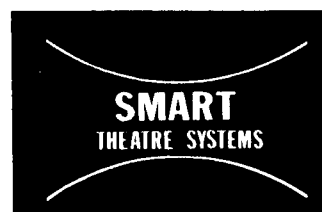


# INSTALLATION AND OPERATION MANUAL

SXL 735 MONAURAL PREAMPLIFIER



**SMART THEATRE SYSTEMS**

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## CRASH COURSE



Here is a quick explanation of the hookup procedures for the SXL735 Sound Control Center. If you have installed the unit before, then this is a checklist. If not, then consider the following as a brief overview of the installation requirements.

1. Using shielded wire, hook the solar cells from each projector to PROJ 1 AND PROJ 2 audio inputs.
2. Connect the output to the power amplifier input through shielded wire.
3. Select changeover scheme (if dual projector booth) from the options on page 2, and wire accordingly.
4. Run a wire from the COMMAND terminal to the automation or remote switch near the projector for the music fade feature.
5. Connect the intermission music machine to the MUSIC inputs.
6. Run a test loop on each projector, and balance the sound level between machines.
7. Set the power amplifier level for proper auditorium level.
8. Adjust the BASS and HF controls for the most pleasing playback of the film.

A more complete description of the operation and adjustments of the SXL735 Sound Control Center is included in this manual.



## SXL735 INSTALLATION INSTRUCTIONS

The SMART SXL735 SOUND CONTROL CENTER is a self contained monaural soundtrack processor that has the capability of conditioning the output from solar cell electrical signals and a music source for a professional presentation in any theater auditorium. It's regulated power supply furnishes power for all circuits and lamp functions, with no other external power required. All inputs and outputs are readily available on a single barrier strip on the back of the chassis. Audio filters and sound shaping controls allow the sound engineer to sweeten or enhance the sound signal for the most pleasing effect in various auditoriums and acoustical environments. The hefty output capability of the SXL735 can drive several amplifiers (booth monitor amp, emergency amp, and main amp) simultaneously. A direct output terminal is ideal for feeding a stereo generator or self amplified booth monitor without affecting equipment connected to the main output terminal.

**MASTER FADER** controls the level of sound sent to the power amplifier and house speaker. The normal fader setting is between 5 and 7 on the numbered dial. This control affects the **film level ONLY**. The setting may be changed by the operator to adjust for various soundtrack recordings and/or audience size.

**FILM CHANGEOVER.** If you are operating a two projector booth, alternate changeover buttons or automation changeover has been provided by the installer. The installer will instruct the operator as to how the changeover has been wired, and if there is a manual control.

**MUSIC-FILM LIGHT.** This LED indicates the status of the Sound Control Center logic. When the lamp is flashing, the music source is present at the output of the SXL735. When the lamp is solid, the film soundtrack has been selected.

**LEVEL** If a music machine has been wired into your system, the LEVEL control will adjust the music non-sync source through the SXL735 to the next piece of equipment and house speaker. This control is part of the music fade-in and fade-out circuitry that is built into the unit. The AUTO-MANUAL switch on the front panel of the product actuates the music fade. A terminal on the rear barrier strip will perform the same function remotely. The music machine must be "rolling" **before** the music fade circuit is triggered to avoid audio "scoop" as the machine comes up to speed.

Before you can install the SXL735 you must determine your wiring requirements. Use the handy reference below, then go on to the appropriate section of this manual for instructions.

Single Projector	or	Dual Projector
Electronic Changeover (both exciter lamps on all the time)	or	Exciter Lamp Changeover (both projector's audio on all the time)
Manual Changeover	or	Automation Changeover
Continuous Command	or	Momentary Changeover Command
Intermission Music	or	No Music

The SXL735 should be positioned at eye level in the equipment rack for easy access to the FADER control and front panel switches. Make sure the rack is properly ventilated and that the rising heat from other components does not overheat the unit.

The three prong AC plug will ground the chassis to reduce the hazard of electrical shock to personnel.

