panel of the EX510 shows the operator the volume level coming from the film. Trailers and short subjects may register a high level, whereas feature films may have a moderate output. The PROGRAM METER is valuable in determining the relative loudness in the auditorium. The soft meter illumination is ideal for a normally lit projection booth.



ADJUST INPUT CONTROL UNTIL THE METER READS 50% ON THE LOWER SCALE (-6 dB ON THE UPPER SCALE)

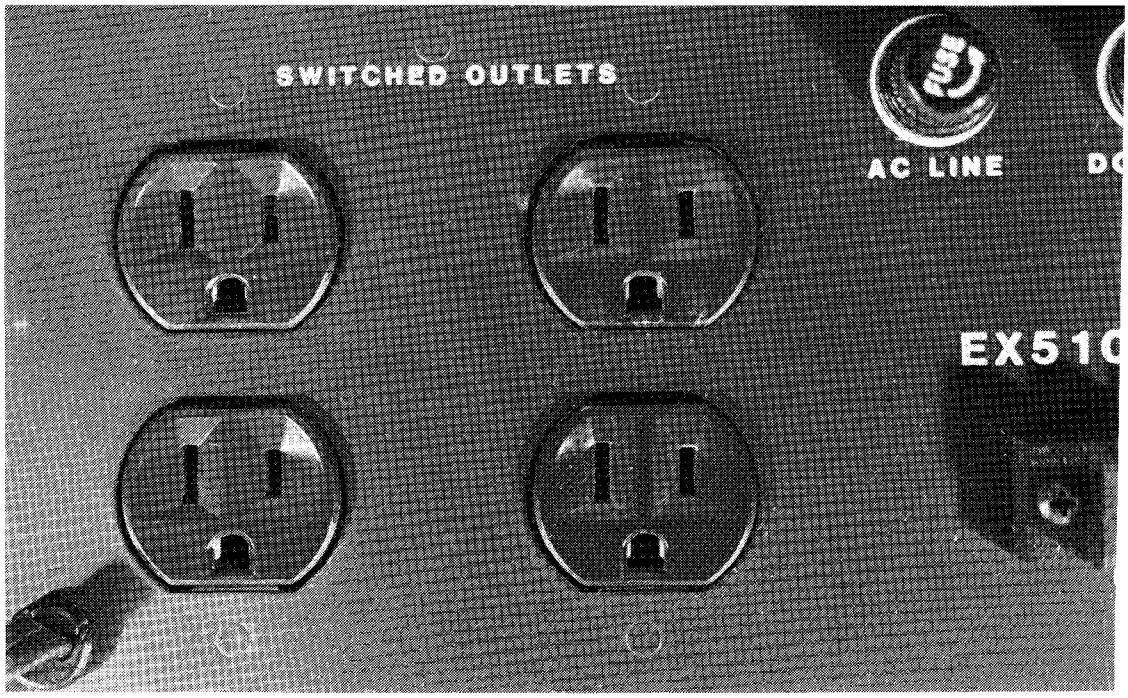


INSERT THE PLASTIC TUNING WAND THROUGH THE HOLE IN THE CHASSIS TO ADJUST INPUT LEVEL

CALIBRATION. There is a small hole in the chassis below the monitor amplifier INPUT TERMINALS. This is the meter calibration pot that may be reached with the "tuning wand" supplied with the EX510. Using the flat blade end of the wand, find the slot in the center of the internal control. With a Dolby™ reference level test loop running on one projector, rotate the control *clockwise* for an increase in meter level. Adjust until the meter reads 50% on the lower scale of the meter. This corresponds to -6 dB on the upper meter scale. This setting would indicate the true recording level on the soundtrack. Trailers and short subjects are usually recorded louder and may register 100% at times. Calibration should be made only when the preamplifier feeding the EX510 is at its normal setting for a normal size audience. The calibration control also affects the audio drive to the monitor amplifier. As you increase the control, more audio signal is fed to the monitor. If no test loop is available, run trailers and adjust the meter for 100% modulation.

