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Dolby®

MODEL CP65
CINEMA PROCESSOR

Users' Manual

Users' Manual

For

Model CP65

Cinema Processor

Dolby Laboratories Incorporated

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to adjust the theatre sound system to a standard response curve. All this means that these prints can be reproduced in theatres with cinema processors like the Dolby CP65 with far wider frequency response and much lower distortion than a conventional soundtrack. In fact, Dolby Stereo has led to a new wordwide playback standard for wide-range stereo prints for both dubbing and exhibition theatres (ISO 2969), just as the "Academy" characteristic applies for mono prints.

An important advantage of stereo optical is that the soundtracks are printed simultaneously with the picture, just like mono prints. Thus, a stereo optical release print costs no more to make than a mono print (although it is more expensive to record and mix in stereo than in mono). Theatre and projector conversion to stereo optical is relatively simple and, once the equipment has been installed, very little maintenance is required, particularly when compared to magnetic stereo playback systems. Moreover, print life is as long as that of conventional mono optical prints, unlike magnetic prints. The result the multi-track capability of four-track magnetic 35 mm (since made all but obsolete by the stereo optical format), consistently higher fidelity, and few of the drawbacks of magnetic formats.

Much of the new technology, including noise reduction and equalization, is also applied to Dolby Stereo 70-mm magnetic releases. Although 70 mm release prints continue to be very expensive, Dolby Stereo brought a resurgence of interest in this "big" format for road shows where the ultimate in picture and sound presentation is particularly likely to be reflected in box-office figures. There are six magnetic tracks on 70 mm film, two of which are used to extend the low-frequency response in the theatre. Some 70 mm films also use a technique developed by Dolby Laboratories for stereo surround, with two independent rear channels in addition to the left, center, right, and bass extension channels behind the screen. The Dolby CP200 processor is required to accommodate 70 mm Dolby Stereo releases in addition to 35 mm stereo optical.

4. Dolby Stereo SR

In 1986, after nearly five years of development, Dolby Laboratories introduced a new professional recording process called Dolby SR (spectral recording). Like Dolby noise reduction, it is a mirror-image, encode-decode process used both when a soundtrack is recorded and when it is played back. It provides more than twice the noise reduction of Dolby A-type, and is particularly effective with for optical soundtracks because it permits them to capture loud sounds with more accurate frequency response and lower distortion.

Dolby Stereo SR 35 mm prints substitute Dolby SR encoding for Dolby A-type; they are otherwise identical to regular Dolby Stereo prints. Indeed, most SR prints are released single-inventory, and can be played back satisfactorily with Dolby Stereo cinema processors equipped only with A-type noise reduction. However, Dolby SR decoders are necessary to reproduce the full fidelity of Dolby Stereo SR tracks. If your CP65 does not have Dolby SR decoders built-in, check with your Dolby theatre equipment supplier should you wish to add SR capability.

Reproduced properly, Dolby Stereo SR tracks place greater demands on a theatre's sound system and acoustics then regular Dolby Stereo. In fact, they subjectively compare to digital formats such as the CD. Theatres wishing to take full advantage of Dolby Stereo SR prints should consult their Dolby equipment suppliers and/or Dolby Laboratories for guidelines to follow to ensure that their audiences hear the difference Dolby SR can make.

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APPENDIX G
CINEMA SOUND AND THE EVOLUTION OF DOLBY STEREO

1. Optical Sound

The photographic or "optical" soundtrack was the first method of putting sound on film, and today it remains the most popular. An opaque area adjacent to the picture contains narrow, clear tracks that vary in width with variations in the sound. As the film is played, a narrow beam of light from an exciter lamp in the projector's soundhead shines through the moving tracks. Variations in the the width of the clear tracks cause a varying amount of light to fall on a solar cell, which converts the light to a similarly varying electrical signal. That signal is amplified and ultimately converted to sound by loudspeakers in the auditorium.

Several advantages of optical sound have contributed to its universal acceptance, the foremost being economy. For one thing, the soundtrack is printed photographically on the film at the same time as the picture. For another, the soundtrack can last as long as the picture, which, with care, can last a long time indeed. A further benefit is that the optical soundhead within the projector is itself economical and easily maintained.

Motion pictures with sound were first shown to significant numbers of moviegoers in the late 1920's. By the mid-1930's, the "talkies" were no longer a novelty, but a necessity, and many thousands of theatres were equipped in that short time to show films with optical soundtracks. This phenomenally rapid acceptance of a sophisticated new technology was not without drawbacks, however. Equipment was installed in theatres so rapidly that there was no time to take advantage of improvements which occurred on an almost daily basis.

A good example is loudspeaker design. The first cinema loudspeakers had very poor high-frequency response. Speakers with superior high-frequency capability became available within just a few years. But there was no time to retrofit the original systems with new units, because engineers were too busy equipping other theatres with their first sound installations. This caused a dilemma for soundtrack recordists. Should the tracks be recorded to take advantage of the improved speakers, or should they be prepared to sound best on the many older installations already in place? Given that it was impractical to release two versions of a given title, the only alternative was to tailor soundtracks to the older speakers. The result was to ignore the improved high-frequency response of the newer, better units.

To forestall compatibility problems, in the late 1930's a de facto standardization set in, the theatre playback response that today is called the "Academy" characteristic. Theatre owners knew what to expect from the films, and therefore, what equipment to install. Directors and sound recordists knew what to expect from theatre sound systems, and thus what kind of soundtracks to prepare. The result was a system of sound recording and playback that made it possible for just about any film to sound acceptable in any theatre in the world. However, it is also a system without the flexibility to incorporate improvements beyond the limitations that existed in the 1930's.

Even with these limitations, for years optical film sound provided higher quality than home phonographs and radios. But by the late 1960's and early 1970's, superior hi-fi stereo systems had been installed in so many homes that a significant and influential proportion of the movie-going public was used to better sound at home than could be heard in the theatre.

INTRODUCTION

Thank you for purchasing the Dolby Model CP65 Cinema Processor. It combines the high performance for which all processors manufactured by Dolby Laboratories are well known with new features, flexibility, and ease of interface and operation with theatre automation systems.

About This Manual

This Operator's Manual has been prepared specifically to help projectionists and theatre managers get the most from the Model CP65 and the theatre sound system after proper installation has been accomplished (installation and alignment instructions are provided in a separate manual). We suggest that you keep this manual readily available and that you also attach the supplied "Operating Instructions for the Projectionist" card to the projection booth wall for quick reference.

The manual is organized as follows:

- Section 1, **Operating Instructions**, covers the basic control functions and operation of the CP65, and is all you need to get the show started.
- Section 2, **Maintenance and Adjustments**, contains tips for maintaining not only the CP65 but rest of the theatre sound system as well.
- Section 3, **Trouble Shooting**, will help you track down problems in the sound system without test equipment. It consists of a trouble-shooting chart and procedures to follow during a show, between shows, and after closing.
- The **Appendices** contain valuable background information which will help you to get the most out of the Model CP65 and your theatre sound system.

For the sake of clarity, boldface type is used for all specific references to the CP65 controls and their labels, such as **bypass**, **mute**, and front-panel **fader**. In addition, indicator lights on the CP65 are referred to in the text as LEDs (light-emitting diodes).

