Photo: Courtesy of Communications Engineering, Inc.

All the News, All the Time

Newseum combines a history of journalism with fast-breaking headlines.

By : Judith Rubin

Relocating from Arlington, Virginia, Newseum has settled into a brand-new, ultramodern building in the heart of Washington, D.C., near the National Mall, where it anticipates welcoming some two million visitors annually. Polshek Partnership Architects LLP and museum designer Ralph Appelbaum Associates created the look of this glass-curtained, skylit, and sun-filled building, of which the 250,000-sq-.ft Newseum takes up seven levels with galleries, theatres, and event spaces, blending news history with cutting-edge technology and hands-on exhibits. The primary funder is The Freedom Forum, a nonpartisan foundation. Sponsors include an A List of prominent news agencies, as evidenced by the naming of most galleries and theatres.

Thanks to its great view of Pennsylvania Avenue, the $450-million Newseum had become a favored broadcast location even before opening to the public on April 11. ABC News broadcasts This Week with George Stephanopoulos every Sunday from the 1,100-sq.-ft. Knight Studio on Pennsylvania Avenue. The Capitol building is clearly visible in the background through the glass curtain wall. This is one of two state-of-the-art HD TV studios in the building, the larger one being 2,800 sq. ft.

Visitors pass through the main entrance into *The New York Times*—Ochs-Sulzberger Family Great Hall of News (the atrium space), where they are met by a gigantic Barco video display and its high-resolution news footage. From there, it's on to Level 1 for the Hearst Corporation Orientation Theatres and the Berlin Wall exhibit. Next stop is Level 7, via the central elevator, which is an exhibit in itself, traveling in a glass shaft that lets you admire all of its intricate workings. Visitors work their way down through the building. Their options include the 9/11 Gallery, sponsored by Comcast; the Cox Enterprises First Amendment Gallery; the Time-Warner World News Gallery; the Journalists Memorial; Pulitzer Prize Photographs; the ABC Changing Exhibits Gallery; Sports Theatre; Documentary Theatre; Ethics Center; Early News Gallery; the Walter and Lenore Annenberg Theatre; the Robert H. and Clarice Smith Big Screen Theatre; the News Corporation News History Gallery; and the Pulliam Family Great Books Gallery.

The abundance of natural light passing through Newseum's generous windows, window-walls, and skylights, shining on its reflective surfaces, is refreshing to visitors. It also has a metaphorical purpose—to symbolize the openness and transparency that are fundamental to a free press. The exhibits seek to convey a definition of news and how it is created, and to motivate visitors to protect its freedoms. The journalist is presented as inquisitive adventurer, chronicler, and a champion of the people.

Containing the roar of the crowd

Open, light-filled spaces in a museum present special challenges for those whose task it is to shed light on the exhibits, to project content onto screens, and to produce sound that is clear, contained, and intelligible. Glass is not an especially sound-absorptive material, yet the glass-curtained broadcast studio used for Stephanopoulos' show faces a major thoroughfare. "Every day, police motorcades with blaring sirens go by on Pennsylvania Avenue," notes Steve Haas of SH Acoustics, which provided the loudspeaker layout design and acoustic engineering for most spaces of Newseum. Haas produced a computer simulation that modeled how the motorcade would sound, using three types of exterior glass, which affected the final choice of material for the curtain wall.

Haas implemented a strategy of applying acoustic materials onto surfaces, and incorporating highly directional sound arrays where amplification is used, keeping levels low and clarity high even in the most challenging areas. "Working with the architect, we came up with a wide palette of materials that fit the nature of the building," says Haas. "Because of the open architecture in the atrium and galleries, the sound travels vertically as well as horizontally. And, because this building is about technology, materials, such as perforated and slatted metals and woods, complemented what the architects were doing and tied into the whole mission of the client."

