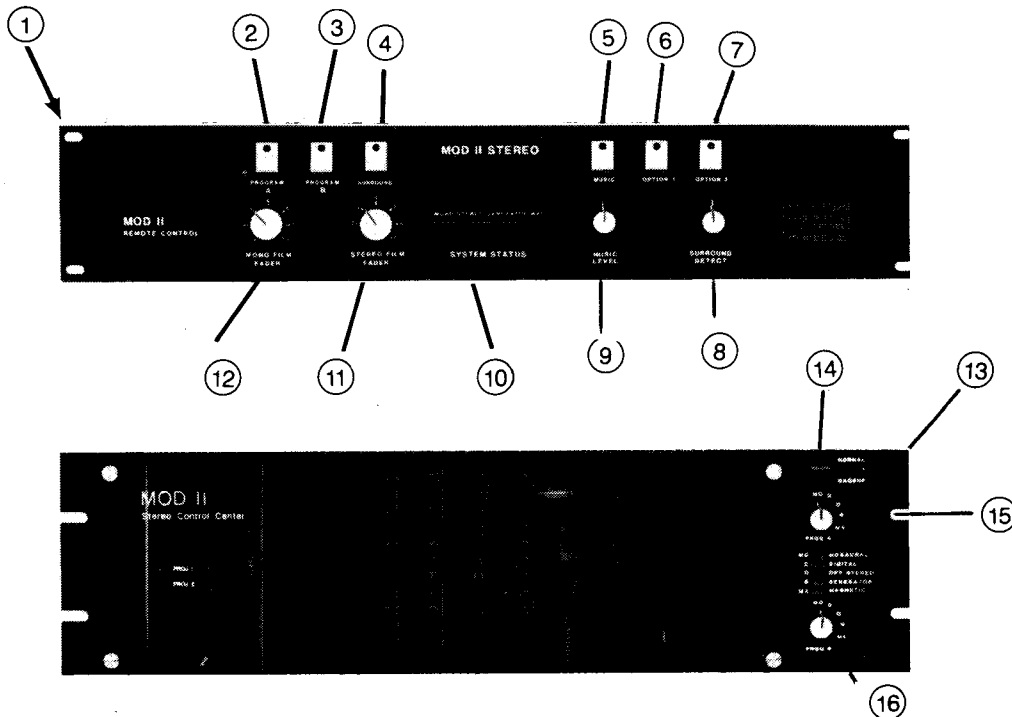


OPERATING INSTRUCTIONS

The MOD II system is one of the easiest systems to operate. However, it may appear complex because the system is full of features not offered on competitive products. The Manager/Operator of the theatre should review the operation instructions to assure that emergency functions are also understood, should they ever be needed.



MOD II Remote Control Panel and Main Processor.

- [1] Remote Control Panel
- [2] Program A Selector Button
- [3] Program B Selector Button
- [4] Stereo Surround ON/OFF Button
- [5] Non-Sync Intermission Music
- [6] Option 1 Select
- [7] Option 2 Select
- [8] Surround Detect Threshold (Generator)
- [9] Non-Sync Music Level
- [10] System Status Indicators
- [11] Stereo Film House Level
- [12] Mono Film House Level
- [13] Main Processor Card Cage
- [14] Normal-Emergency Backup Switch
- [15] Program A Select Switch
- [16] Program B Select Switch

MOD II STEREO

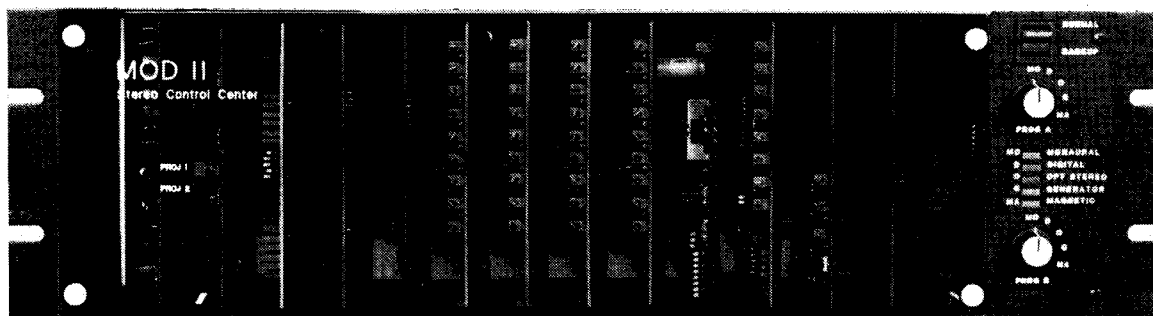
OPERATOR CONTROLS

TURNING ON THE SYSTEM. The sound engineer who installed the sound system has provided a way to apply AC to the system through a master power switch or circuit breaker. Also, several of the individual components in the equipment rack have their own power switches. Become familiar with all switches or breakers that control power to the sound equipment.

