LUCASFILM THX

Home THX® Audio System
Room Equalization Manual
Rev. 1.5

Manual abstract:

1.5 Home THX® Audio System Room Equalization Manual Rev. @@@@.....

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.... 23-24 2 Home THX Equalization Manual Rev. 1.5 Introduction and Background: The goal of the Home THX Audio Program is to reproduce in the home the film sound experience exactly as the director heard it on the film dubbing stage. Even with all the elements of a Home THX Audio System correctly installed, one challenge remains to our ability to perfectly "close the loop" connecting the dubbing stage to the home environment. That challenge is the almost infinite variability of room acoustics. To achieve a consistency of performance under varying acoustical conditions, some form of room equalization is necessary.

Why Room Equalization? In the room volumes (under 6000 cu ft) for which the Home THX Audio System was designed, several problems exhibit themselves no matter how "flat" or "accurate" a speaker is designed. The first problem is the existence of room modes or standing waves. These modes are a function of each room's shape and dimensions, and cause uneven frequency response with peaks and dips in the low frequency range. Since these standing waves occur at fixed locations for fixed frequencies within a room, there is no way to completely avoid these artifacts. However, since the audience for a home theater remains generally in one specific area of a room, prudent equalization can usually level these peaks and troughs and produce smoother response in the listening area. The proper positioning of the Subwoofer elements of a Home THX Audio System can do much to minimize these standing wave artifacts (see the Home THX Newsletter #2), but even with careful placement, bass equalization is usually necessary to restore a flat and accurate bass response. The second problem which room equalization is designed to correct is that of speaker/room boundary interactions. These boundary interactions are the same ones that make a loudspeaker appear to have more bass when placed in a corner versus the center of a room. As you can see, the placement (for example) of the screen LCR loudspeaker asymmetrically in a room can 3 have serious repercussions. The speakers placed nearer to the room's boundaries will have a different tonal balance to those placed more centrally.
The result of unequal tonal balance is that sounds can vary dramatically as they are panned across the three front channels, and dialogue from boundary-close loudspeakers may have poor intelligibility. In both circumstances, with room modes or with room boundary problems, a properly set up room equalizer can restore the accurate spectral and inter-channel tonal balance of a home theatre system. Remember that these effects will vary from room to room and installation to installation. As valuable as room equalization is in restoring correct spectral balance, the measurements required to obtain consistent and repeatable response are very tricky. During the 60's and 70's, graphic equalizers were introduced by the home audio industry.
Unfortunately, these products were used for everything from tone controls to a means of forcibly obtaining flat frequency response from grossly inaccurate loudspeakers. One test method of the period was to use records with tracks separated into 1/3 octave pink noise bands and to plot a speaker's output band by band with an uncalibrated SPL meter! In most cases, the results were highly unsatisfactory. The concept of equalization to correct for room modes and boundary effects was, without accurate test procedures, almost forgotten in the consumer audio field. However, within professional audio circles, and in particular the motion picture industry, the use of equalization to improve the accuracy of sound reproduction has been continuously refined and perfected. Over the past decade the Professional THX Theatre program has equalized over 600 motion picture auditoriums world-wide on a yearly basis.
Since the inception of the THX Sound System program, records have been maintained of the thousands of auditorium analyses and equalizations that we have performed. It was from this experience that the standards for a Home THX Room Equalizer and the enclosed EQ procedure were developed. Home THX Equalization Manual Rev. 1.5 Test Equipment Requirements The use of a single RTA, a large number of multiple measurements, and the averaging of these measurements is a time consuming 1.) Real Time Analyzer process and can be subject to a high degree of operator error. It is therefore highly recomThis procedure requires the use of a realmended that R-2 be employed whenever time (spectrum) analyzer and a pink noise source. possible. The analyzer approved for use is theR-2 THX Audio Analyzer. The R-2 analyzer contains the following: 2.