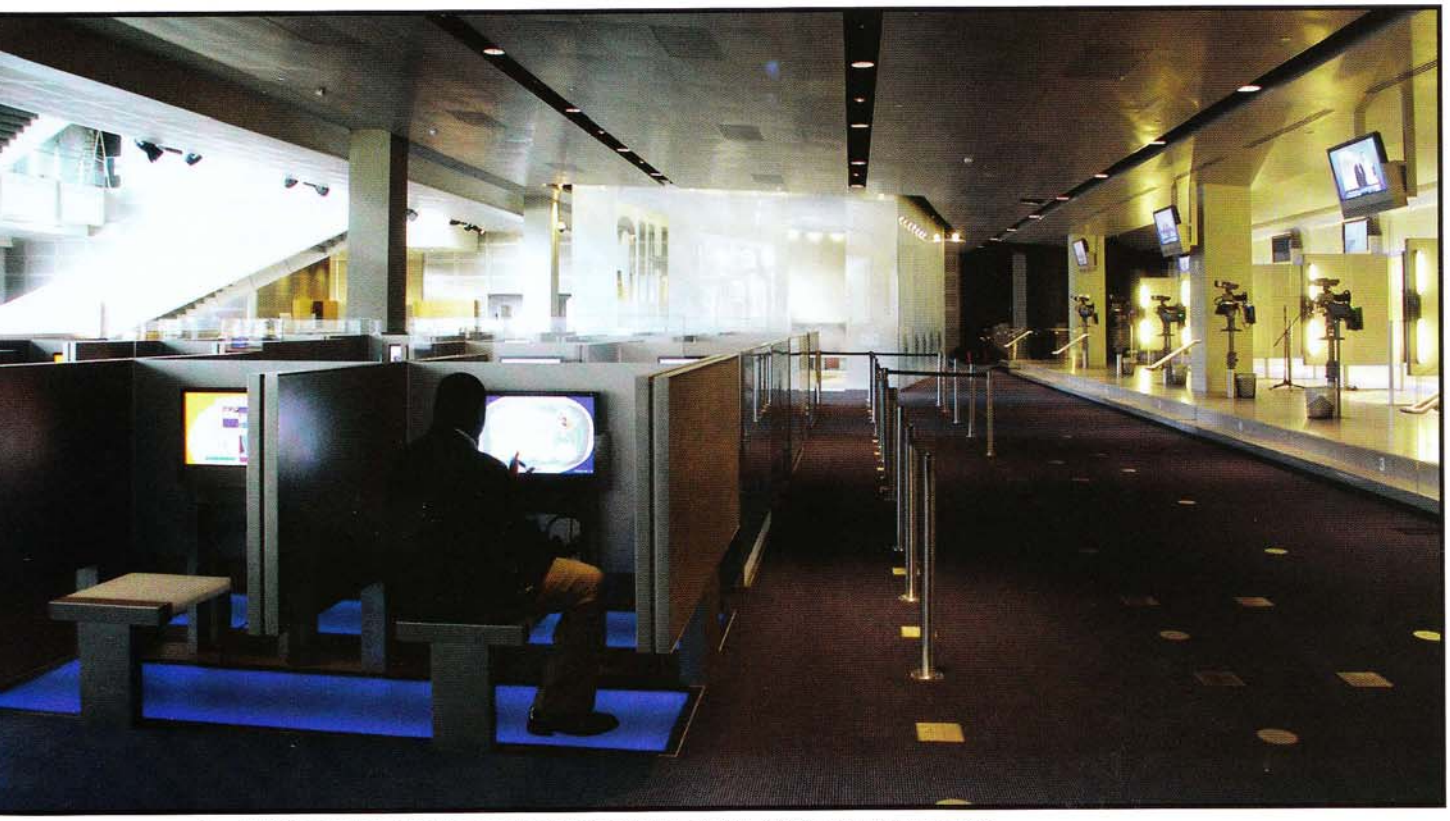
The acoustician established and tuned five global volume presets, allowing the volume to be raised and lowered in response to visitor numbers,

and yet to stay balanced. "On opening day, we ran everything on #5, and it worked: everything running, not bleeding, balanced with the crowd noise, and penetrating just enough," says Haas. "We used a whole network of Peavey NION digital signal processors, to tonally shape and raise each sound source a specific amount."