About The Dolby CP65

The Dolby Model CP65 is the heart of your theatre sound system. All sound sources are connected to the CP65 which processes their signals appropriately and feeds them to the power amplifiers.

The CP65 precisely complements the techniques used in the preparation of Dolby Stereo optical releases. By providing a stereo optical preamp with precise slit-loss correction, professional Dolby A-type noise reduction and Dolby Spectral Recording, an advanced 2:4-channel decoder, and third-octave screen speaker equalization, the CP65 ensures the most exact reproduction possible of all Dolby Stereo releases. Inputs are provided for connecting a Dolby DA10 Dolby Stereo SR•D digital sound track adaptor. It has also been designed for particularly convenient interface with theatre automation systems.

APPENDIX F
OPTICAL BASS EXTENSION

Dolby Laboratories developed the optical bass extension (OBE) circuitry that is provided on the Cat. No. 441 or 241 module (optional in some areas) for use with subwoofers — special bass loudspeaker units designed to provide the very low-frequency bass performance lacking in most conventional theatre speaker systems. (If your theatre is not equipped with subwoofers, consult your theatre equipment supplier for further information on how to take full advantage of optical bass extension.)

At first glance, it would appear appropriate just to add extra amplifiers and subwoofers to reproduce the lowest bass frequencies recorded on a soundtrack. Such an approach is insufficient and can even be detrimental to achieving realistic, natural sound. One problem is that at very low frequencies, there may not only be desirable music and effects information on the soundtrack, but there may also be hum and low-frequency print noise. Furthermore, reproducing very low bass in the theatre can excite resonances which add an artificial, boomy quality.

The optical bass extension circuitry on the Cat. No. 441 is the vital link between the very low bass music and effects often recorded on wide-range Dolby Stereo prints and an installation that incorporates subwoofers and their associated amplifiers. The Cat. No. 441 is not merely a crossover network or a bass synthesizer; it extracts whatever low-frequency music or effects information is already recorded on the release print and, at the same time, rejects low-level hum and low-frequency optical noise. In addition, a sophisticated filter system (adjusted by the trained installer) assures natural low bass response without the boomy quality which would otherwise result from the interaction between low-frequency bass speakers and the theatre acoustics. The result is smooth, deep bass response which complements the improved mid and upper range response already achieved in your theatre by means of the third-octave equalization in the CP65.

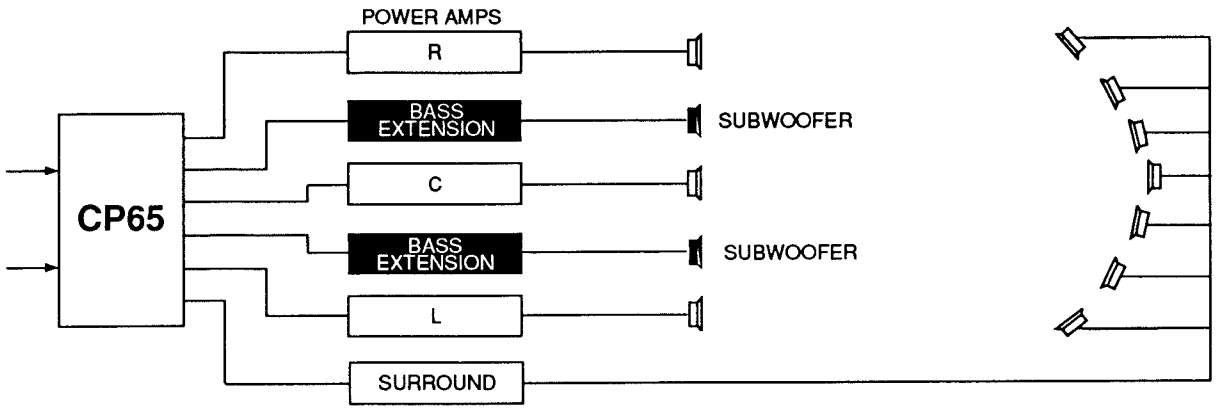


Figure F-1. OBE Installation.

SECTION 1
OPERATING INSTRUCTIONS

A. NORMAL OPERATION

1. Initial Power-Up

Each time the CP65 is connected to power, it automatically sets itself to a predetermined "wake-up state," regardless of the format and control settings last used. The standard factory settings for the wake-up state are as follows:

- Format **04, Dolby Stereo**
- **Mute** off
- **Local** (front-panel) **fader** activated
- **Proj 1** or **Proj 2** LED illuminated, indicating the externally-selected projector that is active (Proj 1 is selected automatically if no external selection has been made).

NOTE

The installation or service engineer can program the CP65 to "wake up" in any format to suit the way your theatre works.

The CP65 also reverts to this condition when it is restored to normal operation after having been operated in the **bypass** mode.

2. Format Selection

Select the desired film soundtrack format or your non-sync source by pressing the appropriate button. The LED in the button illuminates to confirm that the format was selected. The formats are as follows:

- **01 Mono**: for all optical prints of any vintage with conventional mono optical ("Academy") soundtracks.
- **04 Dolby Stereo A-type**: for Dolby Stereo releases, except those marked SR or SR •D.
- **05 Dolby Stereo SR**: for releases marked as having a Dolby Stereo SR soundtrack. If your CP65 is not equipped with the Cat. No. 350 or 300 modules needed to play SR prints format **04 Dolby Stereo A-type** will be automatically selected.
- **10 Dolby Stereo Digital:** for prints with Doby SR•D soundtracks Fcr theares not equipped with a DA10 digital sountrack adaptor select **05 Dolby Stereo SR.**
- **60 non-sync**: for your intermission music tape or CD player.

APPENDIX E
HOW FOUR CHANNELS ARE DERIVED FROM DOLBY STEREO OPTICAL PRINTS

The 35-mm Dolby Stereo optical format calls for the recording in the studio and the reproduction in the theatre of four separate sound channels, — left, center, right, and surround — and yet a Dolby Stereo optical print has only two soundtracks. How is it possible to derive four channels of sound from only two soundtracks? The answer lies in the application of what are called phase matrix techniques for encoding four channels of sound onto two soundtracks, much like the four-channel phonograph records of the early 1970's.

There are two characteristics of sound which cue the brain to its origin and thus, its directionality. First is the amplitude or loudness of the sound. If the source of sound is directly in front of you, it arrives at both ears with equal loudness. But if the sound is located to the left, for example, the sound that arrives at your left ear is slightly louder then the sound that arrives at your right ear. This difference is processed by the brain so you recognize that the sound is coming from the left. Home stereo sound is based in great part on this principle; two channels on a recording that is reproduced on two speakers are sufficient for home listening to convey directional information all across a listening "stage" in front of you.

The other characteristic of sound which cues the brain to its directionality is phase. A sound coming from the left not only is louder when it arrives at your left ear but it arrives slightly earlier. That difference in timing results in what engineers call phase shift. The brain also processes that difference as a further directional cue.