) Pink Noise Sources · a 4 input real-time analyzer with measurement bands at ISO one-third octave and ISO octave intervals four calibrated omnidirectional microphones spatial averaging through microphone multiplexing averaging over time (10 seconds up to 2 hours) a calibrated internal pink noise source Pink Noise can be obtained from one of the following sources: · · · · the R-2 analyzer the "Wow!" laser disc Chapters 8-10 the Delos/Stereo Review Surround Sound Test CD any calibrated true pink noise source (this can be verified by measuring the noise source into the line input of the analyzer for flat response) · · · · Along with real-time analysis, theR-2 Analyzer can measure room reverberation (RT-60) and background noise (NC levels). If the R-2 Audio Analyzer is unavailable, the following equipment may be used with care: · A real-time analyzer with measurement bands at ISO one-third octave intervals and a display range of ± 5 dB (minimum) A calibrated omni-directional microphone, or microphones. The analyzer must be capable of defeating any weighting which may be applied to the real-time display The real-time analyzer must be also capable of correctly storing and averaging a minimum of four measurements and have a slow response mode. · · · Why Pink Noise What is Pink Noise and why choose it over White Noise? Simply put, white noise is a random signal with equal amplitude per frequency, and pink noise is a random signal with equal energy per octave. Let's look at two octave bands; say from 500 Hz to 1 kHz and 1 kHz to 2 kHz. If each of these bands had equal amplitude per frequency, it's apparent that the 1-2 kHz band would contain more energy than the 500 Hz to 1 kHZ band because it contains twice the number of frequencies.

Consequently white noise sounds very bright. Pink noise, however, containing equal energy per octave, closely reflects our psychoacoustic expectations of flat response. Because of this perception of flat tonal balance, pink noise is a very useful tool when using a spectrum analyzer with 1/3 octave or octave measurement intervals, and when comparing loudspeakers for spectral similarity by ear . One element of caution is necessary, though.

Because pink noise has a random element to it, when you measure pink noise using a 4 Home THX Equalization Manual Rev. 1.5 peak level meter or some RTAs you will notice peaks far above the average. This is more noticeable through a Subwoofer than through an LCR speaker. This is because a random bass peak can last for a longer time (lower frequency = longer period) than most RTAs or SPL meters average for.

Higher frequency peaks last for a shorter period. This is why most measurements using pink noise are averaged for a long time or are made by averaging multiple measurements. That way these instantaneous peaks won't throw your readings off. Equalization Procedure NOTE: THE FOLLOWING TEST PROCEDURES ASSUME THAT A HOME THX AUDIO SYSTEM HAS BEEN PROPERLY INSTALLED, AIMED AT THE LISTENING AREA, AND LEVEL CALIBRATED. FAILURE TO CORRECTLY INSTALL A HOME THX AUDIO SYSTEM MAY RESULT IN INCORRECT ANALYZER READINGS, IMPROPER EQUALIZATION, AND AN ACTUAL REDUCTION IN THE OVERALL PERFORMANCE OF THE SYSTEM.

Please refer to the Home THX Audio System Installation and Operation Manual (available from any Home THX Licensee) for details on system design, setup, and calibration. For your convenience, an Equalization Procedure Checklist is located on page 22 of this Manual. We recommend that you use it as a handy reference only after thoroughly studying this Manual. Graphic Conventions: When referring to the THX R-2 Analyzer, specific, numbered function keys on the control computer are identified by the following graphics: F-7 3.) The Home THX Room Equalizer The Home THX Room Equalizer meets the exacting specifications of the Lucasfilm Home THX Audio program. It is specifically designed to have the wide dynamic range, low noise, and low distortion required by the demands of motion picture soundtracks. Careful attention was also paid to musical transparency. The frequency centers of each channel's controls are carefully chosen to provide the precise control necessary for accurate room equalization, and the "constant Q" nature of each control assures the operator that corrections to one band don't "spill over" into adjacent bands. Parametric controls (where provided) allow for the pin-point correction of mid-frequency problems, and every equalizer is provided with a security cover to help keep a tuned system tuned. 5 Home THX Equalization Manual Rev.

1.5 SECTION 1: Room Analysis Using the R-2 Analyzer 1.1) Define The Listening Area: The first step in correctly equalizing a Home THX Audio System is to identify the listening area. @@@@@@These bandwidth limited signals minimize room mode effects. @@With some measurement positions very close to Left or Right screen speakers, care will be needed in averaging the RTA measurements to prevent unintentional weighting. 1.2) Choose Measurement Positions: 1 2 4 3 Mic Positions Suggested Microphone Positions for 1 Row Seating Fig 1 6 Home THX Equalization Manual Rev. 1.5 · Choose four positions that represent prime listening positions spaced equally throughout the listening area (Fig. 1).