Virtually all the spaces in Newseum are set up to accommodate special events of all types, and are divided into 80 sound zones that can operate independently or together in order to accommodate a wide range of possibilities for room setup. Thirty-two jacks, well-distributed on wall plates throughout the building, carry CobraNet digital audio from portable media consoles to the centrally located DSP system. Each media cart is fitted up with a mixer, wireless mics, CD player, and CobraNet interface. Each CobraNet connection allows the sound from that cart to be routed to wherever it needs to go in the building. A graphical interface allows the operator to create the route. The walls of the Great Hall support seven 10' tall Dakota Audio FLA line arrays fitted with 4" speakers, vertically placed and complemented by Bag End S10E-I subwoofers; custom 3" Dakota box loudspeakers in troughs on the balconies; and EAW CIS400 ceiling loudspeakers over the bridges. "We even have feedback-free line arrays behind the stage—great support for an individual speaker," notes Haas.

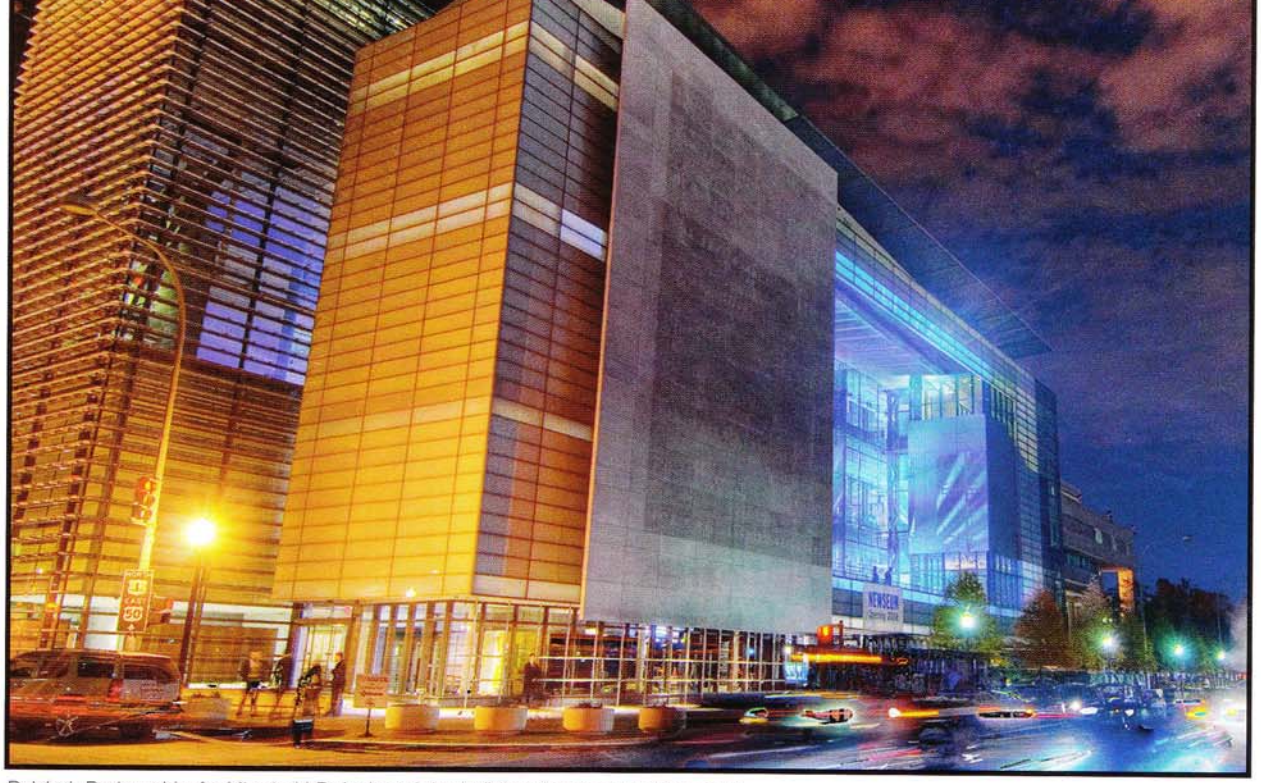
The systems integrator, Electrosonic, Inc., installed these and most other loudspeakers in the building, including the public-address system designed by Electrosonic's business development manager, Andrew Kidd, which consists mostly of EAW CIS400s, processed by Peavey MediaMatrix NION. "Altogether, there are about 800 PA speakers in the building," says Kidd. "Steve Haas did a very good job on the acoustic treatment. We were slightly concerned it was going to sound hollow or boomy, but it is very, very clean. It's almost uncanny when you consider you've got a huge area of terrazzo floor, all that glass, and concrete balcony fronts."