If the components are normally turned on individually, it is important that the processing components are turned on first and the power amplifiers are turned on after all other components are on for a few seconds. This will allow time for the low level circuits to stabilize before the power amplifiers can pass a "turn-on thump" to the auditorium speakers.

PROGRAM SELECTION. It is likely that the sound system will be turned on before the arrival of the first audience of the day. If the automation equipment is in its intermission mode when the sound is turned on, the sound system will lock into its intermission music mode. If the music player (CD player or tape machine) is running, music will be heard in the auditorium and available on the booth monitor.

PROGRAM SELECTORS are on the main card cage unit of the MOD II system. They are labeled *PROGRAM A* and *PROGRAM B*. When the system is powered up OR the system is reset by going to the intermission non-sync music mode, the *PROGRAM A* selection is active. If the *PROGRAM A* selector switch is moved while it is active, the system will select each source as the control is moved to that position. A red LED indicator associated with each function switch indicates whether *PROGRAM A* or *PROGRAM B* is active.

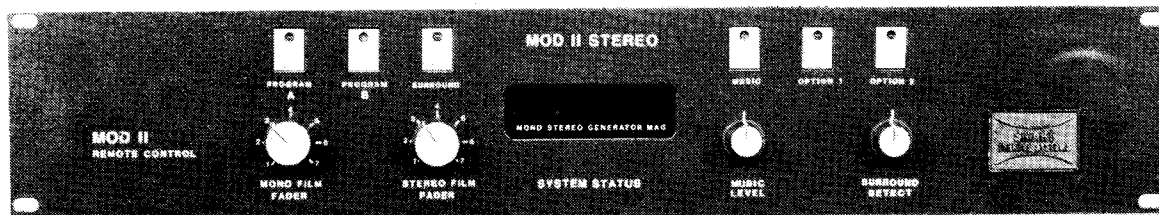


PRE-PROGRAMMING of sources is easily accomplished by setting the *PROGRAM A* function switch on the first desired format i.e. *MONO* for trailers, and the *PROGRAM B* switch to the feature film format (Stereo-Optical, Synthesized Stereo, Magnetic, etc). If the sound system is connected to the automation, a trigger from the automation will switch the system from *PROGRAM A* to *PROGRAM B* at the appropriate time. When the show is over, the intermission non-sync command from the automation will reset the function switches back to *PROGRAM A* for the next show.

EMERGENCY BACKUP SWITCH. The MOD II contains a backup system that will keep the show sound on the screen in the event of a failure of the main system. This special circuitry is located on the MONO card in the main card cage unit and is activated by the red *NORMAL-BACKUP* switch. A separate power supply supplies the backup system.

STEREO MASTER FADER. This control is located on the Remote Panel and is used to set the system level for any stereo program (multi-channel format). This includes Stereo-Optical, Stereo Generator, and Magnetic Stereo. The *STEREO FADER* is completely independent from the *MONO MASTER FADER*.

MONO MASTER FADER. This control sets the level for the sound system when the MONO function is selected on the active PROGRAM selector switch. Therefore, trailers or short subjects may be adjusted for a different playback level than the stereo source. It is common to find previews recorded at a much higher level than the feature film. This demands that the operator be available when the trailers are finished to adjust the sound level for the feature film. In a multiplex, theatre this feature is greatly appreciated. Setting the proper sound levels for the mono source and stereo source should be done during the first new feature film change for the week.



SURROUND DETECT CONTROL. The MOD II system contains a surround generator for monaural soundtracks when the system is expanded from the basic monaural package. Front-Surround Stereo configurations and full four and six channel systems contain the surround generator on the surround time-delay PC card.

The Rear Detect control on the remote Panel sets the sensitivity of the surround generator circuits. The threshold of the analog logic of the circuit is affected by the setting of the control. Clockwise rotation of the control makes the circuit more sensitive, and counter clockwise adjustments less sensitive. The normal setting for the pot is in its mid-position. The control should not be moved unless the surround channel is coming on and off at the wrong times, or dialog is consistently appearing on the surround channel. The surround generator may be defeated by using the surround button on the Remote Panel.

PROGRAM SELECT SWITCHES. Two soft-touch switches on the Remote Panel manually select the *PROGRAM A* or *PROGRAM B* mode that has been pre-programmed on the main card cage unit. Modern multiplex theatres use automation equipment to change modes, but the manual switches also contain LED's that indicate the program mode that has been selected in the system.