The distinction between amplitude and phase as directional cues is not so important in conventional home stereo as in motion picture stereo. Movie theatres require more than two channels for good stereo sound. For example, in a theatre, left and right speakers are so widely spaced that sounds coming from the center (dialogue in particular) must be more firmly defined than in a home system. This requirement is met by the addition of a third, or center, channel and screen speaker. In addition, the use of a fourth channel toward the rear of the theatre is highly desirable to reproduce ambient sound for more life-like overall sound and to reproduce special directional effects. Thus, good theatre stereo requires a total of four channels.

Dolby Laboratories developed a phase-matrix technique for encoding the four required channels of sound onto two tracks in exactly the same space as the conventional mono track. The final soundtrack is mixed to four discrete channels (left, right, center, and surround). Those four channels are then encoded to the two tracks which ultimately wind up on the release print. Basic left and right information is recorded unchanged onto the left and right tracks. Information which is to be reproduced in the theatre as a center channel — that is, sound which is identical in phase and amplitude — is split between and recorded on both the left and the right tracks. And the surround information is also split between the two channels, but is recorded with a distinct phase shift to distinguish it from the left, center, and right information.

In the theatre, when the signals from the two tracks on a Dolby Stereo print reach the CP65 processor, its 2:4 decoder constantly compares the two signals. Those signal elements which differ primarily in amplitude are assigned to the left and right speakers. Those which are

- **Mag / Aux**: the **Mag / Aux** format may be programmend in a number of different ways depending on the optional equipment fitted and the installation. Possible options include:

- Magnetic soundtracks (with or without A-type noise reduction).

- Extra sound sources, such as a PA microphone (with preamp) or a "stereo" synthesizer. (Genuine stereo sound in the theatre can be realized only from stereo optical or multi-track magnetic prints.)

The film soundtrack format numbers used on the CP65 front panel (and also the model CP200) often appear on the film can and leader. If these numbers are not supplied and you are not sure if a print is mono or stereo optical, see Appendix A for a means to distinguish mono from stereo optical soundtracks.

If you are playing an early Dolby Stereo release and it is marked as format 03 "Dolby Stereo without surround," we suggest you select format **04 Dolby stereo A-type**.

3. Local (Front-Panel) Fader

The local **fader** on the front panel of the CP65 controls the volume level in the theatre in both the **normal** and **bypass** operating modes. When the CP65 has been correctly installed, setting the fader to 7 provides the proper level in your theatre for any Dolby Stereo release (that is, the level at which the film was mixed).

A detent on the silver-colored outer ring around the **fader** knob enables you to turn the **fader** knob to a preset level (such as the standard setting of 7) by feel. The ring can be rotated to align the detent with the desired fader setting.

Although a minor adjustment in playback level might be required under unusual circumstances, you should avoid significant deviations from the correct level (7) established by the installer. If the playback level is set too low, dialogue will be hard to understand; too high a level risks damage to the speaker systems and complaints from the audience.

4. Remote Faders

If remote faders have been installed, they are activated by pressing the select local/remote button located directly below the fader (the button will have no effect if there are no remote faders). The local active LED will go out to indicate that the remote faders have been activated. If Dolby Cat. Nos. 122 and 123 remote faders have been installed, the remote fader associated with the operating projector will be activated automatically when the remote mode is selected.To re-activate the local fader, press the select local/remote button again. The remote faders will be de-activated, and the local active LED will light to indicate that the front panel fader is now active.

5. Mute Function

When you press the **mute** button, the volume will automatically fade all the way down and the LED on the button will flash. When you press the button again, the volume will automatically rise to the level set by the fader and the LED will go out.

APPENDIX D
ABOUT DOLBY NOISE REDUCTION AND DOLBY SR

The application of Dolby A-type noise reduction to film soundtracks, as explained in Appendix G, "Cinema Sound and the Evolution of Dolby Stereo," had a major impact on cinema sound recording and reproduction. The later application of Dolby SR has had still further impact. An understanding of how these systems work will help you better understand Dolby Stereo film sound in general, the CP65 in particular, and why the Dolby Level adjustment procedure is important in maintaining good sound in the theatre.

1. How Dolby Noise Reduction Works

Whenever sound is recorded — on magnetic tape, phonograph records, or film soundtracks — noise is added to the original signal. Dolby noise reduction keeps that added noise down to a minimum in a way that has no adverse effect on the quality of the original signal (e.g., it does not turn down the treble as filters do).

Dolby noise reduction is a two-step process used both at the time a recording is made and when it is played back. Just before the signal is recorded, it is processed by the Dolby noise reduction circuitry. Loud sounds which naturally hide noise are passed through unchanged. But quiet sounds which would be marred by added noise are selectively boosted (that is, they are recorded louder than normal). The resulting recording or film soundtrack is said to be "Dolby encoded." Both tracks on Dolby Stereo optical release prints are encoded in this way.

When the encoded recording or soundtrack is played back, it is decoded by Dolby noise reduction circuitry switched around to operate as a mirror image of the circuit used when the recording was made. Loud sounds again pass through unchanged. But the boosted quiet sounds are reduced in volume to where they were before they were recorded, a process which simultaneously reduces any noise added by the recording medium. The CP65 has two channels of Dolby A-type noise reduction circuitry to decode the two soundtracks on Dolby Stereo release prints (the left, center, right, and surround channels are derived from the two soundtracks after the Dolby noise reduction decoding).

2. About Dolby SR

The soundtracks on Dolby Stereo SR prints have been encoded with the newer Dolby SR (spectral recording) process, rather than Dolby A-type. Dolby SR also boosts quiet sounds when a recording is played and brings them back down again when it is played back. However, the amount of boost it imparts is both greater and more selective than Dolby A-type. The result is more than twice the noise reduction, with the same freedom from side-effects Dolby A-type is noted for. In addition, Dolby SR incorporates further refinements which enable the soundtrack to carry louder sounds with lower distortion and fewer signal losses. The result is a dramatic improvement in soundtrack dynamic range, that is, the volume range between residual film grain noise and the loudest sounds that can be recorded accurately.

The following occurs when the CP65 is in the bypass mode:

- The front-panel **fader** remains operational but **remote faders will not work.**
- You cannot select among formats. The optical preamp outputs and the inputs from any four-channel magnetic preamp remain operational simultaneously. If you are not playing the optical track, be sure that the projector exciter lamps are turned off. If you are playing an optical print, be sure that there are no signals present from any of the other sound sources.
- Even when a stereo print is playing, a **mono** signal is fed to the screen speakers. Thus, you can switch to the **bypass** mode to keep the show going if one of the power amplifiers fails.
- The Dolby A-type noise reduction circuitry, Spectral Recording processors, 2:4-channel decoder, screen speaker equalizers, surround equalizers, and subwoofer circuits are not powered and thus, do not operate.

Be sure to follow the trouble-shooting procedures and call your trained service engineer, if necessary, as soon as possible if **bypass** operation is required to keep the sound system going.

NOTE

The CP65 may not operate even in the bypass mode if there is a fault in either the Cat. No. 240A optical preamp card or the bypass circuitry section of the Cat. No. 249 power supply card. It is strongly recommended that a spare of both of these cards be kept on hand for substitution in emergencies. A "Parking" slot for a spare Cat. No. 240A is provided in the CP65 (see Appendix C).

