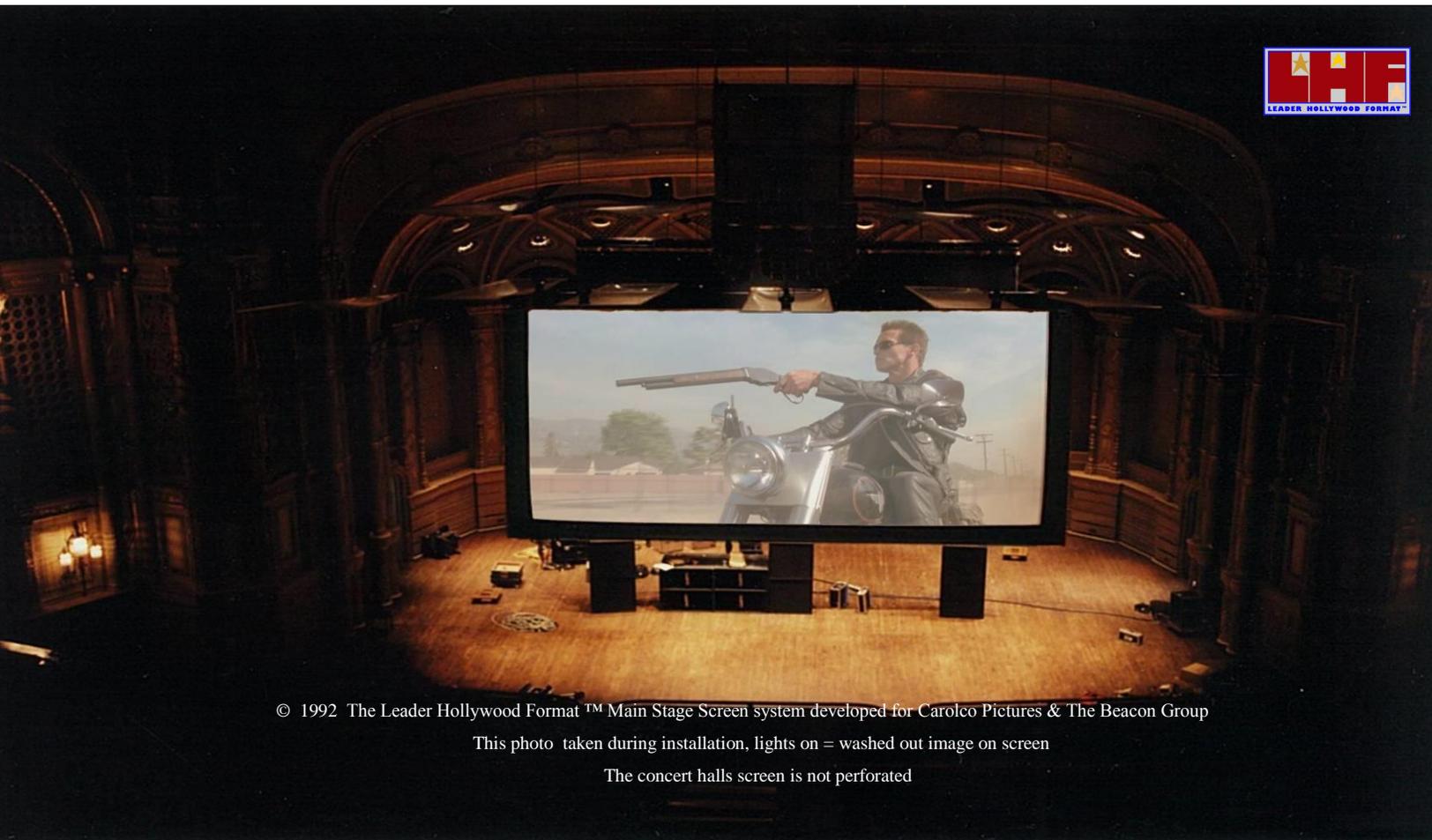




TECHNICAL DATA

Terminator 2 the Investor Group Screenings

Our client had invested \$ 40 million in T2. The Beacon Group (Canada) had many billions invested by Chinese immigrants to Canada during the early 90's. Other investors were across the United States. Prior to our involvement with this T2 project, Beacon had shown T2 to their investors in New York. The event and screening was held at Lincoln Center. The overall performance of the sound system was lack luster. The system could not keep up with the enormity of the new Digital Audio sound track. Leader Cinema was commissioned to design a system which could present T2 to audiences as it was heard, experienced and created on the Dubbing Stage. T2 to this day (2013) remains a milestone in cinema sound. Its dynamic sound track contains the elements which when properly reproduced will provide a movie experience which outperforms any IMAX (tm) theater. Leader Hollywood Format(tm) for T2.....it's a ride!!!