OPTION BUTTONS. Additional soft-touch buttons are provided to select the operation of option cards that may be installed in the main card cage. If these options have been furnished, the option buttons will "toggle" the option function on and off. The LED on the button indicates that the option is ON.

MOD II STEREO

MUSIC BUTTON. This switch will manually select the non-sync music source and fade-out any film source if the system is not being used with an automation system that performs this function. The red LED remotely indicates that the music is playing through the system. If you have an automated system, the LED will indicate the MUSIC status, but the button can override the automation control of music. Do not normally press the MUSIC button in automated systems.

SURROUND BUTTON. There may be cases where a stereo mode (Stereo-Optical, Stereo Generator, Magnetic Multi-channel) has been selected but the surround channel must be turned off. The Surround-Off button will silently turn off the surround channel and allow all stage channels to continue to operate. An example may be where a poorly recorded mono track is synthesized into stereo through the Stereo Generator, but is mistracking on the surround speakers. Another case may be a Stereo-Optical soundtrack that contains no recorded surround information. It is wise to turn the surround channel off in order to keep any soundtrack noise out of the surround speakers. The LED in the center of the button indicates that the surround channel is active. Pushing the button will turn off the track and extinguish the light.

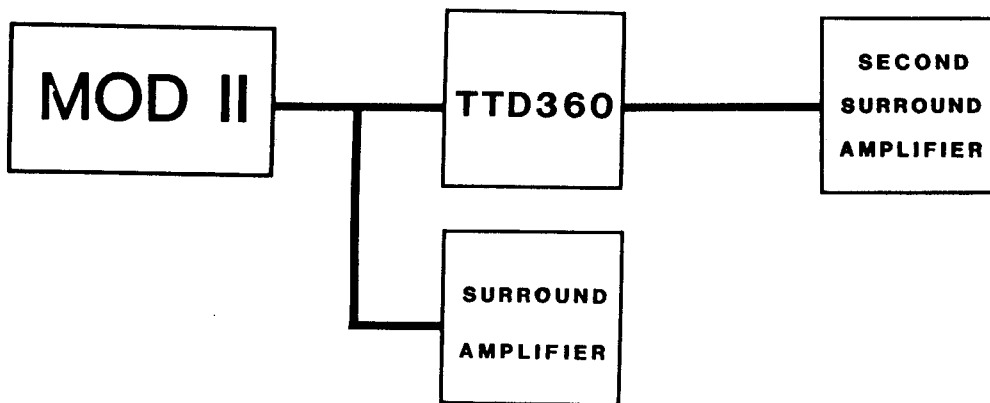
STATUS WINDOW. A window in the center of the Remote Panel contains a row of LEDs that shows which program source that is active. These status indicators advise the operator whether the film format playing through the system is *MONO*, *OPTICAL STEREO*, *STEREO GENERATOR*, or *MAGNETIC*.

Another version of the Remote panel is offered as an option to the standard MOD II system. A computer diagnostics card may be added to the main card cage that will test the sound system every time it is powered up each day, or be tested by remote control over a telephone line to the theatre circuit's home office central computer. When the optional computer card is added, another version of the remote panel must be used that has an alphanumeric illuminated Liquid Crystal Display is installed into the status window of the Remote Panel. The LCD displays vital system information in addition to system status messages. Consult the special manual that covers the computer testing system for further information if you have this option installed.

A description of each of the functions of the MOD II system is covered in the technical and installation section of this manual. For further information, please refer to the appropriate section of this manual.

ADDITIONAL COMMENTS

SPLIT SURROUNDS. Very long, narrow theatres and large motion picture palaces have a special problem. Setting the time delay for the surround speakers is difficult because the farthest seats are an extreme distance from the screen. If the time delay is set to accommodate the listeners in the rear of the house, the listeners seated in the center of the auditorium will hear an echo. Likewise, if the delay setting is set for the middle of the seating area, the listeners at the rear of the house will hear crosstalk because of insufficient "masking". This problem can be corrected by installing a second time delay connected to the surround output of the MOD II system. Set the delay of the MOD II for correct delay in the middle of the auditorium. Feed the input of another time delay product (The SMART TTD 360 is designed as a stand-alone delay) and adjust the second delay for the rear of the auditorium. Check for proper playback level and delay time using a "Choo-Choo" test soundtrack, or the SMART pink noise option PC card. A second power amplifier is required on the surround channel to feed the distant speakers from the second delay unit.