Position your analyzer's microphones at seated ear height (38" to 48" off finished floor). Place the microphone(s) on a stand. Do not attach any microphone directly to the analyzer or hold it in your hand. Yourimate the inverse of the correct EQ curve. As a starting point, assume that a dip of -3 dB on the analyzer calls for an increase at the appropriate EQ frequency of +3 dB.

Remember the scale on the analyzer is 2 dB per division. Since we will re-measure a number of times, any over correction or under correction will be caught. When analyzing the averaged RTA curve, try to look for the mean SPL for all frequencies and adjust the peaks and dips to that mean. Remember that we are trying to achieve a response in the LCR channels of ±1 to 2 dB from 100 Hz to 1 kHZ without drastic EQ shifts. A boost of 6 dB places many demands on both amplifiers and loudspeakers.

1.6) Re-analyze: After applying the corrections to the appropriate channel frequency centers, re-run the procedure described in 1.4 to verify the corrections. You will find that you will have to measure and correct several times to achieve a balanced and repeatable response. NOTE: ABOVE 1 kHz, IN TYPICAL ROOM ENVIRONMENTS, THE SOUND FROM HOME THX LCR SPEAKERS IS DIRECT FIELD DOMINATED AND THE FREQUENCY RESPONSE MAY BE POSITION DEPENDENT. AVOID DRAMATIC EQ CHANGES ABOVE kHz. SINCE WE ARE MORE 1 SENSITIVE TO FREQUENCY PEAKS THAN DIPS, USE THE CONTROLS AVAILABLE SPARINGLY TO REDUCE HIGH FREQUENCY PEAKS, RATHER THAN TRYING FOR RULER FLAT RESPONSE . Avoid radical EQ beyond this point. Typical Unequalized Room Response 75 70 dB SPL 65 60 25 40 63 100 160 250 400 630 1000 1600 2500 4000 6300 10000 16000 Frequency Hz Fig 4 10 Home THX Equalization Manual Rev. 1.

5 You will have achieved a correct EQ curve when successive measurements show the same flat response. Repeat this procedure for each remaining screen channel and the subwoofer. Use the appropriate track on "Wow!" or your pink noise source, and remember to connect only the speaker that you are testing. Your front channels are now equalized. 1.7) Compare EQ Settings NOTE: IN INSTALLATIONS THAT ALLOW FOR SYMMETRICAL L/R SPEAKER ROOM PLACEMENT, CONFIRM THAT THE EQ SETTINGS FOR L & R CHANNELS ARE SIMILAR. Small variations of 1 dB in individual 1/3 octave bands are tolerable. In asymmetrical L/R speaker placement, larger variations in EQ curves are acceptable; particularly at the lower frequencies where boundary effects are most common . Using R-2, the comparison function compares the curve in memory to a curve on the disk drive. This means that the stored curve on the disk drive is always assumed to be the reference.

The resulting difference curve shows the deviation of the curve in memory from the reference curve. To compare a curve on display to a stored curve, select F-2 , then select the reference curve from the items listed. You can save the resulting comparison by hitting F-9 . 1.8) Equalizing the Subwoofer Measuring the Subwoofer is very similar to measuring the LCR channels with one exception.

Because the pink noise source will exhibit larger instantaneous fluctuations in amplitude at lower frequencies (see the section on pink noise in the introduction), longer averaging times may be necessary to improve measurement consistency. If you are using "Wow!" as the pink noise source, use the Center Channel Pink Noise (Chapter 9).

Otherwise connect your pink noise source into the both Left and Right channel inputs of your decoder. Unequalized Subwoofer Room Response 75 70 dB SPL 65 60 25 40 63 100 160 250 400 630 1000 1600 2500 4000 6300 10000 16000 Frequency Hz Fig 5 11 Home THX Equalization Manual Rev. 1.
5 When equalizing the Subwoofer Channel, you should concentrate on reducing the serious peaks. You may find that because of the depth of the room modes a ruler flat response is not within the range of the equalizer. This not a major concern since a response within ± 3 or 4 dB is very acceptable. One tip; a reduction of energy in the 20-30 Hz range will enable the subwoofer to play louder without before encountering excursion problems. 1.9) Confirm the Subwoofer Splice: Center Channel The next step is to activate the internal test signals present in your Home THX Controller and readjust all SPL's to their correct 75 dB C weighted levels. This will even out any level variations introduced by equalization. After level check, return to your "Wow!" Center Channel pink noise; Chapter 9. Observe on your RTA the relative levels of the Subwoofer and the Center Channel. The overlap area is referred to as the splice point.