Solar cell cables should be two conductor with an overall foil shield. Ground the shield at the input ground terminal on the SXL735 only. Do not ground the other end at the projector. It is good practice to cut off the remaining foil and drain wire and wrap the cable jacket with electrical tape so that the shield cannot rub against machine parts or other grounded metal.

**PROTECTION** The SXL735 uses one main fuse mounted on the rear of the chassis. This fuse can be quickly replaced in the event of failure. The LEDs on the front panel will indicate a loss of AC power. Replace the fuse with a 1/2 amp 3AG type **only. MAKE SURE THE THEATER PERSONNEL HAVE A SPARE FUSE IN CASE OF EMERGENCY.**

**GROUNDING.** The printed circuit card in the SXL735 is grounded to the chassis. Also, the third wire of the AC cord is connected to the printed circuit board. This effectively provides **common** for the board, chassis, equipment rack, and the booth electrical system. If, for some reason the ground for the PC board or AC cable ground must be broken, two jumpers have been provided on the card that can be cut out. These wire loops can be snipped individually to change the grounding scheme. It is very important to observe good grounding procedures for a quiet, humfree system, particularly if a sub-woofer speaker system is used.

**OUTPUT CAPABILITY.** The SXL735 Sound Control Center is capable of driving several amplifiers simultaneously. It's low impedance output can be used to supply signal to the main amplifier, emergency amplifier, and booth monitor amplifier without undue loading. Also long lines are possible to allow the SXL735 to be quite distant from each amplifier. Before connecting several amplifiers to the output of the preamp, be sure that each

amplifier has it's own power transformer to isolate from the AC line to avoid a "hot" system. Connect a shielded audio cable to the output of the SXL735 , and the shield to the nearest ground terminal. The other end of the cable is connected to the power amplifier input.

**MUSIC-FILM LIGHT.** The Music-Film LED tells the operator the status of the input sources. The built-in cross fade circuit is actuated by grounding the **command** terminal on the rear barrier strip. This grounding action may be controlled by automation equipment, or a remote manual switch by the operator. When non-sync (intermission music) is selected (terminal grounded) the LED will flash rapidly. When the film soundtrack is passing through the unit (terminal ungrounded), the LED is brightly lit with a steady glow. The operator can determine the status of the sound system visually in his booth monitor has been turned down.

**SINGLE PROJECTOR OPERATION (PLATTER).** When the AC power is applied to the SXL735 the solid state logic circuit will ALWAYS cause the changeover to select **projector one** input FIRST. For this reason, connect the solar cell leads to the projector ONE input terminals on the rear barrier strip. **GROUND THE PROJECTOR ONE X-OVER TERMINAL** to the nearest ground terminal. This will assure that the solid state changeover cannot accidentally changeover to the unused projector two input, thereby causing a sound failure. Set the internal changeover option "shunt" to the **EL**(electronic changeover) position. Do not ground the X-OVER two changeover terminal. The "A" or "C" option on the internal logic shunt may be left **in either position** since the grounding of the projector one changeover terminal forces the logic into a permanent mode. The MUSIC-FILM action is controlled either by grounding the **command** terminal on the rear barrier strip with a remote switch contact closure, or by actuating the front panel AUTO-MANUAL switch. If remote action is desired the front panel switch **must be in the AUTO position.**

**DUAL PROJECTOR (AUTOMATIC OR MANUAL),** The solid state logic will always select **projector one** changeover FIRST when the SXL735 is turned on each day. Identify which projector is number ONE, and run a two conductor shielded audio cable from the solar cell to the projector ONE input terminals. Ground the shield at the preamplifier end only. Cut off the shield at the projector end and wrap the cable jacket with electrical tape. Follow the same procedure for the second projector and connect to the projector TWO input. Set the internal input level trim controls to the fully counterclockwise. This completes the soundtrack input wiring.