This is where the Dolby Level Tone on the Cat. No. 69 film comes into play. The tone on this film is very carefully recorded at the standard reference Dolby Level. When you make the Dolby Level adjustment on the CP655 as this film plays, you are making sure that the tone on the film is converted to a standard reference voltage at the inputs to the decoders. Thereafter, signals from Dolby soundtracks will be converted to the correct voltages for mirror-image decoding. As long as the proper Dolby Level procedures are followed, any Dolby-encoded soundtrack recorded anywhere in the world will be accurately decoded by any Dolby cinema processor anywhere in the world.

Although large level-matching errors can cause audible decoding errors (such as frequency response changes), both Dolby A-type and Dolby SR are tolerant of errors smaller than about 2 dB. Thus, Dolby Level must be readjusted only if there is a significant change in the reproduction chain ahead of the Dolby decoding circuit. In the theatre, exciter lamp brightness is the variable most likely to affect Dolby Level calibration. The voltage present at the inputs to the decoder circuitry is directly proportional to the amount of light that passes through the slit and soundtracks onto the solar cell. Therefore, significant changes in exciter lamp brightness — likely as the lamp ages over time or when a new lamp is installed — should be compensated for by adjusting Dolby Level.

4. The Consumer Dolby Noise Reduction Systems

Dolby A-type noise reduction and Dolby SR are used for professional applications, including music recording, broadcasting, and preparing film soundtracks. Other Dolby noise reduction systems — B-type, C-type, and S-type — have been developed for use in such consumer products as cassette recorders.

Dolby B-type was the first Dolby system developed for consumer applications, and is in use today in hundreds of millions of cassette recorders and other products (a modified version of B-type noise reduction is also used to encode the surround channel on Dolby Stereo and Dolby Stereo SR release prints). Dolby C-type was later developed to provide more noise reduction than Dolby B-type, and is provided along with B-type in many of today's high-performance consumer products. The newest consumer system, Dolby S-type, is based on some of the operating principles of Dolby SR, and provides still more noise reduction. In addition, much like Dolby SR on film soundtracks, S-type also improves a cassette recorder's high-level signal capability. The result on the newest decks with Dolby S-type is cassette performance subjectively equivalent to the Compact Disc.

These consumer systems systems differ from the professional Dolby systems in the type of noise reduction they achieve. Because they were developed for professional applications, Dolby A-type and Dolby SR reduce all types of noise at all frequencies (low-frequency hum as well as high-frequency hiss). The Dolby B-type and C-type reduce the tape hiss which prevails in cassette recording; the circuits are considerably simpler and operate primarily at the higher hiss-related frequencies. Dolby S-type provides even more hiss reduction, and some noise reduction at low-frequencies as well.

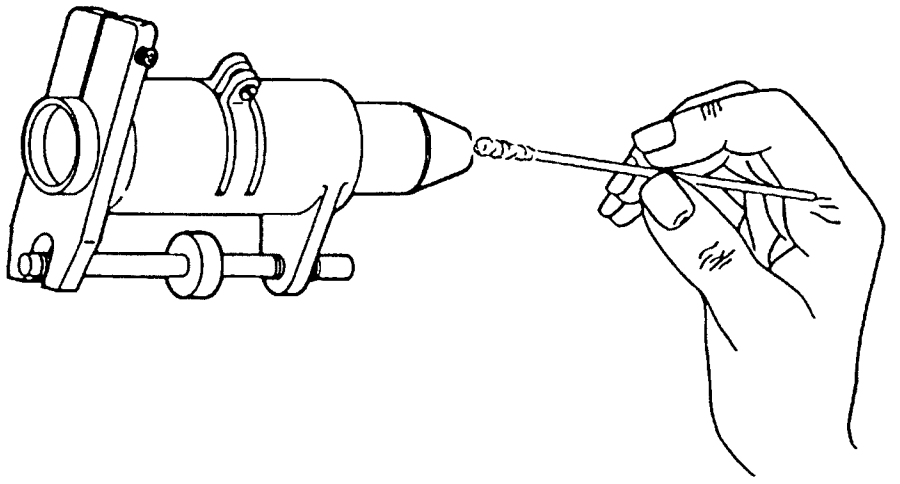
SECTION 2
MAINTENANCE AND ADJUSTMENTS

The installation of the Dolby CP65 in your theatre indicates a commitment to providing a high-quality presentation to your audiences . However, the presence of even the very best equipment does not in itself guarantee the best results. A number of routine maintenance and adjustment procedures — requiring no special test equipment or technical knowledge — are necessary to realize the full potential of the sound system on a day-in, day-out basis. These procedures can also prevent costly show cancellations and service calls.

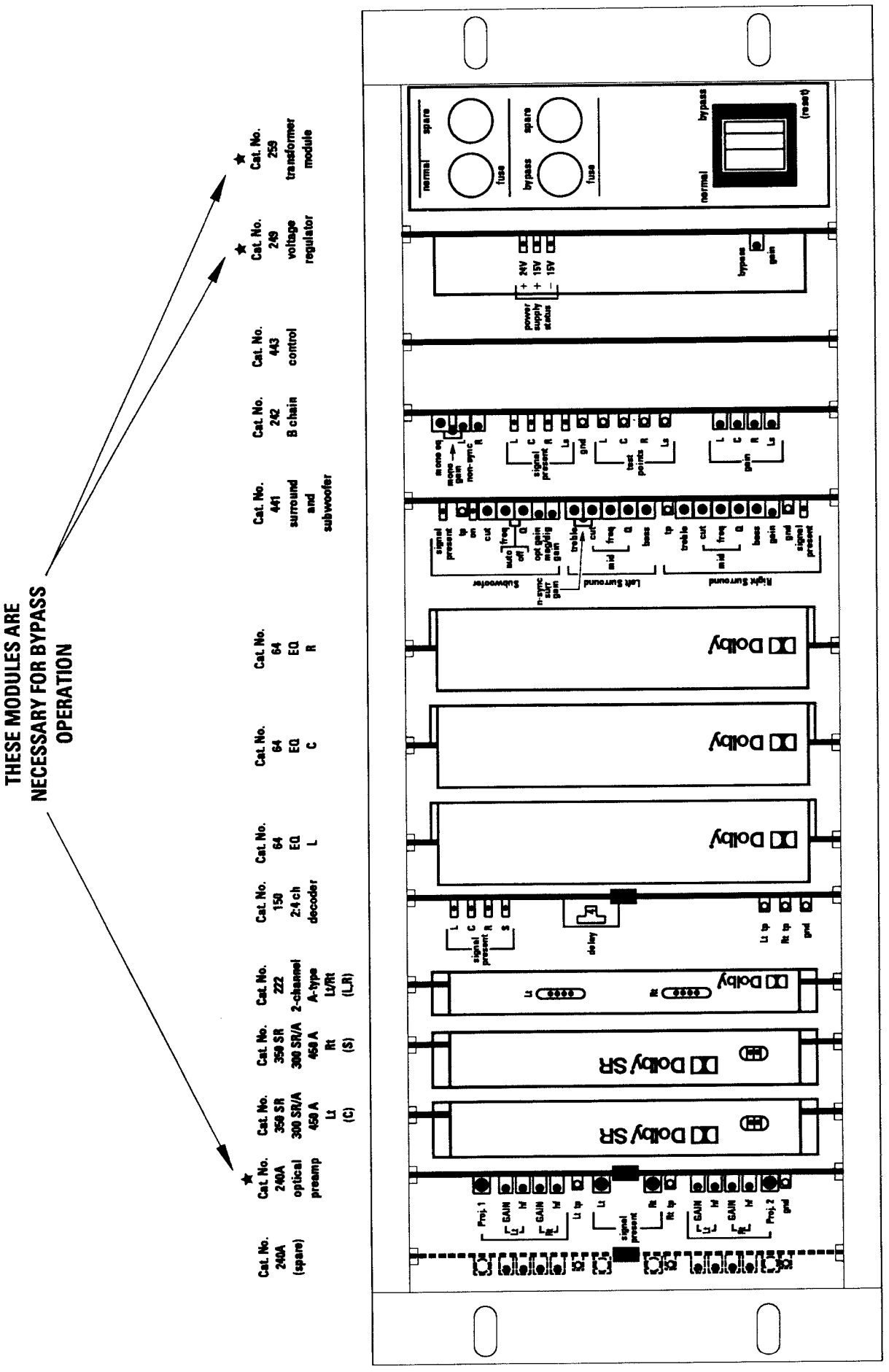
A Dolby Cat. No. 69 test film is required for proper maintenance of your sound system. We also recommend that you keep on hand the Dolby Cat. No. 251 Jiffy Test Film and run it regularly to check the theatre sound system thoroughly (see Appendix B).