© 1992 The Leader Hollywood Format™ Main Stage Screen system developed for Carolco Pictures & The Beacon Group

This photo taken during installation, lights on = washed out image on screen

The concert halls screen is not perforated

The resulting Main Screen L-C-R and Sub Woofer system was gargantuan, and absolutely right for the task. None of the equipment was from a “cinema catalog”. To guarantee the success necessitated a critical forensic study of the sound track by Leader Cinema. We analyzed both the optical and digital tracks. We came to the realization that the sound mixers on the dub stage were pushing the envelope.

When listening to T2 in both Dolby SR analog and CDS Cinema Digital Sound (a joint venture between Optical Radiation Corporation and Kodak) on typical cinema sound systems common at that time, apart from split “stereo” surrounds, there was little dynamic improvement in the performance, as the Main Screen Systems were first designed for the limited dynamic range of the 2 channel analog optical sound track on the film..... about a 55 dB dynamic range for all decoded 4 channels: Left, Center, Right, mono surround and derived “sub-woofer” channel.

Digital Cinema Sound now presented demanding requirements for the sound system to produce dynamic range approaching 90 dB in *each* of the 5 main channels, now many hundreds of times greater dynamic range than analog. This is the reason behind all THX™ systems becoming stressed all over the world, resulting in blown woofers, compressed sound, and irritating sound (distortion).

The Leader LHF™ Main Screen Channels for T2 were of 5 way active design. Horizontal coverage angle was deliberately designed to be 60 degrees. (Typical cinema systems are 90 degree horizontal coverage) 60 degrees was chosen as concert halls generally have harder more reflective wall surfaces, and this was an attempt to eliminate unwanted wall reflections...it worked.

A concert hall to seat some 2600 people is a far larger space than a cinema. Approaching 594,000 cu feet or 16820 cu meters, no cinema sound system would have the capability of providing the level of overall sound fidelity and purity that the digital track required. In addition, the extent of the depth of the bass down to 25 Hz in *each* Main Screen Channel together with the overall elevated level of these most e-x-p-l-o-s-i-v-e sound effects, it was necessary for us to apply a revolutionary low frequency system in both the Main Screen Channels and also for the LFE Low Frequency Effects Channel.

We calculate that the low frequency portion of the system is in the range of 150 times acoustically larger than a cinema system below 100 Hz. The mid band and high frequency sections also are a few hundred times larger than a cinema system. The human hearing system is less sensitive in the low pitched sounds in the deep bass range. At 30 Hz, our human hearing system is some 17 to 20 dB less sensitive than sounds in the mid band. This means that deep bass sounds need to be reproduced sixty-

four times (+18 dB) louder to be perceived as balanced with the mid band. This requires a healthy check book or a few platinum credit cards !

The VLF Very Low frequency section for the LFE channel was handled by a unique motor driven piston woofer in a folded horn enclosure. The National Geographic Society had experimented with such a system in their research in communicating with elephants at great distances in the wilds of Africa. Four (4) systems were used in our system.

Each Screen Channel's Mid Bass and Low Frequency section contained 4 x 18 inch woofers with the capability to extend each main channels bass response down to 30 Hz flat. Most cinema sound systems start to roll off below 40 Hz, missing more than a half octave of information. The amplifier power to the Low frequency enclosure's 4 woofers was $2400 \text{ watts} \times 2 = 4800 \text{ watts}$ average (not peak) The three L-C-R low frequency enclosures input power becomes $4800 \times 3 = 14,400 \text{ watts}$. However electrical watts does not tell the entire story, as the efficiency of the speaker and its output in Acoustic Watts is the real test. A single LF enclosure could generate average peak output levels to 143 dB SPL with safe long term average output to an astonishing 200 Acoustic Watts. The combined total of the 3 screen channel bass systems (a total of 12 x 18 inch woofers) would create 1512 Acoustic watts (average long term safe thermal) resulting is a possible SPL of 147 db SPL between 25 Hz to 100 Hz. Each enclosure weight: $380 \text{ Lbs} \times 3 = 1140 \text{ lbs} / 518 \text{ Kgs}$