A cubicle farm of individual interactive stations is found in the NBC Interactive Newsroom on Level 2, running programs that let the user role-play as a journalist, photographer, etc., each with its own mini-acoustic environment plus a pair of embedded Dakota mini-arrays arranged horizontally in the perforated metal sides of the enclosure, specified by SH Acoustics to deliver and contain the sound. Each mini-array is about 3' long and made up of fifteen 2" speakers. "When you're sitting in the zone, you're enveloped by the sound, but you step back 2-3' and the sound drops off dramatically," says Haas. "The multiple small sources combine to give you the same level as one big speaker, but each speaker can be significantly lower in level. The total



The NBC Interactive Newsroom lets visitors role-play as journalists and photographers.

Photos: Left: Courtesy of Communications Engineering, Inc. Right: Sam Kittner/Newseum



Polshek Partnership Architects LLP designed the building that houses Newseum.

number of decibels is the same, but individual elements are not as loud. Time delays make it very precise, so all the sound reaches your ear at the same time."

Running along the rear wall of this room is a stage with a line of eight open video production bays that form the Be a TV Reporter experience, an immediate hit with the younger set and an enjoyable spectacle for other visitors. The user buys a ticket and is entered into the system. He or she chooses a backdrop and a script, and is led by a docent through a photo snap, a rehearsal, and then the recording process, after which he or she receives a souvenir photo; one can later download one's entire video from Newseum's website. Electrosonic handled the design, equipment specification, installation, commissioning, and software programming. "We had to write a fairly complex piece of software for that," says Electrosonic project manager Dan Laspa. ("There's a lot of media-file management going on in the background," says Andrew Kidd.) The company received validation of a job well done in an unexpected way, during the pre-opening test period. "A couple of girls snuck into a bay that wasn't being used and figured out how to operate it themselves," says Laspa.

Be a TV Reporter uses modern TV equipment and Chromakey blue-screen technology from ReflecMedia and Broadcast Pix. "The backdrop surface is highly reflective, and there's a ring of LED lights around the camera lens so that, when you're off-register, you see a faint green or blue glow but, when you look right into the ring light, it just pops into full vibrant color," says Laspa. "The reflectivity keeps the effect from breaking down in ambient light, which is very important because the space is open to the atrium and sunlight can come in."

Lectrosonics wireless systems are used throughout the facility. Nine of the company's IFB transmitters and 12 RFPL bases transmit frequencies simultaneously to eight different studios and exhibits, using fiber and coax cable, says Jim Dugan, project engineer for Bexel ASG, the overseer of the large distributed antenna system at Newseum. "There are also approximately 75 receiver frequencies, including 25 Lectrosonics UM400 body packs, 25 UT transmitters, and 24 RFPL belt packs," says Dugan. He adds that Lectrosonics' VR Series Venue modular receiver systems were especially helpful. "We wanted to move receivers and re-allocated the usage of systems," he says, "so the VR frame concept was perfect." The rest of the venue's lineup of Lectrosonics gear includes 25 R1a belt pack receivers, two SM transmitters, and four UCR411a compact receivers with tracking front ends, all used in two theatre spaces, three conference rooms, four mobile equipment carts, the central equipment room, and the two broadcast studios.