**CONTINUOUS SINGLE WIRE COMMAND.** When the internal "SHUNT" is placed in the "C" option position, a single wire to ground will execute a changeover between two projectors. Connect a single pair of wires to projector TWO changeover (X-OVER) terminal, and the ground terminal. Run the other end of the wire pair to a remote SPST switch or automation equipment. When the wire pair is shorted projector TWO audio is activated. When the wires are

unshorted, Projector ONE audio is ON. When using the single wire X-OVER command option, the X-OVER ONE terminal is not used or needed.

**MOMENTARY CHANGEOVER.** Two terminals on the rear barrier strip are used to switch audio alternately between two projectors. They are labeled "X-OVER 1" and "X-OVER TWO". Any momentary contact to ground of either of these terminals will force the logic and electronic switch into the desired mode. An SPST momentary contact switch mounted near each projector is all that is needed for manual changeover capability. If the SXL735 is to be used with automation equipment, check the relay (in the automation) making sure it's contacts have ON voltage on it's contacts. You are looking for a point that will ground the changeover lead for each projector. Although a momentary contact to ground is all that is necessary to execute a changeover, a continuous ground is also suitable. However, grounding **both X-OVER terminals at the same time** is a non-allowable state for the logic circuit. Place the "shunt" in the "A" option position on the PC card. Run a pair of wires to remote switch number 1, and a pair to remote switch number 2. Connect a wire from each pair to the proper X-OVER terminal. The remaining wires should be grounded. Remember to use **momentary contact** switches.

**SOLAR CELL INPUTS.** The SXL735 Sound Control Center is a monaural (single channel) device. In the event the unit is used with a split solar cell (stereo), both the left and right cell leads should be joined and connected to the appropriate projector audio input. The neutral wire of the cell (black) is common.

**ELECTRONIC CHANGEOVER.** An electronic switch selects projector ONE or projector TWO audio upon command from the logic circuit. This positive action takes place when the internal "shunt" on the printed circuit card "header" has been moved into the EL position. When a two projector booth has both exciter lamps on at all times, the electronic changeover mode should be used. Electronic changeover is the preferred method because there is a minimum of 3 dB better noise figure than with exciter lamp changeover. Refer to the **momentary** or **continuous** command in another section of this manual.

**EXCITER CHANGEOVER.** Some dual projector systems rely on switching voltage to either of two exciter lamps in order to affect a changeover. In this arrangement, both solar cells are active, and each exciter lamp is switched alternately. The internal changeover option "shunt" in the SXL735 should be placed in the EX position. There is a slight drop in audio preamp levels due to the mixing action. However, this can more than be compensated for with the extra gain in the unit.

**AUDIO SHAPING CONTROLS.** The audio shaping controls are accessible to the installing engineer and are adjusted during the final phase of installation.

**HF (HIGH FREQUENCY) CONTROL.** When the HF control is at it's fully

counterclockwise position, the **Academy Curve** is approximated. This severe roll-off of high frequencies is often too dull for the average listener. Playback of the soundtrack lacks sparkle. The installer may wish to brighten the auditorium sound for a more pleasing effect. Turning the HF control clockwise adds more high frequency material. Select a suitable setting that gives the best sound while minimizing film scratches on badly worn prints. The fully clockwise rotation of the control provides a "flat" response. No boost is available on the HF control.

**BASS CONTROL.** This important control can add fullness to the soundtrack. The bass boost is effective below 125 Hz and will not muddy the mid-range dialog region. A permanent 60 Hz **high pass filter** in the SXL735 provides protection to the woofers in the stage loudspeakers by limiting cone excursion during loud soundtrack passages when bass boost is used. Clockwise rotation of the bass control will **boost** the bass to a maximum of 12 dB. Counterclockwise rotation will cut bass by 12 dB. Mid-position of the control is **flat**. The cut feature is useful in highly reverberant auditoriums such as prisons, gymnasiums, or other rooms that are not acoustically "normal". Reducing the bass will increase the intelligibility of dialog and add clarity to the reproduced sound. The BASS and HF controls do not affect the music channel.