The three way Mid-Hi System had an overall weight of 425 lbs / 193 Kgs for each enclosure resulting in 594 KGS for the 3 L-C-R systems. The peak output capabilities for each enclosure is 137 dB SPL. Total amplifier power: 2600 watts per enclosure, total 7800 watts

The overall sound quality was simply sublime during our more down to earth tests. Classical music took on the majesty of a full symphony orchestra when tested in a 300 seat theater. Jazz was as real as Ella Fitzgerald standing in the room with her trio. The elegance was astonishing even at a whisper. There are exceptional differences when this can be achieved at a whisper...it's magic !

Leader calculates the overall output of the Terminator 2 LHF™ system in acoustic watts to be 3160 Acoustic Watts Average (usable). The distribution over the entire volume of 500,000 cu feet is 0.006 acoustic watts per cubic foot. This is a big number. But...why so big?

At usual volume levels of dialog, the overall spoken word level is in the range of 85 dB SPL 2/3 of the way into the theater. The max output of a digital sound track depending on the depth of the sound effect can easily reach 112 to 115 dB SPL (but not in all theaters). In order for this maximum level to be accurately reproduced, it is necessary to have “headroom” or safety margin to insure that the system is operating in it’s linear range. To achieve this, almost 6dB of headroom is required. This safety margin requires more than 4 times the peak level that simply sits there as a safety factor. This is the reason for everything being so massive to insure that nothing is stressed, which results in highly accurate sound reproduction for many decades of trouble free performance..today, tomorrow and into the future.

Yes it was l-o-u-d ! However the balance between the bass to the mid band to the top end high frequencies was polished, elegant and easy to listen to. T2’s sound track was created to be a roller coaster ride. Hi volume sound effects, explosions, Harley Davidson motor cycles would then be balanced by considerably quieter sequences. It is a wonderful achievement to reproduce the sound of swishing sand in a slow breeze almost at a whisper. These effects are contained on the sound track. Not always is the entirety presented to the ears of the audience as the sound designers for the sound track would like.

Today, there remains a miss match between picture fidelity and sound performance. Leader brings forth the elegant solution were each element between picture and sound enhances the other.

2.5.5 Technical Data and Specifications:

The Leader Large Screen Large Format System 2013 version:

The data below is shown for a single screen channel:

VERY LOW FREQUENCY SECTION

**Note: 4 enclosures are used in a dedicated screen channel
12 enclosures are combined using our proprietary processing to create the
LFE channel (incorrectly called the sub-woofer system)**

4 each D1800-17-26 SD Very Low Frequency Enclosures	
Total 18 inch woofers:	8
Power Bandwidth:	24 to 90 Hz flat 0 dB
Frequency Response:	18 to 130 Hz -6dB
Low Frequency Tuning:	B6
Electrical Amplifier Power:	4800 watts Long Term Average @ 8 ohms 8000 watts Continuous Program

LFE CHANNEL

DXMS-24 Leader Management System required

3 each L-C-R VLF systems combine creating 12 enclosures. The LFE channel is processed in the DXMS-24 and this low passed signal is sent to the L-C-R VLF low frequency outputs for each L-C-R channel. Each channels low frequency content is sent to its own dedicated VLF 4 enclosure system.

The benefit to this technique, is that the LFE bass content below 80 Hz is produced by the DXMS Processor. The Acoustical sum total of the 12 enclosures amounts to over 2000 acoustic watts. Time delay offsets shape the polar pattern of the low frequency system with the result that an even power distribution across the audience is possible. In addition the headroom afforded through the use of over 14,400 watts of available amplifier power below 80 Hz results in over 6 dB of headroom. The Continuous Power available is 24,000 watts.

LFE ARRAY OUTPUT: 151 dB SPL
 2115 Acoustic Watts
Headroom / safety margin: 30 dB
Bandwidth: 20 to 80 Hz
Power Compression at max Cinema Level = 0 dB absolutely no power compression = ideal phase
This system will n-e-v-e-r be damaged or blown up!

The quality of the bass is masterful. At a whisper, you can feel the room breathing

COMPLETE MAIN SCREEN STAGE L-C-R + SPECIAL LFE

Complete System Weight: 6474 Lbs / 3.24 Tons 2943 Kgs

Total Output in Acoustic Watts: 3100 aW (calculated)