A. SOUNDHEAD MAINTENANCE

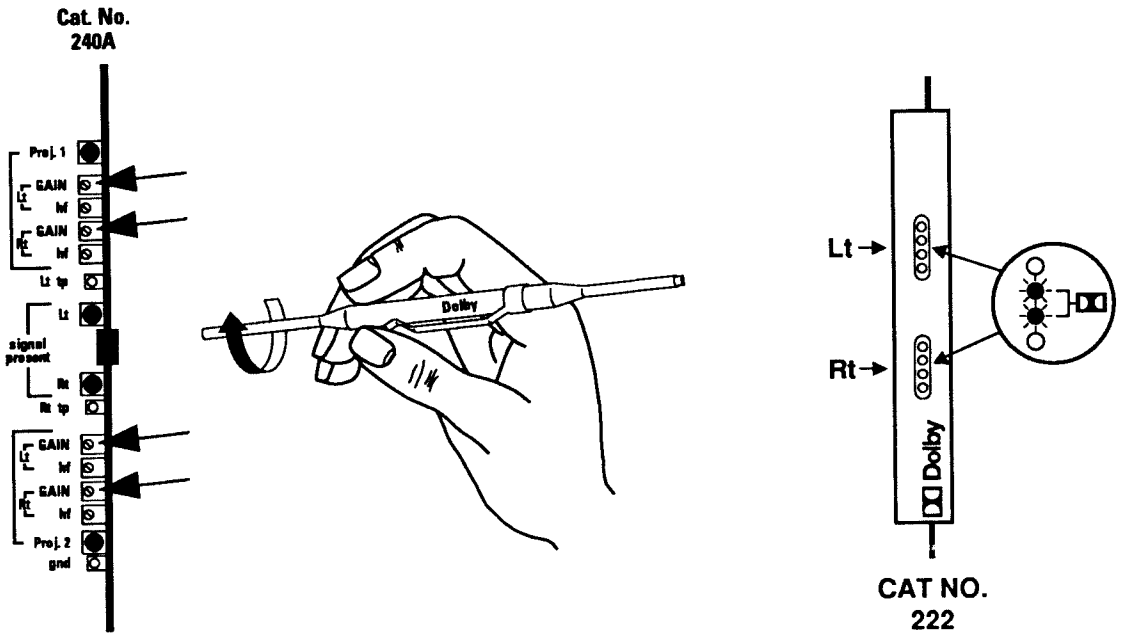
No single maintenance procedure is more vital to good sound in the theatre than regular cleaning of the projector soundhead optics. Use cotton swabs and isopropyl alcohol to clean the optical barrel lens surfaces, but do not clean the solar cell. The solar cell and its adjustment are very delicate; avoid touching the cell. We strongly recommend that you use compressed air, readily available in convenient pressure cans, to blow dirt and debris away from the cell. Be sure that the nozzle does not touch the cell.



Cleaning the Soundhead Optics

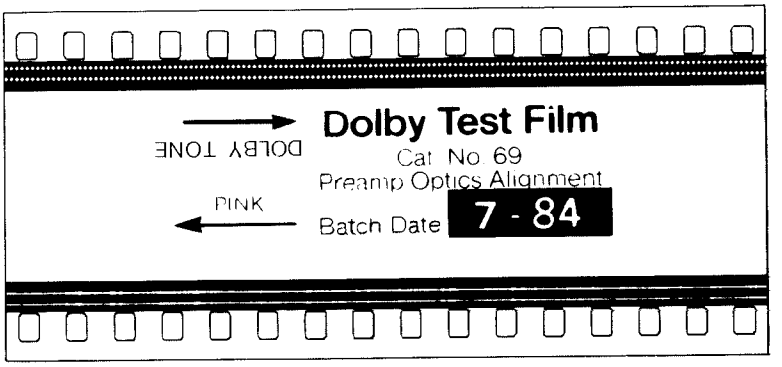


Interior View of CP65, Showing modules installed in place.



(a) Location of gain Controls on Cat. No. 240A;
(b) Dolby Level LEDs on Cat. No. 222.

Dolby Tone



Cat. No. 69

Identifying Dolby Tone on the Cat. No. 69 Film

APPENDIX C
CP65 MODULE DESCRIPTIONS

1. **Spare Slot** (not wired) for storing an optional spare Cat. No. 240A. The CP65 will not operate even in the bypass mode if the main Cat. No. 240A fails. This spare is strongly recommended (with a spare Cat. No. 249 power supply).

2. **Cat. No. 240A optical preamplifier card** amplifies and optimizes the solar cell outputs of the selected projector. Electronic switches controlled by the external changeover contacts select projector 1 or 2.

3. **Cat. No. 222 Two-channel noise reduction module** contains two channels of Dolby A-type noise reduction and metering for adjusting Dolby Level.

4. **Cat. No. 350 Spectral recording processor module** contains SR processing circuits. Some CP65 processors may be fitted with Cat. No. 300 modules in place of the Cat. No. 350s. Cat. No. 300 SR/A processors contain both A-type and SR circuits and the additioal channels of A-type may be used to decode 4 channel magnetic soundtracks.

5. **Cat. No. 150 2:4 channel decoder card** derives left, center, right, and surround information from the two tracks on stereo optical releases (includes the required time delay for the surround channel).

6. **Cat. No. 64B equalizer modules** contain 27-band third-octave equalization for optimum response from the left, center, and right screen speakers.

7. **Cat. No. 241 surround equalizer and bass extension card** provides equalization for the surround speakers and extracts low-frequency bass information from optical soundtracks and sends the resulting signals to the subwoofer output through equalizer and fader circuits. (This module is not supplied as standard in some areas and may not be present in your CP65; see Appendix F for further information on optical bass extension.)