The big winch

Barco supplied the show-stopping giant LED screen that is the central feature of the New York Times—Ochs-Sulzberger Family Great Hall of News. It is visible from the street outside and, inside, visitors may view it across the atrium from each level of

The New York Times-Ochs-Sulzberger Family Great Hall of News.

Newseum. The 40' x 22' screen employs a Barco ILite 6 XP display consisting of 405 individual tiles with a total pixel resolution of 1944 x 1080—more than two million individual pixels of ultra-high-resolution video (6mm), with 14-bit color processing and Level 2 calibration to optimize light output, color, and enhanced grayscales for the indoor conditions. The content—breaking news, historic news presentations, documentaries—is pumped from the main control room. It accepts and reproduces a native serial digital HD signal along with a wide range of other incoming signals—analog, S-Video, composite, RGB, YUV, SDI, HDSDI, or data DVI up to SXGA. It is powered by Barco's DX-700 video processor.

To hang the Barco screen, which weighs some 21,500lbs., and enable it to be raised and lowered (positions range from 2'-50' above the floor), Barbizon Capital called on the rigging specialists at J.R. Clancy to design and produce a monster winch: a 12,500lb., double-purchase, self-supporting, self-climbing, lineshaft winch, which was installed by Pook Diemont & Ohl (PDO).

"It flies up and down over people's heads all day long, so multiple safety features were engineered into the design," notes Mark Fink, project manager for Barbizon. "The winch uses 5/8" Dyform cable, squeezed to make it harder and stronger in the manufacturing process. If one cable should snap, the other can still support the screen. It uses a pushbutton and key interface—a key switch to enable the system and a dead-man switch in each direction of movement. There are also limit switches at the top and bottom and midpoints. It uses two 10-horsepower motors, one at each end, running in tandem. It was very important, before we put the center linkage of the hoist in place, to make sure the motors were rotating in opposite directions, so they would turn the shaft properly." Sensors will automatically halt the mechanism if it is out of alignment, or if one of the motors overloads. The winch mechanism is always visible above the giant screen. "Because it is such a focal piece, this behemoth had to be a nice-looking piece of machinery, and it is balanced and symmetrical, very elegant for something that has all of this brute strength," says Fink.

"The architecture provided fairly good challenges to get the projection right. It was a challenge installing heavy equipment around the lighting and the exhibit vendor, who was putting in enormous quantities of expensive glass cases."

Noting that the combined weight of the screen plus the hoist is about

Photos: Left: Maria Bryk/Newseum. Right: Courtesy of Communications Engineering, Inc.

34,000 lbs, J.R. Clancy's project manager, Anthony Seifritz, says, "The lifting cables are set up in a double-purchase arrangement that go around loft blocks above the ceiling and tie off back to the winch base, so the winch only has to lift half of the capacity—17,000lbs—and the building takes the other half." Due to the enormity of the winch, it was shipped in two 20' sections, requiring intricate handling.

It was necessary to coordinate installation of the winch with the building construction. "The loft blocks that the cables go over are installed above the ceiling for each of the four lift lines," says Fink. "All that had to be located and installed while that atrium was still full of scaffolding. It was very important to have accurate measurements from the surveyors, so the ceiling people could cut holes in the right spots, and, once the scaffolding was cleared out of the atrium, for us to get up on a lift and put the cables over the loft blocks."