USING THE EX510 WITH SMART EQUIPMENT. The latest generation of Stereo Decoders (SR300 and SR135) and preamps (SXL735) produced by SMART THEATRE SYSTEMS have a DIRECT OUTPUT terminal to drive other system components with a constant level. The FADER on these products affects the MAIN OUTPUT terminal only, and not the DIRECT OUTPUT. Use the *direct output* to feed the EX510 monitor amplifier, and the *main output* to feed the house power amplifier. The operator can therefore adjust his preamp FADER to suit the house volume level without changing the calibration of the PROGRAM METER or changing the input signal level to the EX510.

AC CONVENIENCE OUTLETS. There are four duplex outlets on the rear of the EX510 that are switched by the front panel power switch. This array of outlets IS NOT FUSED by the EX510. Each piece of equipment plugged into the convenience outlets must be individually fused for protection. The front panel power switch can be used to turn the whole sound system on and off. Be sure that the total current draw through the outlets does not exceed 12 amps *or the current rating of the switch and line cord will be exceeded.*. Another advantage of the convenience outlets is that it provides a common ground point in the sound system for the green third wire of each piece of equipment.



EX510 SERVICE

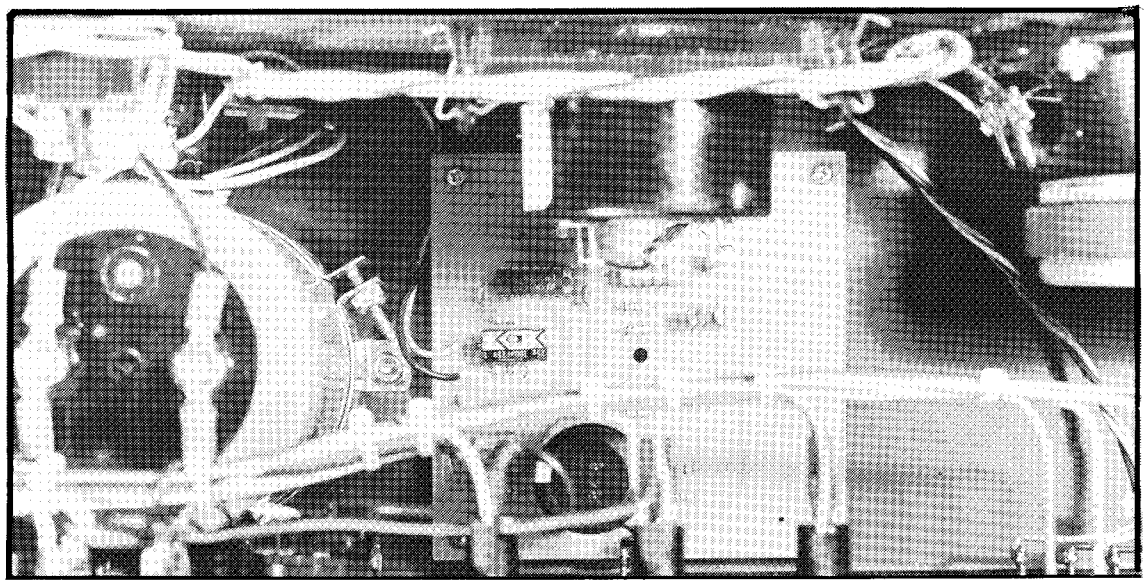
LAMP SECTION. The EX510 uses a very efficient toroid transformer as its main power source. The secondary winding voltages are calculated so that the voltage and current on the winding used for the AC lamp supply is about the same as the rectified and filtered DC lamp supply. LO and HI voltage select terminals are used to select the desired operating range for a particular bulb. The following chart indicates the voltages you should measure on each winding with 117 volts AC applied to the primary of the toroid.

WINDING	DC OUTPUT	AC OUTPUT
LOW SECONDARY	5.2 VOLTS	5.6 VOLTS
HIGH SECONDARY	7.5 VOLTS	7.5 VOLTS
AMPLIFIER TERTIARY	21 VOLTS	16.5 VOLTS AC

The Low and High secondary feed to exciter lamp output terminals directly when the front panel LAMP-EMERG switch is in the EMERG position. The SELECT TERMINALS must have a shorting link connected from the COMMON terminal to one of the SECONDARY WINDINGS. This AC voltage can be measured at the lamp output terminals.