8. **Cat. No. 441 surround equalizer, subwoofer and SR•D interface card** the Cat. No. 441 may be fitted in place of the Cat. No. 241. In addition to the functions provided by the Cat. No. 241 the Cat. No. 441 provides inputs, equalization, fader and ouput amplifier for an additional surround channel and inputs for low-frequency bass information from an external DA10 Dolby Stereo digital adaptor. The Cat. No. 441 may also be used in a CP55 cinema processor.

9. **Cat. No. 242 B-chain card** contains the signal processing circuitry for the B-chain other than the Cat. No. 64B equalizers. It has input buffers for non-sync and magnetic sources, electronic selector switches to determine formats, a 4-channel fader circuit, and output level potentiometers.

10. **Cat. No. 443 control logic card** sets the CP65 for the selected format. It also contains mute and fader local/remote status circuits, and generates control logic signals for the other modules in the CP65. It responds either to the front-panel controls or to signals from the automation system, if the theatre is so equipped.

WARNING

The CP65 was adjusted initially by a specially-trained engineer so that your theatre would have the same standard playback characteristics as the dubbing theatres in which all Dolby Stereo films are mixed. This results in the most accurate reproduction possible. **Never attempt to adjust any controls within the CP65 except those specified above.**

All other controls are for use by a trained engineer when the CP65 is first installed or repaired. Adjusting these controls requires the use of special test equipment. Misadjusting these controls can have an adverse effect on the sound in your theatre and will require a service call to restore proper operation. The first thing to do when you have a problem is to consult Section 3 **Troubleshooting,** and not arbitrarily adjust these specialized controls.

In addition, do not adjust any of the controls on the other audio equipment in your theatre sound system such as power amplifiers, which have been preset by the installer. For example, misadjusting the power amplifier gain controls can cause channel imbalance and /or too much power amplifier noise. Those controls have been set by the installer for correct channel balance and so that the playback level in the theatre is correct with the **fader** set to **7**. If a satisfactory level can only be achieved with the **fader** set to some other level, the gain controls on the power amplifiers have been incorrectly set and should be recalibrated by a service engineer.

Cat. No. 351 Stereo Demonstration Film: *"listen . . ."*

"listen . . .", an eight-minute Dolby Stereo demonstration film for public exhibition, has been professionally produced to demonstrate the commitment of the theatre to providing its audiences with the best in both sound and picture. It is intended for screening prior to a feature and is a fast-paced, entertaining short which shows off a quality projection system to its best advantage. Thus, it serves to promote the experience which only the motion picture theatre can provide and which cannot be matched by home entertainment media.

"listen . . ." has no narration and no sales or technical message except that implied by the quality of its presentation in the theatre. It consists of a wide variety of short scenes, both live action and an animation sequence, integrated into a unique sight and sound experience which bears repeated viewing. Because there were none of the plot constraints of a conventional feature, scenes were chosen specifically to demonstrate different aspects of stereo sound — from a trickling brook to a cannon salute, from a string quartet to a church organ, from the sounds of children at play to the thundering lift-off of a Saturn 5 rocket.

To ensure quality at least equivalent to the feature likely to follow it in the theatre, Dolby Laboratories engaged professional film craftsmen, including several Academy Award winners, to produce ***"listen . . ."***.

Running time:	8 minute
Picture format:	35-mm color, 2.35:1 anamorphic
Sound format:	04 Dolby Stereo A-type

Cat. No. 97 and Cat. No. 151 Test Films

These two specialized test films are for use only by trained engineers with special test equipment and need not be kept on hand at the theatre. The Cat. No. 97 is used for aligning stereo solar cells in projector soundheads, while the Cat. No. 151 is used to set the level of the surround speakers relative to the screen speakers.

IMPORTANT SAFETY NOTICE

This unit complies with the safety standard IEC65. To ensure safe operation and to guard against potential shock hazard or risk of fire, the following **must** be observed:-

GB

- Ensure the **voltage selector** is set to the correct mains voltage for your **supply**.
- Ensure **fuses** fitted are the **correct rating and type** as marked on the unit.
- The unit **must be earthed** by connecting to a correctly wired and **earthed** power outlet.
- The **power cord** supplied with this unit must be wired as follows:-

Live	Brown
Neutral	Blue
Earth	Green/Yellow

IMPORTANT – NOTE DE SECURITE

Ce materiel est conforme à la norme IEC65. Pour vous assurer d'un fonctionnement sans danger et de prévenir tout choc électrique ou tout risque d'incendie, veuillez observer les recommandations suivantes.

F

- Le selecteur de tension doit être placé sur la valeur correspondante à votre alimentation réseau.
- Les fusibles doivent correspondre à la valeur indiquée sur le materiel.
- Le materiel doit être correctement relié à la terre.
- Le cordon secteur livré avec le materiel doit être cablé de la manière suivante:

Phase	Brun
Neutre	Bleu
Terre	Vert/Jaune

WICHTIGER SICHERHEITSHINWEIS

Dieses Gerät entspricht der Sicherheitsnorm IEC65. Für das sichere Funktionieren des Gerätes und zur Unfallverhütung (elektrischer Schlag, Feuer) sind die folgenden Regeln unbedingt einzuhalten:

D

- Der Spannungswähler muß auf Ihre Netzspannung eingestellt sein.
- Die Sicherungen müssen in Type und Stromwert mit den Angaben auf dem Gerät übereinstimmen.
- Die Erdung des Gerätes muß über eine geerdete Steckdose gewährleistet sein.
- Das mitgelieferte Netzkabel muß wie folgt verdrahtet werden:

Phase	braun
Nulleiter	blau
Erde	grün/gelb

NORME DI SICUREZZA – IMPORTANTE

Questa apparecchiatura è stata costruita in accordo alle norme di sicurezza IEC 65. Per una perfetta sicurezza ed al fine di evitare eventuali rischi di scossa êlettrica o d'incendio vanno osservate le seguenti misure di sicurezza:

I

- Assicurarsi che il selettore di cambio tensione sia posizionato sul valore corretto.
- Assicurarsi che la portata ed il tipo di fusibili siano quelli prescritti dalla casa costruttrice.
- L'apparecchiatura deve avere un collegamento di messa a terra ben eseguito; anche la connessione rete deve avere un collegamento a terra.
- Il cavo di alimentazione a corredo dell'apparecchiatura deve essere collegato come segue:

Filo tensione	Marrone
Neutro	Blu
Massa	Verde/Giallo

APPENDIX B
DOLBY TEST AND DEMONSTRATION FILMS

Several test and demonstration films produced by Dolby Laboratories are available from your equipment supplier. For proper system maintenance, the Cat. No. 69 test film is required and the Cat. No. 251 Jiffy Test Film is strongly recommended. The Cat. No. 69 test film should be formed into endless loops for ease of use. The eight-minute color short "***listen . . .***" (Cat. No. 351) is an excellent way to demonstrate in an entertaining way your commitment to a quality presentation. Two additional test films, Cat. Nos. 97 and 151, are for use only by a trained engineer with special test equipment; they are mentioned here so you know what they are should you ever come across them.