**MUSIC LEVEL.** The front panel control labeled "LEVEL" sets the film-to-music balance in the system. Setting the proper film level was discussed earlier in this manual. If the tape player feeding the music input has it's own volume control, set the level for normal undistorted output. A stereo player will require a 10K resistor added to each output channel audio lead so that the two channels can be "summed together" to provide a complete program. The two resistors feed the single input music terminal on the rear of the unit. Adjust the LEVEL control on the SXL735 for the proper sound level in the auditorium. Of course you must move the front panel AUTO-MANUAL switch to the **manual** position, or activate the COMMAND terminal on the rear barrier strip before you will hear the music fade-in. We recommend that the music level be slightly lower in volume than the soundtrack, for the most pleasing effect.

**MUSIC-FILM CROSS FADE.** This produces a professional transition between pre-show music and the beginning of the show. The reverse action occurs at the end of the feature. The aural effect is similar to two records cross-faded on a radio broadcast. It also effectively covers noises of the traveling screen mask, curtain pulley movement, and curtain motor noise in the auditorium. The music source (tape player, phono, etc.) must be "rolling" at the time the cross-fade circuit is activated. When the COMMAND terminal on the rear barrier strip is **grounded**, the music will fade IN and the film soundtrack will fade OUT. When the terminal is **ungrounded**, film will quickly fade IN, and intermission music will slowly fade OUT.

**PROJECTOR SOUND LEVEL MATCHING.** The audio output level of each projector must be matched in a dual projector booth. This assures a smooth transition during changeover. Here is the recommended adjustment procedure.

1. Set the PROJ 1 and PROJ 2 projector trim controls fully counterclockwise.
2. Attach the "hot" probe of your VOM or scope to the output terminal of the SXL735. Attach the other probe to ground.
3. Place the front panel FADER to it's mid-position.
4. Run a test loop tone on one projector. Changeover to the active machine. The test loop may be an SMPTE 1 KHz tone or a Dolby reference tone (440 Hz @ 50% modulation).
5. Adjust the trim control of the selected projector for a .775 to 1 volt reading on the test instrument.
6. Move the test loop to the other projector and adjust for the same level as the first machine.
7. Set the power amplifier gain for normal listening volume in the auditorium.

**DIRECT OUTPUT.** The SXL735 has **TWO** outputs. The terminal labeled "MAIN" on the rear barrier strip is used to drive other components in the booth sound system. This output is affected by the master FADER. The operator can adjust the output of the Sound Control Center with the Fader to accommodate various soundtrack recording levels, and audience size. The "DIR"(direct) output is used to feed a constant level signal to special equipment like the SMART SG1130 or SG1100 Stereo Generators. It can also be used to feed active booth monitors. (those that have built-in amplifiers). The SMART EX510, EX500, or MN520 are such devices. The output of the DIRECT output cannot be adjusted by the operator. Both "Main" and "Direct" outputs are low impedance, unbalanced sources that will drive any higher impedance device.

**TERMINATE-UNTERMINATE SWITCH.** On the rear of the SXL735 chassis there is a slide switch that connects the solar cell input termination resistors to each of the projector preamps. When the switch is in the **terminate position**, the resistors are in the circuit. This feature allows you to connect the solar cells to more than one preamp without heavy loading of the cell. The switch is normally left in the TERMINATE position. See the instructions for using a SXL735 as backup to your main preamp.

**USING THE SXL735 AS A BACKUP TO OTHER SYSTEMS.** A well designed sound system includes an emergency backup as insurance against failures. The SXL735 Sound Control Center can be used several ways for system protection.

1. An SXL735 as backup to an SXL735. You can join the solar cell inputs of the two units, the music inputs, and directly connect the X-OVER and COMMAND terminals from one unit to the other. **YOU CANNOT JOIN OUTPUTS TOGETHER.** One unit will look like a direct short to the other. You must **switch** outputs into the power amplifier. One unit should be designated as the MAIN unit, and the other as the STANDBY. The TERMINATE switch on the rear of the main unit should be in the **terminate position**, while the STANDBY unit is in the **unterminate position**.