While doing the latter, there was a setback. "There was a piece of structural bracing installed where one of the blocks was supposed to be," says Fink. "The holes hadn't been cut yet, the entire atrium was filled with scaffolding, we were up there with four big steel sheaves to mount, and we found out there was a big piece of steel in the way." A rapid regrouping took place. "In another five weeks, we were going to install the hoist and it had to line up with the sheaves. In between, we would have to remove the scaffolding, after which we wouldn't be able to get back to the sheaves easily. They had to be right. We couldn't just move one of the holes, because the spacing between sheaves had to be consistent to what had already been built for the winch. We had to figure out the dimension to move the entire assembly—it ended up moving a distance of just under 2'. That changed the final position of the screen itself, so the architect had to be part of the discussion. It was about a half-hour from the discovery to going-into-solution mode. That's why having an onsite project manager is so important: The installer was able to call me, I went up, we took digital photos, figured out what the dimension of the move would be, fired off an e-mail describing it and showing the photos, and got everybody mobilized. By the next day, we had all agreed."

Barbizon and Bill Price, the company's director of systems, were involved in the first iteration of Newseum in Arlington, where Barbizon provided the studio lighting. This time around, the company played a heftier role, starting out as integrator for rigging systems in the Great Hall (as described above) and lighting and rigging systems for the two Knight Studios and the Annenberg Theatre. The role expanded to onsite project management and field coordination for the building-wide architectural lighting control system, and the event lighting fixture package installed in the Great Hall. The latter includes 14 Robe ColorSpot 1200 AT automated fixtures, 24 Elektralite Paintcan automated color-mixing units, two Martin Professional MAC TW1 tungsten automated lights, and 20 Selador x7 Xtra-21 LED fixtures. The lighting is controlled by ETC's Congo console, with connections provided by Pathway Connectivity's Pathport UNO single-port DMX nodes.

One of Newseum's audio control rooms.

A control room for one of the broadcast production studios.

Nelly Bly in 4-D

With *I-Witness: A 4-D Time Travel Adventure*, The Walter and Lenore Annenberg Theatre, on Level 1, puts visitors in the journalist's seat. Using about half the space available in the multi-purpose theatre, a presentation dramatizes the respective contributions of Nelly Bly, the first female reporter, and Edward R. Murrow, the pioneer television reporter and interviewer, to the field of investigative new reporting. Seats that rock and vibrate (supplied by Irwin and customized by Oceaneering Entertainment Systems, including one Buttkicker per seat), plus wind and water effects, give the experience its extra dimension. Cortina Productions was the media producer.

The designer of the audio visual systems and primary integrator for the theatre was Electrosonic, working with Barbizon to create the show lighting and effects. The theatre's pre-show experience is provided by a pair of Toshiba P47LHA displays, with audio provided by 11 EAW CIS400 ceiling loudspeakers, plus two JBL Control 19CTs and one QSC CX 602V amplifier.

Inside the theatre, a custom motorized chain-track curtain system, using Trumpf 95 and Cue-Track products provided by Gerriets, with curtains by Stage Decoration & Supplies, was installed by PDO, under Barbizon's supervision, to conceal and reveal the screen and enable the theatre to double as a live auditorium, a 4-D theatre, and broadcast venue. It was designed by John Sergio Fisher & Associates; the firm also designed the rigging and dimming systems and seating layout. The rigging system can be operated from the main control console or a handheld LCD touchscreen pendant. An overhead catwalk system allows access to all the lighting for the 4-D show and broadcast use. Three DeSisti batten hoists raise and lower the rigging equipment. Loudspeakers on a line-shaft winch can be used to change the acoustical profile of the room. A custom logic cabinet by PDO provides the control integration, which is, in turn, controlled by an ETC Expression console with an Emphasis 3D server.

About 195 seats are animated; these are in the center of the theatre, within the optimal cone of vision for the 3-D media. Another block of about 150 seats offers stationary views. Three custom 22' rolldrop scrims, built by Hawkeye Scenic, are lowered from the ceiling to help guide viewers into the central seating area as they enter the room; they also serve as the projection surface for the introductory portion of the show. When the drapes part, the main Stewart Filmscreen reveals itself as 57' wide by 25' tall.