The DC LAMP output voltage can be measured at the lamp output terminals when the front panel LAMP-EMERG switch is in the LAMP position. The selected secondary winding is rectified by a 25 amp full wave diode bridge and filtered by a 68,000 μf 15 volt electolytic. The resultant DC voltage has an extremely low ripple. Because of the high current capability of the toroid and bridge, there is about a 2 volt drop across the bridge which is converted to heat. If the bridge ever has to be replaced, be sure to use heat sink compound on the replacement diode bridge to assure a good thermal bond to the chassis.

MONITOR AMPLIFIER SECTION. The printed circuit card for the monitor amplifier contains the bridge diodes for full wave rectification and filter capacitor to power the LM384 5 watt integrated circuit power amplifier, along with two transistors in a darlington configuration for the meter driver. A single pot feeds audio to the meter circuits and the monitor amplifier circuits. The amplifier chip *must be soldered to the board in order to properly heat sink the chip.* A second heat sink is cemented to the top of the device. Operating voltage for the amplifier is approximately 21 volts DC. This allows a safety margin for high AC line voltage that could damage the chip if a higher operating voltage were used.



The entire card can be removed for replacement by disconnecting the input leads, the power transformer leads, and the output leads. The front panel level control can be removed without unsoldering. The easiest way to remove to remove a bad IC chip is to cut each lead from the top of the card, and unsolder each pin from the bottom of the card. Refer to the schematic diagram and parts list for circuit details.

SMART THEATRE SYSTEMS maintains a service department for repair of products in or out of warranty. Also, telephone help is available during normal business hours (EST).

EX510 MONITOR-EXCITER

OPERATING INSTRUCTIONS

POWER SWITCH. Turns the sound system ON and OFF. The other components of the system are plugged into the convenience outlets on the rear of the EX510 and will be controlled by the master power switch.

LAMP-EMERG SWITCH. The RED panel switch is used to switch the DC exciter lamp supply from DC to AC backup in the event of failure of the main supply. The exciter lamp(s) should maintain about the same brightness on the backup system as on the main DC supply.

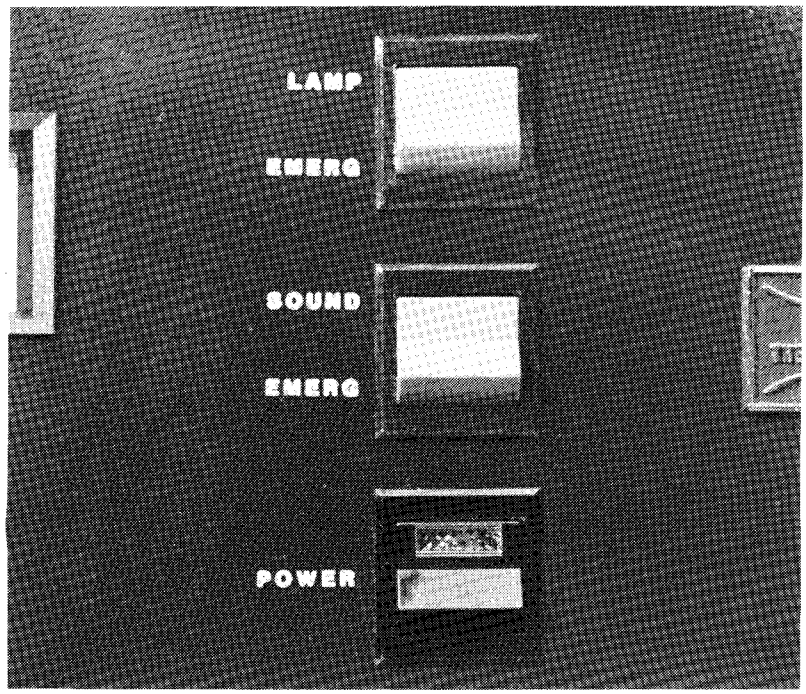
SOUND-EMERG SWITCH. The main power amplifier output passes through the SOUND-EMERG switch to the stage loudspeaker system. If the main amplifier fails during a show, this switch substitutes the built-in monitor amplifier as a backup. The monitor FADER must be set for sufficient loudness in the auditorium. When the emergency switch is activated, the booth monitor will be disconnected.