2. The SXL735 as a backup for a stereo decoder. Since the Sound Control Center has two solar cell preamps, it can be connected directly to each half of a stereo solar cell in a single projector stereo booth. The primary preamp in the stereo decoder must be an **unbalanced input** type device. The TERMINATE switch on the chassis must be in the **unterminate position** when bridging the primary unit. Move the jumper "shunt" inside the SXL735 to the EX (Exciter) connection so that each preamp is joined to the other, thereby providing a mixing action of the two halves of the solar cell. A monaural output will result. This will not affect the stereo separation of the main system. Output switching should be provided to select between the output of the SXL735 and the center channel of the stereo decoder.

3. Using the SXL735 with other brands of equipment. Check the manufacturer's specifications and schematic diagrams to determine if the input loading scheme is used on the solar cell input on their equipment. Be sure the TERMINATE switch is in the **unterminate position** and the outputs are switched between the primary preamp and the SXL735.

#### **FINAL TIPS:**

1. The projector input trim controls have plenty of reserve gain. Extra gain was included in the design to accommodate that run reduced voltage on the exciter lamps. However, at rated brightness, the controls will be fully counterclockwise to avoid overdrive to the other sections of the circuit.

2. A **SHORTING LINK** is shipped with the SXL735 that connects the X-OVER 1 terminal to ground for single projector booths. If your installation is in a dual projector system, remove the link and wire the unit according to the instructions.

3. Make your power amplifier level setting when the SXL735 has been fully calibrated. The FADER should be in mid-position to allow an adjustment range for various prints.

The parts list on the following page is subject to change as improvements are incorporated into later production units.

## SERVICE INFORMATION

Every component of the SXL735 Sound Control Center is field replaceable with commonly available parts, including the various integrated circuits. The product has been carefully designed to work with plus or minus 10% tolerance capacitors and resistors. IC sockets are used to facilitate easy removal of any integrated circuit, should this ever become necessary.

Each unit is "burned in" for 2 days at the factory before quality control testing and packaging. In case of failure, always check the obvious causes of the symptoms first.

1. Is the unit receiving AC power? (power LED on)
2. Is the fuse blown? (the SXL735 has one 1/2 amp 3AG fuse)
3. Are all external switches (manual and automation) in their proper position?
4. Is the equipment preceding or following the unit operating properly?
5. Are the exciter lamps on the selected projector?