Follow the same averaging procedure you used in Section 1.4. In particular, look at the crossover area between 80 Hz and 200 Hz. This area will usually appear uneven (Fig. 6). Uneven Subwoofer Splice 72 dB 68 SPL 64 60 25 40 63 100 160 250 400 630 1000 1600 2500 4000 6300 10000 16000 Frequency Hz Fig 6 The most common cause of an uneven Subwoofer splice is the relative difference in positions between the LCR speakers and the Subwoofer(s). These position differences can cause frequencies common to all the speakers to arrive at different times at the listening position, and partially cancel or reinforce themselves. At this point use the Center Channel EQ to adjust the response at the splice. DO NOT use the Subwoofer EQ . 1.
10) Confirm Subwoofer Splice: Left and Right Channel Next, in the Stereo or Bypass mode play both the Left and Right Pink Noise from "Wow!"; Chapters 8 & 10. Measure and analyze as described in Section 1.4. Adjust both the Left and Right Chan12 Home THX Equalization Manual Rev.
@@@@@@WARNING! @@@@@@@@@@@@@@@@@@@@A smooth curve, without radical peaks or dips, is what is desired.
@@@@@@@@@@@@@@These bandwidth limited signals minimize room mode effects. @@@@1.5 · Choose four positions that represent prime listening positions spaced equally throughout the listening area (Fig. 8). Position your analyzer's microphone(s) at seated ear height (38" to 48" off finished floor).
Place the microphone(s) on a stand. Do not attach any microphone directly to the analyzer or hold it in your hand. Your body is an acoustical object large enough to influence what is supposed to be a room measurement. Label in your notes each position and note any related information (e.g., Microphone 3 located under loft overhang) which can affect your interpretation of the measurements. Do not point any microphone directly at a loudspeaker. Point it straight up. You are looking for a room measurement; not measuring the direct field of the loudspeaker. If you are placing a microphone on any piece of furniture (i.

e., a chair or couch), make sure that the mic is away from any cushion or seat back by at least 1 foot. This will improve the accuracy of measurements at that position above 800 Hz. For multiple rows of seats, see Fig. 9 below. · · · · · 2 1 3 4 Mic Positions Multiple Row Seating and Microphone Positions Fig 9 15 Home THX Equalization Manual Rev. 1.5 2.3) Home Theatre and Test Equipment Set-Up Home Theatre Equipment: · Switch your Home THX Controller to the "Dolby Pro Logic Surround" mode. The Home THX Cinema mode must be switched off for this procedure.
Disconnect or disable the Subwoofer and the channels you are not measuring. You want to analyze each channel individually and disconnecting unused channels helps prevent assignment errors. One installer spent a frustrating hour trying to EQ a Center Channel speaker only to find that he had been playing pink noise through the Right Channel speaker. Calibrate the individual channel levels as usual using the internal test signals and a reliable SPL meter. Set the System Volume at Reference.
· · · RTA Equipment: · Defeat any weighting on the RTA portion of the analyzer (e.g., "C" weighting). Measurements are to be taken with flat response. Set the analyzer to Slow Response.
Set your analyzer's scale to the appropriate SPL range, and the dB per division scale to 2 dB. · · Pink Noise Sources: Pink Noise can be obtained from one of the following sources: · · The "Wow!" laser disc, Chapters 8-10. An external calibrated pink noise source (200 mV RMS) placed into each channel's EQ input. 2.4) Real-Time Analysis: Start your pink noise source. If using "Wow!" Chapters 8-10, put the appropriate track on A-B repeat so that it conveniently cycles automatically. Placing your microphone at a reference position (Microphone 1). Take three or four measurement samples and store each reading into a memory position of the analyzer. Average these readings and store the average in a memory location. Repeat the procedure at each of the other three locations chosen.