The projectors are Christie HD products, as are most of the video projectors in the various theatres throughout Newseum: two CP2000s for the 3-D main show, one DW6K, and two DS+65s for the scrims. The CP-2000s are front-projection units operating from a booth at the back of the theatre, where they share space with two DVS HD compression-less video playback servers: A Fostex D2424LV multitrack hard disk audio player, and the show control, run by Electrosonic ESCAN software, and a Crestron TPS 6000 touch

Photos: Left: Courtesy of Communications Engineering, Inc. Right: Courtesy of Newseum

panel. The main loudspeaker system consists of a left-right-center arrangement of one Renkus-Heinz PN151T/12A, two PN151T/9As, and three QSC CX1102 amps. The sub bass system consists of five Bag End S18E-I IFs, two Bag End INFRA-MXB low-frequency processors, and four QSC CX702 amps. Front fill is provided by six EAW JF60s and three QSC CX302 amps. The left and right surround system includes six Tannoy V12s and three QSC CX502 amps. The show runs from a single control panel. A Telex assisted listening system is available for the hard-of-hearing.

Communications Engineering Inc. (CEI) added some broadcast capability to the Annenberg Theatre in the form of camera drops and connectivity. Nancy Schertler designed the theatre's lighting, which includes 90 ETC Source Fours in various degree sizes, 50 Selecon Rama Fresnels, and eight Martin Mac 700 Profiles.

An ETC Congo light server receives S232 commands from the show-control system, and executes all programs and cues and curtain moves. "There are base panel controls on the light server, of course, but it's more convenient to have the external keyboard," says Fink. All the lighting consoles throughout Newseum are ETC Congo and Congo jr models. "The Congo line is ETC's product for live events and production events, as opposed to the Eos and Ion models for the theatrical market; a lot of what happens at Newseum is not scripted—with the 4-D show being a massive exception—so you want something that gives the ability to quickly affect and manipulate the lighting rig. When there's a live event in the Annenberg, they bring in the Congo jr and connect it to the server. Any of the consoles can be used in any of the spaces—it's just a matter of loading the right patch and right show file."

The other big screen

A long, rectangular space on Level 5 is divided into several areas, all containing audio visual elements: the Robert H. and Clarice Smith Big Screen Theatre, the News Corporation News History Gallery, the Pulliam Family Great Books Gallery, and several pocket theatres.

The News History Gallery contains a long swath of glass cabinets holding a vast archive of articles that visitors can slide out and view, accompanied by projected murals and touch-screen displays with mimic screens above. Electrosonic installed some 20 Christie DS+25W projectors in this area. "The architecture provided fairly good challenges to getting the projection right," notes Dan Laspa. "There were not all that many places to put things, and it was a challenge installing heavy equipment around the lighting and the exhibit vendor, who was putting in enormous quantities of expensive glass cases."

The Big Screen Theatre has casual tiered seating running the width of its 90' x 10' HD custom screen from Stewart Filmscreen, which CEI installed along with five Christie DW3K projectors. The projectors talk to various items that live on Level 2 in the master control room: a Vista Systems Spider video processor that calculates the edge-blending, and a Medialon show-control system that receives its five channels of content (a repeated program interspersed with breaking news clips) from Grass Valley K2 servers, all installed by CEI.

These congruent zones posed multiple challenges for SH Acoustics. "In the theatre with the 90' wide screen, the client was adamant about even coverage," says Haas. "We used a proximity stereo effect to get the sound as close to the audience as possible, and localize it to the images onscreen. This approach also gave us the relative containment we needed, so that the sound drops off a lot when you move away." The custom 5" x 5" speakers from Dakota were positioned in Bessel arrays: five blocks of 25 speakers arranged in 5 x 5 grids. (According to the AES E-Library, "The Bessel array is a configuration of five, seven, or nine identical speakers in an equal-spaced line array that provides the same overall polar pattern as a single speaker of the array.") "The approach goes back to the 1950s," says Haas, "and was found by my former colleague, Bill

The 9/11 gallery, with headlines from around the world.