MONITOR CONTROL. The front panel control sets the level of the booth monitor when the SOUND-EMERG switch is its normal SOUND position. When the switch is in the EMERG position, no sound will be heard from the booth monitor speaker. The MONITOR CONTROL now sets the loudness of the stage speaker.

PROGRAM METER. Indicates the level at which the soundtrack was recorded. Most trailers and short subjects are recorded louder than most feature films. The meter can be useful in determining how loud the sound is in the auditorium.

PROTECTION. There are three fuses on the rear of the chassis that protect the internal circuits. *Each should be replaced with the proper size.* The main fuse is a 3 AMP 3AG type. The DC Lamp is a 12 amp fuse if two bulbs are on simultaneously, and 8 amp if only one bulb is used. The monitor amplifier fuse is a 2 amp 3AG type.

For an expanded explanation of each of the circuits and features, see the appropriate section of this manual.



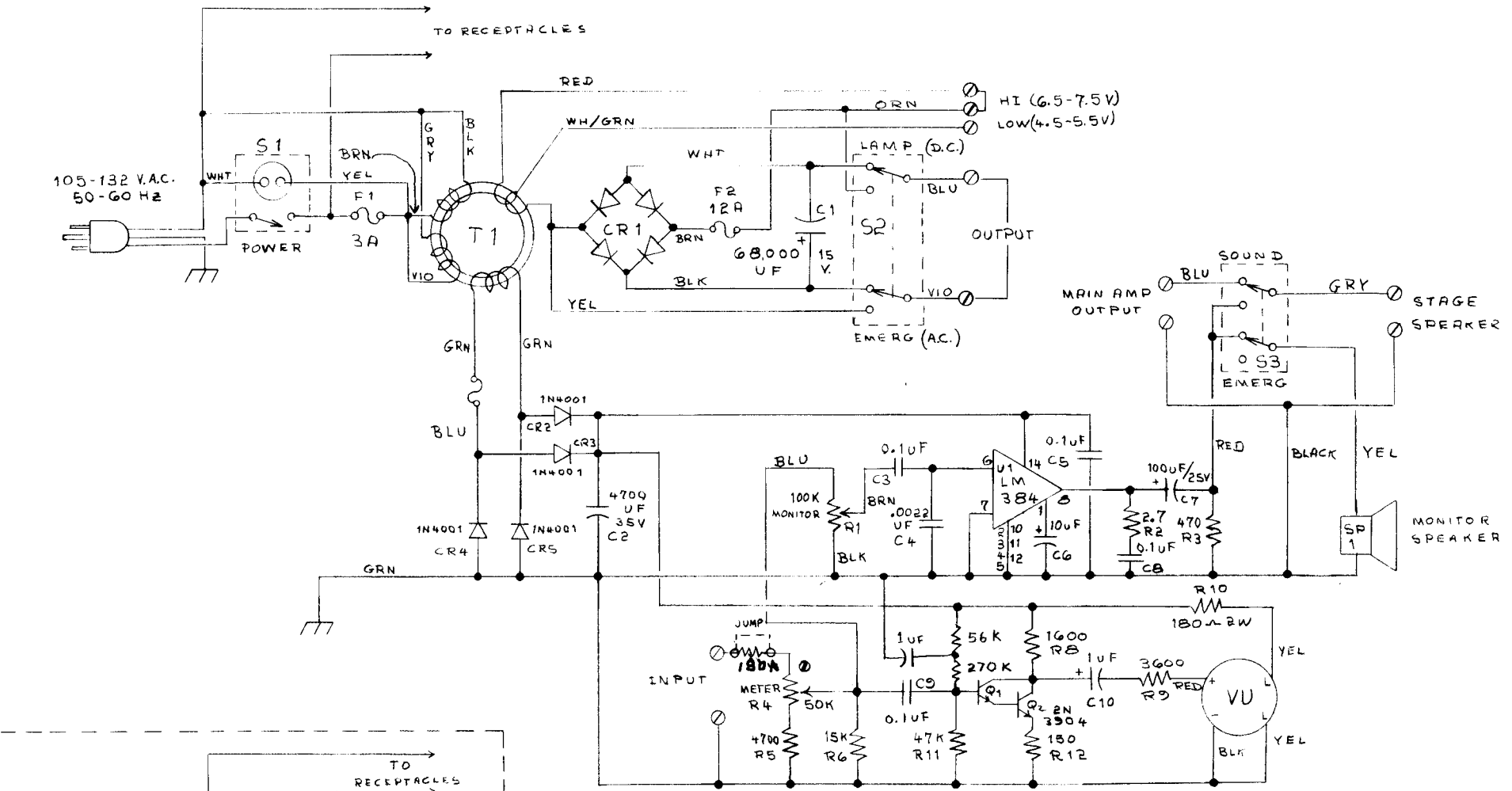
ALL OPERATOR CONTROLS ARE CLEARLY MARKED ON THE FRONT PANEL

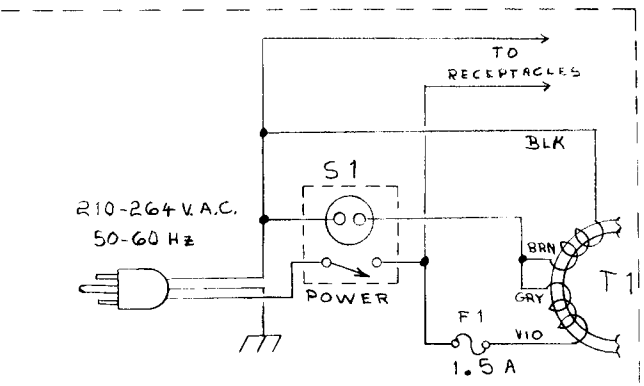
EX510 PARTS LIST

C1	CAPACITOR	68000uF 15 VDC
C2	CAPACITOR	4700uF 50 VDC