Cat. No. 69: Dolby Tone and Pink Noise

This film is required to maintain your theatre system. The Dolby Tone recorded on one side is for adjusting Dolby Level as instructed on page 2-2; this simple adjustment must be performed whenever an exciter lamp is replaced and should also be performed from time to time to compensate for the normal aging (and reduced light output) of exciter lamps. The other test signal, pink noise, is for use by a service engineer to optimize the high frequency response of each projector soundhead when the CP65 is first installed and when its Cat. No. 240A optical preamp is replaced.

Cat. No. 251: Jiffy Test Film

This eight-minute test film is strongly recommended to help keep your system sounding its best. No special equipment is required because the tests have been specifically designed to permit subjective judgement by ear. Each test is described by either a male or female voice and is supplemented by captions on the screen which help identify the causes of sound system problems. Visual checks are also included to assist in identifying some picture projection problems.

Tests provided on the Cat. No. 251 include: Level Set, Channel Identification, Channel Level and Loudspeaker Equalization, Loudspeaker and Amplifier Condition, Projector Wow and Flutter, Overall System Performance, Visual "Quick-checks", and a Noise and Interference Test.

Duration:	8 minutes
Picture format:	35-mm color, can be screened either 1.85:1 wide-screen or 2.35:1 anamorphic
Sound format:	04 Dolby Stereo A-type

SECTION 3
TROUBLESHOOTING

Your theatre sound system consists of a number of critical audio components in addition to the Dolby CP65. Thus, the first step when something goes wrong with the sound is to find the source of the problem. The troubleshooting chart starting on page 3-6 can be helpful.

If the troubleshooting chart is not sufficient for finding and solving the problem right away, the procedures in the following paragraphs should be helpful. Each paragraph is gauged to the time available for troubleshooting — during a show, between shows, and after closing. In addition, Appendix C contains brief descriptions of each circuit module, which will further help you to track down any problems with the CP65.

If you are unable to solve the problem using the information which follows, call your local authorized service engineer. If he is unavailable, you may also call Dolby Laboratories' 24 hour emergency number in San Francisco for expert advice: (415) 558 - 0200 (U.S.A. only). You will be asked to leave your name and number and a Dolby engineer will call you back promptly.

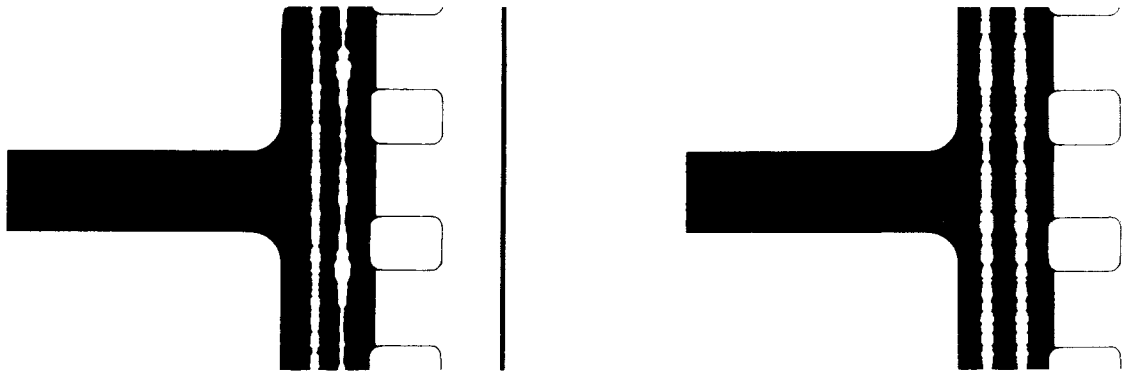
A. DURING THE SHOW

1. If All Sound Is Lost

- Check to make sure that the power amps are on.
- Immediately open the door of the CP65 and switch the CP65 to bypass. If sound comes back on, it will be mono but you can continue the show while you try to find the source of the trouble.
- If sound is not restored, check that power is connected to the CP65. If power was disconnected for some reason, switch the CP65 back to normal. Normal sound should be restored when power is restored.
- If you still have no sound, check that the exciter lamp is lit.
- Next, check all control settings. Be sure that the correct format and projector are selected, and that the CP65 is not in the **mute** mode (indicated by the flashing of the LED on the **mute** button).
- Check both the main and bypass fuses and replace if necessary (mute the CP65 and switch off the power amplifiers to prevent loud thumps out in the theatre as fuses are replaced).
- If these checks do not restore the sound, switch the CP65 to format **60 non-sync** and play your source of intermission music. If the system operates properly in this format, there is no problem with the equipment following the CP65 in the system (such as amplifiers and speakers) and the problem may well be in the projectors. Double-check both projectors and continue the show on a working projector if you find that one projector is at fault.

APPENDIX A
HOW TO TELL A STEREO OPTICAL PRINT FROM A MONO PRINT

A Dolby Stereo optical print should be identified as such on both the film can and leader. However, with handling the identification may be lost. If you are not sure if you have a stereo print, play a reel and find a section with music and/or effects only (on dialogue or narration, stereo soundtracks look much the same as mono soundtracks). Examine the soundtracks closely; on music and effects, the two soundtracks will appear to be different on a stereo print; on a mono print they are identical. Alternatively, while the film is playing, open the front panel and check the signal-present LEDs; the left, center, and right LEDs will flicker regularly if the print is stereo; the center LED will predominate if the print is mono. If you specified a stereo print and received a mono print in error, be sure to check with your local exchange or the film distributor.



Stereo vs. Mono Soundtracks

There is no way to tell by visual inspection if a stereo print has been encoded with a surround channel. However, all but a few early Dolby Stereo releases do have a surround channel so, in general play any stereo print in format 04 Dolby stereo A-type. (See "Format Selection", page 1-1, and "Excessive or Inappropriate Sound from the Surround Speakers", page 3-2.)

(2) The alignment of the solar cell in the projector being used

(3) The Cat. No. 240A optical preamp

(4) The Cat. No. 150 2:4 decoder

Continue the show with the surround amplifiers off and have the problem corrected later by your service engineer.

B. BETWEEN SHOWS

If bypass operation was required to complete a show and your preliminary checks suggest that the cause of a problem may be a fault within the CP65, you can take some further steps when you have more time between shows.

- Listen to each channel individually over the booth monitor. If each channel sounds OK, the problem is in equipment following the CP65 in your system. To verify this conclusion, play a film and watch the signal-present LEDs on the Cat. No. 242. If they flicker as the film is playing, chances are that the CP65 is working properly and the fault probably is after the CP65.

- If the indications are that the fault is in the CP65, perform the checks below after you have turned off the power amps to prevent loud thumps in the theatre.

- With the CP65 still in bypass, check the main fuse on the Cat. No. 259. If it is blown, replace it (a spare fuse is in the right-hand fuseholder).