Lobb, when he was doing research for this theatre. It provides the widespread sound needed, and doesn't occupy much space behind the screen, which is good because there was little depth to work with."

Between the News History Gallery and the Sidebar Theatres, "we had to worry about sound leaking all over the place," says Haas, who relied on careful placement of acoustical materials, embedded sound panels plastered inside the walls, and "activated" screens made of a synthetic material with transducers embedded in them.

The control backbone

CEI, a company with a broadcast tech specialty, built, specified, purchased, installed, set up, commissioned, and trained operators for the master control room, the production control rooms, the edit suites and the rack room. Raef Alkhayat was the company's project manager.

The master control room on Level 3 monitors all the streams of content running through Newseum. All in coming signals and outgoing signals are displayed on its screens in that room, which is divided into three workstations: broadcast, AV, and production/IT. Broadcast-related activities are supported by a Grass Valley Kalypso production switcher and a 1M/E control panel, via which an operator can route and control the look of the video for the giant Barco. In the AV area, an operator can call up the image on any of the approximately 160 computers running an interactive in the building, and can get access to the ESCAN program that controls the building functions. The producer station/IT desk, which is continuously manned by one to three people, is available to assist content providers from outside the facility as well as those within who need tech support; it provides support for the various galleries. There are nine customized Barco 50" DLP rear-projector displays and an Evertz MVP video processor with 64 inputs.

Also on Level 3 are two HD broadcast production control rooms, identical in capabilities, that work with the two Knight TV Studios. Either control room can work with either studio. The primary equipment is the Kalypso production switcher, with four M/E and full HD capabilities. "It's basically a video mixer," says Alkhayat. On the audio side is a Euphonix Max Air digital audio mixer. A monitor wall shows various displays: six customized Barco 50" displays and an Evertz MVP with 48 inputs.

There are five Avid edit suites set up for HD, non-linear. Four are edit suites only; the fifth doubles as a screening room with a Christie DW3k projector and a 60" Stewart screen.

The room of 115 racks, for all the noisy, but essential, backbone control devices connected to control panels throughout the building, is on the third mezzanine. Here are the chassis of the Grass Valley switcher, and the major facility video and audio router, respectively a Grass Valley Trinix and Apex. These connect to control panels all through the building. These racks hold not only the broadcast equipment, but all the centrally located interactive computers, all the video players and DSP equipment for the exhibits, and the museum-wide control system, handled by Electrosonic's ESCAN software.

And now the news

The best way to summarize Newseum is to imitate it and deliver some quotes:

"At a time when journalists are reeling from scathing rebukes and public skepticism about their profession, the gleaming Newseum is poised to become a welcome reminder of all that's good about the business." — Jessica Meyers, *American Journalism Review*

"Nothing ever clarified for me the power and nature of print like the displays in the cavernous 'history of news' gallery at Newseum." — Rick Salutin, *The Globe and Mail* (Canada)

"Working with the architect, we came up with a wide palette of materials that fit the nature of the building. Because this building is about technology, materials, such as perforated and slatted metals and woods, complemented what the architects were doing and tied into the whole mission of the client."

"An endless network of corridors and theatres contains a wealth of news materials that are, at least to someone of my generation, a wonderful and moving evocation of the past." — Robert Campbell, *Boston Globe*

"From every frenetic corner, Newseum fairly shouts, 'News is necessary to a functioning democracy. News is fun, news is cool, news matters.'" — Maria Puente, *USA Today*

"The new incarnation of Newseum is dazzling, innovative, and absorbing, a first-class addition to the capital's cultural institutions." — Howard Kurtz, *The Washington Post*