16 Home THX Equalization Manual Rev. 1.5 NOTE: CHECK THE OVERALL SPLs AT EACH MICROPHONE LOCATION. IF THESE VARY BY MORE THAN ± 1 dB, ADJUST THE MASTER VOLUME ON THE CONTROLLER TO COMPENSATE THE SPL AT EACH LOCATION TO APPROXIMATE THE SPL AT THE REFERENCE POSITION (Microphone 1). FAILURE TO DO SO MAY RESULT IN SKEWED SPATIAL AVERAGES. With the four positions stored in memory, now average to obtain the spatial response for the entire listening area. Notice that we have used the method of obtaining several samples for each microphone position to smooth out the stochastic effects of the pink noise. NOTE: DISPERSION AND AIR ABSORPTION AT HIGHER FREQUENCIES WILL CAUSE A GENTLE ROLL OFF IN RESPONSE BEGINNING AROUND kHz. THIS IS NORMAL AND DOES 6 NOT REQUIRE EQUALIZATION. (Fig.
10) Typical Unequalized LCR Room Response 75 70 dB SPL 65 60 25 40 63 100 160 250 400 630 1000 1600 2500 4000 6300 10000 16000 Frequency Hz Fig 10 2.5) Equalize: The resulting spatial average will approximate the inverse of the correct EQ curve. As a starting point, assume that a dip of -3 dB on the analyzer calls for an increase at the appropriate EQ frequency of +3 dB. Since we will re measure a number of times, any over correction or under correction will be caught. When analyzing the averaged RTA curve try to look for the mean SPL for all frequencies and adjust the peaks and dips to that mean. Remember that we are trying to achieve a response in the LCR channels of ± 1 to 2 dB, from 100 Hz to 1 kHZ, without drastic EQ shifts.

A boost of 6 dB places many demands on both amplifiers and loudspeakers. 17 Home THX Equalization Manual Rev. 1.5 2. 6) Re-analyze: After applying the corrections to the appropriate channel frequency centers, re-run the above procedure to verify the corrections. You will find that you will have to measure and correct several times to achieve a balanced and repeatable response. NOTE: ABOVE 1 kHz, IN TYPICAL ROOM ENVIRONMENTS, THE SOUND FROM HOME THX LCR SPEAKERS IS DIRECT FIELD DOMINATED AND THE FREQUENCY RESPONSE MAY BE POSITION DEPENDENT. AVOID DRAMATIC EQ CHANGES ABOVE kHz. SINCE WE ARE MORE 1 SENSITIVE TO FREQUENCY PEAKS THAN DIPS, USE THE CONTROLS AVAILABLE SPARINGLY TO REDUCE HIGH FREQUENCY PEAKS, RATHER THAN TRYING FOR RULER FLAT RESPONSE . Avoid radical EQ beyond this point. Typical Unequalized Room Response 75 70 dB SPL 65 60 25 40 63 100 160 250 400 630 1000 1600 2500 4000 6300 10000 16000 Frequency Hz Fig 11 Repeat the above procedure for each front channel. Use the appropriate track on "Wow!" or your pink noise source, and remember to connect only the speaker that you are testing. Your LCR channels are now equalized. NOTE: IN INSTALLATIONS THAT ALLOW FOR SYMMETRICAL L/R SPEAKER ROOM PLACEMENT, CONFIRM THAT THE EQ SETTINGS FOR L & R CHANNELS ARE APPROXIMATELY THE SAME.

Small variations of 1 dB in individual 1/3 octave bands are tolerable. In asymmetrical L/R speaker placement, larger variations in EQ curves are acceptable; particularly at the lower frequencies where boundary effects are most common . 18 Home THX Equalization Manual Rev. 1.5 2.7) Subwoofer Equalization: All Subwoofer measurements should be done using the Center Channel Pink Noise band on "Wow!" (Chap. 9) or with your pink noise source into the Left and Right inputs of the decoder. Disable or disconnect the LCR speakers. Unequalized Subwoofer Room Response 75 70 dB SPL 65 60 25 40 63 100 160 250 400 630 1000 1600 2500 4000 6300 10000 16000 Frequency Hz Fig 12 Measuring the Subwoofer is very similar to measuring the LCR channels with one exception. Because the pink noise source will exhibit larger instantaneous fluctuations in amplitude at lower frequencies (see the section on pink noise in the introduction), more averages will be necessary to improve measurement consistency.
It is therefore recommended that, rather than attempting to spatially average the microphone positions with a non-multiplexing RTA, you take the maximum number of readings at Position 1 that you can store and average them. Then adjust your EQ setting for flat response for that average. If you are using "Wow!" as the pink noise source, use the Center Channel Pink Noise (Chapter 9). Otherwise connect your pink noise source into the both Left and Right channel inputs of your decoder. When equalizing the Subwoofer Channel, you should concentrate on reducing the serious peaks.
You may find that because of the depth of the room modes a ruler flat response is not within the range of the equalizer. This not a major concern since a response within ± 3 or 4 dB is very acceptable. One tip -- a reduction of energy in the 20-30 Hz range will enable the subwoofer to play louder without before encountering excursion problems. Reconnect your front speakers. 19 Home THX Equalization Manual Rev.
1.5 2.8) Confirm the Subwoofer Splice: Center Channel The next step is to activate the internal test signals present in your Home THX Controller and readjust all SPL's to their correct 75 dB C weighted levels. This will even out any level variations introduced by equalization. After level check, return to your "Wow!" Center Channel pink noise; Chapter 9. Observe on your RTA the relative levels of the Subwoofer and the Center Channel. The overlap area is referred to as the splice point. Follow the same averaging procedure you used for Subwoofer EQ. In particular, look at the crossover area between 80 Hz and 200 Hz. This area will usually appear uneven (Fig.