C3	CAPACITOR	.1 uF 100 VDC CERAMIC
C4	CAPACITOR	.0022uF 100 VDC POLY
C5	CAPACITOR	.1 uF 100 VDC CERAMIC
C6	CAPACITOR	10 uF 16 VDC ELECTRO
C7	CAPACITOR	100 uF 16 VDC ELECTRO
C8	CAPACITOR	.1 uF 100 VDC CERAMIC
R1	RESISTOR	100K LOG PANEL POT
R2	RESISTOR	2.7 OHM 1/4 WATT 5%
R3	RESISTOR	470 OHM 1/4 WATT 5%
R4	RESISTOR	50K LOG PANEL POT
R5	RESISTOR	4700 1/4 WATT 5%
R6	RESISTOR	15K 1/4 WATT 5%
R7	RESISTOR	56K 1/4 WATT 5%
R8	RESISTOR	1600 1/4 WATT 5%
R9	RESISTOR	3600 1/4 WATT 5%
R10	RESISTOR	180 OHM 2 WATT 10%
R11	RESISTOR	270K 1/4 WATT 5%
R12	RESISTOR	180K 1/4 WATT 5%
U1	IC	LM384 5 WATT 14 PIN
S1	SWITCH	DPDT EMERG SOUND
S2	SWITCH	DPDT LAMP EMERG
S3	SWITCH	SPDT POWER, NEON
F1	FUSE	3 AMP 3AG PANEL
F2	FUSE	12 AMP 3AG INTERNAL
F3	FUSE	8 AMP 3AG PANEL
CR1	DIODE	25 AMP 200V BRIDGE
CR2	DIODE	1N4001 50 V SILICON
CR3	DIODE	1N4001 50 V SILICON
CR4	DIODE	1N4001 50 V SILICON
CR5	DIODE	1N4001 50 V SILICON
T1	TRANS	900005 SMART DESIGN

All parts are available from the factory.

Pricing on individual components on request.





ALTERNATE POWER HOOKUP

EX510 MONITOR-EXCITER

10

SMART THEATRE SYSTEMS		
SCALE:	APPROVED BY:	DRAWN BY: MEC
DATE: 11-6-84		REVISED
EX510 EXCITER-MONITOR		
SCHEMATIC		DRAWING NUMBER 05108500