The **WIDE SCREEN STEREO** logo shown above may be used by the theatre that installs a SMART stereo product to advertise the playback capability of the theatre. This logo may be incorporated into a newspaper ad, program flyers, or reproduced for special promotional activities. The logo tells the patrons that the theatre is presenting it's feature in Stereo. This pertains to optical stereo, synthesized stereo, or magnetic 35MM/70MM formats.

**WIDE SCREEN
STEREO**

SERVICE

WARNING

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

Service instructions are included for use by qualified personnel only. To avoid electrical shock, do not perform servicing other than that described within the Operating Instructions unless you are qualified to do so. Refer all such servicing to qualified service personnel.

Repairs to this product should be performed in accordance with applicable safety standards, and should be performed only by a trained service technician.

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

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

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

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

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

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

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

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

Signal tracing procedures may also be employed when servicing the time delay portion of the *SURROUND CHANNEL*. A signal at the input, through the filter circuit, the delay chip, and the anti-alias filter will reveal where the signal has stopped. Refer to the schematic for pin identification of the signal flow. The HFE4047 clock associated with the delay chip must be operating properly for the audio signal to pass through the delay chip. An oscilloscope will reveal high level square wave pulses on pins 10 and 11 of the 4047 when this device is operating. If either phase of

MOD II STEREO

the clock fails, no audio can pass. We suggest you NOT REMOVE the delay chip itself unless you are positive it has failed. This component is very expensive and can be easily destroyed by stray static caused by handling. The BIAS pots near the chips are factory set to each individual chip, and should not be moved unless the IC must be replaced by a new device.

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

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

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

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

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

SERVICE ACCESS. The MOD II contains up to 14 plug-in printed circuit cards, depending on the system configuration. These cards should be removed *ONLY WHEN MAIN POWER HAS BEEN REMOVED*. Plugging in a card with power present can cause a jolt to the input regulators, causing them to fail. It should never be necessary to remove the main "Mother Board" that lies at the rear of the card cage.

To replace pushbutton switches or LED's in the Remote Panel connections to the vertical card must be detached from the front panel by removing the six screws holding it to standoffs mounted on the rear of the front panel. It is necessary to remove the knobs on the Fader pots before attempting to release the card. After the screws have been removed, it is possible to slowly and carefully pull the card back from the front panel so that all buttons and LED's are clear of their holes. The card may then be disconnected from the ribbon connector and removed.

To reassemble the unit, follow the directions in reverse. Before tightening the screws holding the vertical card to the standoffs, test all buttons to make sure that they do not bind against the front panel when operated. If they do, realign the panel as necessary.

CAUTION

Service instructions are included for use by qualified personnel only. To avoid electrical shock, do not perform servicing other than that described within the Operating Instructions unless you are qualified to do so. Refer all such servicing to qualified service personnel.

Repairs to this product should be performed in accordance with applicable safety standards, and should be performed only by a trained service technician.

P.C. CARD COMPONENT REPLACEMENT

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

If any of the CMOS logic chips are replaced, use reasonable care to avoid damage due to static electricity. If the relative humidity is below 50%, use a grounded workbench and make sure that the PC board is grounded to it. To prevent static damage to a chip, do not touch any of the leads unless you are also touching the workbench, or you are connected to it through a standard high-resistance grounded wrist strap. (Such wrist straps are connected to ground through a 1 megohm or more resistor, greatly reducing danger to personnel due to electric shock.)

Other components are soldered in place and may be replaced following the instructions covered in this section.

If filter capacitors are to be replaced, fasten them securely to the board using the original factory installation as a model. This will prevent them from breaking loose from vibration in the future.

REPLACEMENT PARTS.

If you have difficulty finding parts for this or any other SMART product, The SMART Technical Support Department stands ready to supply you with the required parts at a fair price. Please contact us at the address on the title page of this manual.

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

MOD II STEREO

The circuit boards used in the MOD II are of the double-sided plated-through variety. This means that there are traces on both sides of the boards, and that the through-holes contain a metallic plating in order to conduct current through the board. Because of the plated-through holes, solder often creeps 1/16" up into the hole, requiring a sophisticated technique of component removal to prevent serious damage to the board.

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

Another technique is:

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

B) COMPONENT INSTALLATION:

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

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

5. TROUBLESHOOTING IC OP-AMPS

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

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

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

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

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

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

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SMART THEATRE SYSTEMS maintains a factory service department that can provide quick handling of replacement parts, or telephone advice in the event of a problem in installation or service. Our Watts service number is 1-800-45-SMART and a technician can be reached during normal business hours from 8 AM to 5 PM (Eastern time) Monday-Friday.