13). Uneven Subwoofer Splice 72 dB 68 SPL 64 60 25 40 63 100 160 250 400 630 1000 1600 2500 4000 6300 10000 16000 Frequency Hz Fig 13 The most common cause of an uneven Subwoofer splice is the relative difference in positions between the LCR speakers and the Subwoofer(s). These position differences can cause frequencies common to all the speakers to arrive at different times at the listening position, and partially cancel or reinforce themselves. At this point use the Center Channel EQ to adjust the response at the splice. DO NOT use the Subwoofer EQ . 2.9) Confirm Subwoofer Splice: Left and Right Channel Next, in the Stereo or Bypass mode play both the Left and Right Pink Noise from "Wow!"; Chapters 8 & 10. Adjust both the Left and Right Channel splices to the Subwoofer channel by using your Left and Right Channel EQs. @@Use the Left, Center, or Right EQ controls only to adjust for uneven frequency response at the splice point. 20 Home THX Equalization Manual Rev.
1.5 WARNING! @@Subwoofers or LCR speakers connected out of phase may cause a "suck-out" at the crossover point. @@@@If multiple and offset Subwoofers are used, you should attempt to smooth the response by reversing the polarity of the Subwoofer furthest from the LCR speakers, or by repositioning the offset Subwoofer. 2.10) LISTEN! @@ Correct EQ with Subwoofer Splice 80 76 72 68 64 60 25 40 63 100 160 250 400 630 1000 1600 2500 4000 6300 10000 16000 dB SPL Frequency Hz Fig 14 Please Note: The above curve represents atypical room EQ.
@@A smooth curve, without radical peaks or dips, is what is desired. With difficult rooms, acceptable tolerances can be up to ± 3 dB. 21 Home THX Equalization Manual Rev. 1.5 Equalization Checklist: Set-UP · Set Up Home THX Audio System · Aim L, C, R loudspeakers using pink noise on "Wow!" disc · Calibrate individual channel levels with controller's internal test signals · Set Up Microphone positions · Set RTA weighting for Flat · Set Up Scale Range and Divisions With R-2 Audio Analyzer only · Set Measurement interval for 20 sec.
minimum · Begin Microphone Multiplexing Analyze & Equalize A) Disconnect Subwoofer, Left, and Right Channels B) Play Pink Noise through Center Channel C) Measure multiple locations, average readings, and equalize Center Channel D) Repeat C until measurements are consistent Repeat operations A,B,C, &D for Left, Right, and Subwoofer channels Confirm EQ Reconnect System Confirm splice of Subwoofer with Center Channel by playing Center pink noise in Dolby Pro Logic mode Confirm splice of Subwoofer with Left and Right Channels by playing Left & Right Channel Pink Noise in Stereo or Bypass mode Check System Set-up Re-calibrate individual channels with controller's internal test signals Listen to circulating Pink Noise on "Wow!" disc to compare timbre of LCR speakers Return to Home THX Cinema Mode and playWow! demo listening for accurate Foley, clear dialogue, precise localization, smooth pans, and overall detail · · · · · · · · · · *Foley is a term used to describe the all of the "natural" sound effects which contribute to our sense of reality in motion pictures.*

These effects are created in a special sound stage in sync with the action of the film. The process was named after Jack Foley who invented the system of adding the sound of footsteps to early talking motion pictures in order to enhance their believability. 22 Home THX Equalization Manual Rev. 1.5 Chapter 2: The Home THX Audio System; Tomlinson Holman discusses the elements of the Home THX Audio System and what sets it The "WOW!" laser disc was created by apart from more conventional home theatre Lucasfilm for use with Home THX Audio systems. systems. "WOW!" consists of exciting demonstration, educational, and testing material to help you best Chapter 3: Mode Selections; appreciate the Home THX Audio System. "Wow!" Five short selections illustrate the most is available to consumers with the purchase of a appropriate use of the various modes of your THX Home THX Audio System controller. controller.