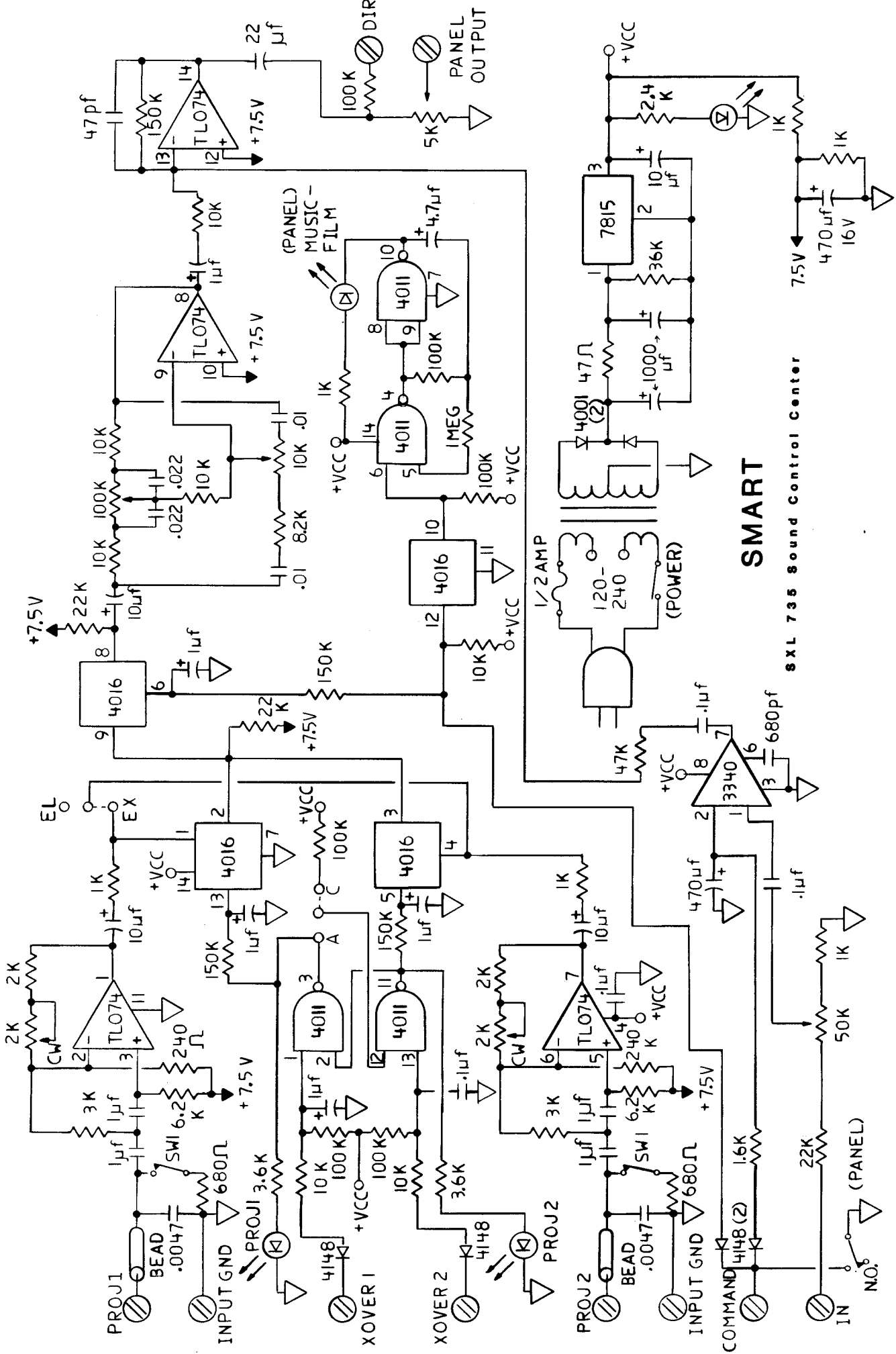
When the symptoms point to an internal problem your choices are to substitute the product or fix it in the booth.

A quick check of the 15 volt regulator power buss will indicate the proper operating voltages available to the active components. In addition to the main 15 volt supply, there is a voltage divider circuit that provides 7.5 volts bias to some of the op-amp circuits. Both voltages must be present in order to pass audio. Check pin 3 of the LM7815 regulator for the correct voltage. Then find the two resistors and filter capacitor that form the voltage divider and measure 7.5 volts. **Be sure not to short the pins of the regulator when making tests, or you may destroy it.**

When you are sure that voltages are correct, go to the section of the circuit that appears to be giving trouble. The most practical way to troubleshoot audio circuits is through signal tracing. Put an audio circuit into each input and follow it with a scope until the signal is no longer present. This method will allow you to locate a defective component.

It is very rare to replace an entire PC card. Suspect active components first, then capacitors, and finally resistors; in that order.

**AC POWER WIRING** The SXL735 is capable of running on 117 volts AC or 230 volts AC, with either 50 Hz or 60 Hz power. The unit is shipped with the power supply "jumpers" in the 117 volt position. To change to 230 volt operation it is necessary to remove the **two** jumpers on the PC card, and substitute one jumper. This can be



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SXL 735 Sound Control Center