- Locate the three red LEDs at the top of the Cat. No. 249 (they indicate the status of the three power supply voltages). Switch the CP65 from bypass back to normal operation, and watch what happens to the LEDs:

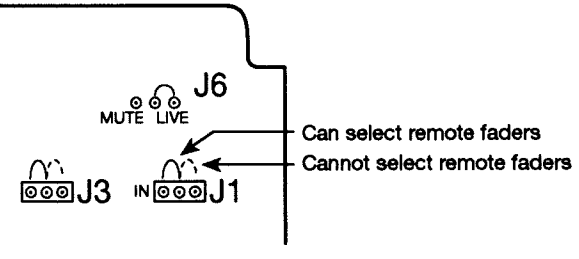
- If all three LEDs come back on and stay on, the Cat. No. 249 is working properly. If all three go out again after about three seconds, the Cat. No. 249 may be at fault, and you should try substituting your spare Cat. No. 249.

- If none of the LEDs light, the main fuse may have blown again. The Cat. No. 249 or 259 is probably at fault. Call your service engineer to correct the problem.

- If only one or two of the LEDs come on and then go out in about three seconds, one or more of the power supplies are not working. Substitute your spare Cat. No. 249 for the one in use, and see if that restores proper operation.

If by now you have not been able to restore all sound system functions, switch the CP65 back to bypass and finish the day's shows. When the theatre is closed and you have more time, follow the instructions in the following paragraphs to track down the problem.

D. TROUBLESHOOTING PROCEDURES (cont'd)

Trouble	Probable Cause	Recommended Action
The sound output of the CP65 is at the highest level (full on), regardless of the setting of the fader control.	Short circuit in fader circuitry.	Call service engineer.
When you select the local fader, there is no output from the CP65; all LED indications are proper; remote fader operation is OK.	Malfunctioning Cat. No. 242 B-chain facilities card, Cat. No. 443 control logic card, or Cat. No. 447 front panel card.	Call service engineer.
When you select the remote fader, there is no output from the CP65; all LED indications are proper; local fader operation is OK.	Defective wiring from remote fader to CP65. Malfunctioning Cat. No. 242 B-chain facilities card, Cat. No. 443 control logic card, or Cat. No. 447 front panel card. Defective remote fader.	Check the wiring for damage or breaks. Check that all connections are firmly made. Call service engineer. Repair or replace remote fader.
You cannot change from local to remote fader operation.	Improperly installed jumper on Cat. No. 443 control logic card. Malfunctioning Cat. No. 443 control logic card or Cat. No. 447 front panel card.	Place CP65 in bypass and remove Cat. No. 443 module. Check that the jumper is as shown below. Change if necessary.  Call service engineer.

2. Front Panel Control Errors

If the CP65 does not respond properly to its front-panel controls, the fault may be with the Cat. No. 447 front-panel control module or the Cat. No. 443 control logic module. If your theatre has an automation system, the fault could be in the external automation circuitry. To track down the problem:

- Open the front panel and check that the end of the ribbon cable from the Cat. No. 447 front-panel control card is securely plugged into the backplane connector.

- If the connection is secure and your theatre is equipped with an automation system, switch the CP65 to bypass. Then, obtain access to the rear of the CP65. Remove the connections from the automation system connected to J18 and/or TB1. Switch the CP65 back to normal operation and check if its various functions operate manually.

- If so, the fault lies with the external automation circuitry and you can continue to use the CP65 manually until the fault is repaired.

- If not, the problem may be with the Cat. No. 443 control logic module. If possible, substitute a Cat. No. 443 from another CP65 cinema processor. Do not use a Cat. No. 243 from a CP55 cinema processor, the two modules are similar in appearance but they are not interchangable.

- If substituting the Cat. No. 443 does not help, the problem is most likely in the Cat. No. 447 front-panel control module which will require replacement by your service engineer

3. Projector Change-Over Failure

If the problem is a failure to change over, first verify that your external change-over switch is functioning properly. If so, the problem may lie in the Cat. No. 240A. Substitute your spare Cat. No. 240A or one from another processor. If that solves the problem and it is necessary to leave the alternate Cat. No. 240A in the CP65 to keep the system going, check and adjust Dolby Level as instructed on page 2-2. The high frequency response of the system may not be correct, however, unless the hf adjustments on the spare Cat. No. 240A were performed at an earlier time by a service engineer.

D. TROUBLESHOOTING CHART

The following pages contain a brief troubleshooting chart that covers typical problems that can arise with the CP65 system. The chart is organized into three columns — Trouble — Probable Cause — and Recommended Action. In the case of the recommended action, you are directed to follow simple procedures that can be performed rapidly in order to help you determine if your actions solve the problem. In some cases, the only remedy available to you is to replace a module or card. If you have a spare module or card, install it in place of the apparently malfunctioning item. (If the replacement item is a Cat. No. 242, Cat. No. 64, or Cat. No. 441, call your service engineer to perform the appropriate alignment). If you do not have replacement modules or cards or if such replacement does not solve the problem, call your service engineer.

D. TROUBLESHOOTING PROCEDURES (cont'd)

Trouble	Probable Cause	Recommended Action
When a stereo film is projected, the sound appears to be coming from the wrong speakers.	The A-chain has become misaligned.	Call service engineer.
You can hear pops and thumps at projector changeover.	A diode should be soldered across the winding of the projector changeover relay to prevent noise from the change over relay from leaking in to the audio wiring. This diode may be missing or defective.	If possible, check that the diode is installed across the relay winding. If you are familiar with such electronic components, check to see that it is not blown. If the diode is not present or if it appears to be blown, install a diode; 1N4004 for 100/120V (1 amp, 400 V diode) or a 1N4008 for 220/240V (1 amp, 800 V diode)
	Malfunctioning Cat. No. 240A optical preamplifier.	Call service engineer to correct the malfunction.
Sound from the front (screen) channels is leaking into the surround channel.	The A-chain has become misaligned.	Call service engineer.
	Surround sound delay set improperly.	Call service engineer.
	Surround sound level set too high.	Call service engineer.
You detect an echo in a small theatre.	Surround sound delay set improperly.	Call service engineer.
The sound level in bypass is higher or lower than the normal sound level.	**Bypass** gain improperly set.	Call service engineer.

D. TROUBLESHOOTING PROCEDURES (cont'd)

Trouble	Probable Cause	Recommended Action
All channels fail.	Defective exciter lamp or lamp power supply.	Check that the exciter lamp is on and that the lamp power supply is operating. If not, call service engineer.
	No signals coming from stereo solar cells.	Check that the signal present LEDs on the Cat. No. 240A optical preamplifier are flashing while film is projected. If not, there is no signal from the solar cells or the Cat.. No. 240A has failed. Call service engineer. Note these LEDs do not operate in bypass.
	Malfunction in the CP65.	If the signal present LEDs on the Cat. No. 240A optical preamplifier are flashing, the problem is caused by a malfunctioning card or module in the CP65. Call service engineer.
One channel fails.	Defective power amplifier or wiring for that channel.	Place the CP65 in bypass. There should be three mono channels. If not, there is a fault in the power amplifier or wiring for the missing channel. Check if amplifier is on and if the fuse(s) blew. Check that the wiring from the CP65 to the amplifier to the loudspeaker has not been broken or disconnected.
	Malfunctioning module in CP65.	If the power amplifier and the wiring are satisfactory, the problem is a malfunctioning module in the CP65. Check the signal present LEDs to identify the module or card in which the missing channel first appears. Then call service engineer.