These selections show the best use of the Home THX Cinema, Dolby Pro Logic, and "WOW!" should only be played through a Stereo modes. Home THX Audio System, and should never be sold, rented, copied, broadcast, or used for Side 2: any commercial purposes. Any unauthorized use of this copyrighted material is strictly Chapter 4: Soundtrack; prohibited, and violators will be prosecuted. This chapter outlines the process whereby the soundtrack of a movie is created. @@laser disc, and prowatch a movie on a non-THX system. There is far vides some suggestions on their use. more to making a film soundtrack than most people imagine. @@@@@@WOW! 0 dB(reference level) when this signal is provides a short and complete movie going playing. experience, and shows off all of the potential of the Home THX Audio System. WOW! contains a Chapter 6: Pink Noise, Left & Right, In-Phase, wide variety of sounds, from very quiet passages, -10 dB; to loud, explosive ones; there are sounds panThis signal is comprised of broad band noise ning between Left and Right, and from front to and can be used to adjust the Center output level, back; there is soft dialog buried in the midst of or check the phase of the Left, Right, and Center competing, loud sound effects; there are power- speakers, as well as the Subwoofers.
When ful, deep bass sounds that make you feel fully played back through a correctly adjusted system, involved in the action. The Home THX Audio this signal should yield 75 dB SPL (Sound PresSystem will deliver all of these sounds with starsure Level) on a sound level meter, C-weighted, tling realism, and unequaled clarity! slow mode. Appendix: "WOW!"-- A User's Guide 23 Home THX Equalization Manual Rev. 1.5 Chapter 7: Pink Noise, Circulating L-C-R-S, -10 dB; This signal is comprised of broad band noise and can be used to calibrate all the individual output level controls after the input level controls have been calibrated.
Set the level to read 75 dB SPL on a sound level meter, C-weighted, Slow mode in each channel in turn, measured from the primary listening position. Chapters 8-11: Pink Noise, Left, Center, Right, Surround Channels, 0 dB; This signal is comprised of broad band noise and can be used to assist in aiming the Left, Center, or Right speakers directly at the primary listening area (especially in the vertical plane). Simply listen for the best high frequency response at your seated position. The Surround Channel Test Signal (Chapter 11) may be used to test the Surround Speaker positions for the best evenness and envelopment of the Surround Field. When played back through a correctly adjusted system, these signals should yield 85 dB SPL on a sound level meter, C-weighted, slow mode.
These signals can also used for spectrum analysis if room equalization is performed. Chapters 12-15: Frequency Sweep, 20 Hz to 20 kHz, Left, Center, Right, & Surround Channels, 0 dB; This sine wave sweep covers the entire audible range and can be used to measure the frequency response of the Left, Center, Right, or Surround channel electronics. Use in conjunction with a chart recorder set for a 3 mm/sec. pen speed. It is not recommended to use this test for loudspeaker adjustments since room standing waves make the results unreliable.Warning: this signal can be damaging at high volumes. Care is required in setting the volume for this test. Chapter 16: Rattle Test, Frequency Sweep, 20 Hz to 500 Hz, 0 dB; This is an extremely slow low frequency sweep, intended to help pinpoint rattles, structural resonances and other potential problems in the bass. Warning: this signal can be damaging at high volumes. Care is required in setting the volume for this test.

Chapters 17-18: Slap Echo Test, Center and Surround Channels; This recording of a hand clap is repeated several times to facilitate the identification of "slap echoes" which might be stimulated by the system. Slowly walk around the room, listening for a fluttering, percussive echo following each initial clap. Treat room surfaces accordingly. For best results it is recommended to shut off the L, R, and S speakers on the Center Channel Test, and the L, C, and R speakers on the Surround Test. Chapter 19-20: Video Test Patterns; These patterns will enable a video technician to correctly set you TV set, monitor, or video projector to the correct levels of color, hue, contrast, and brightness. Copyright 1992 LucasArts Entertainment Company ©Rane Corporation 10802 47th Ave.W., Mukilteo WA, 98275-5098 TEL (206)355-6000 FAX (206)347-7757 Printed in the U.S.A.
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