SONY METREON

San Francisco, California

By Judith Rubin

S AN FRANCISCO IS A FASCINATING STUDY IN OPPOSITES. As one of the oldest West-Coast towns, it still has some architecture that's well over a century old, like St. Patrick's Church. Across the street from this church is a technological monument called the Metreon.

Metreon is Sony's trademarked name for its own special brand of urban entertainment center. Created by Sony Development, a division of Sony Corporation of America, the flagship venue is housed in a 4-story complex in San Francisco's thriving South of Market District.

Metreon features three unique, permanent themed attractions

developed by Sony through the licensing of unique intellectual properties. In each case, Sony took the work of a living artist/author expressed in 2-D illustration and text and evolved it into a 3-D, enter-the-book experience.

Where the Wild Things Are/In The Night Kitchen is an interactive walk-through attraction for children, a restaurant and a retail store, all based on the works of children's book writer/illustrator Maurice Sendak. Wild Things takes a classic theme-park approach in allowing you to become a character in the story; you meet and manipulate Sendak's characters and creatures in the Wild Things funhouse. The walk-through employs many standard theatrical and magic devices.

Designing Attractions the Operations Staff Will Also Enjoy

KEY ONE: COMMONALITY

ALTHOUGH METREON HAS THREE VERY UNIQUE entertainment attractions (*The Way Things Work*, *Airtight Garage* and *Where the Wild Things Are*), a single operations team must maintain all three. This team must also support special events and maintain security systems, overall building background music and architectural displays. I made the decision early on that at no time would the show quality be compromised, but the attractions must share a common design philosophy and

use common components. This would make the attractions easier to operate because they would share similar functions, use common components, and could share spare parts.

There are two main areas where a common design philosophy can make a huge impact on the ease of operations and maintenance in a multi-attraction venue like Metreon: show control and audio-video processing. It is not surprising that these areas share the common need for convenient human interfaces. Keeping the user interface design consistent can save an incredible amount of design dollars, with an even greater savings in

Where the Wild Things Are uses many theatrical sound and lighting tricks to create the full experience.

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The Airtight Garage is a sophisticated multi-user game room for older children and adults based on the work of graphic novelist Moebius (Jean Giraud). Airtight Garage fleshes out the other-worldly flavor and the futuristic fantasy environments of Moebius' work. You don't so much walk into the world of his novels as into a world devoted to and inspired by them. The attraction features three virtual-reality games created through the collaboration between Sony and Moebius.

The Way Things Work — In Mammoth 3-D is a walk-through environment culminating in a 3-D video theater experience, plus a retail store, based on the work of author/illustrator David Macaulay. Named after Macaulay's best-selling book, The Way Things Work preserves the feeling of ink on paper and produces a sense of traveling through a giant version of the book with its layman's explanations and playful illustrations of machinery.

Metreon combines these attractions with restaurants, retail stores and a 15-screen movie theater complex that includes the Sony Imax 3-D theater, the very first large-format theater in metropolitan San Francisco. Everything has been carefully customized for the Bay Area. The restaurant area, A Taste of San Francisco, showcases the area's unique chefs and eateries. Retail includes Sony Style, PlayStation®, the Discovery Channel Store, and microsoft®SF. Sony Development is the master tenant of the building, designed by local architects Simon Martin-Vegue Winkelstein Morris, with Gary Edward Handel & Associates of New York. Developers were Millennium Partners, New York, and WDG Ventures, San Francisco.

Metreon promotes the involvement of local, women-owned and minority-owned businesses. This effort began at the design and construction phase, and San Francisco area companies dominate the vendor list. The Sony team roster likewise contains a remarkable number of Disney veterans, including John K. MacLeod, senior vice president of development and operations for Sony Development; Trevor Bryant, senior vice president of the creative division, Sony Development; Kari Novatney, vice president and general manager of Metreon; Scott Sinclair, executive creative director of Sony Development; and David Spencer, senior vice president of the Entertainment Technology Group, Sony Development. (Since the completion of Metreon, Sony Development has mutated into Hyper Entertainment, headed by Mike Sweeney.)

INSTALLATION CHALLENGES

Everyone concerned with the show design

In each [attraction], Sony took the work of a living artist/ author expressed in 2-D illustration and text and evolved it into a 3-D, enter-the-book experience.

and installation ran into challenges. There were challenges in combining the show design and architecture, working within a compressed construction schedule, adapting to the pre-existing building design, and incorporating the physical aspects of the building and its maintenance. Natural light flooding through the mostly glass northeast face of the building limited lighting design. Fixtures would be permanent and would be serviced by a building maintenance crew. Seismic and structural requirements were stiff, partly due to location (earthquake country) and partly because the complex was constructed on top of an existing building (the nearby Marriott Hotel's underground ballroom).

HVAC was the worst obstacle. Huge air ducts would appear in places other than those specified on the plans, forcing show designers to compromise. The HVAC components also greatly reduced ceiling heights

operations cost.

I use the term "common user interface design" to mean commonality in anything an operator or technician uses. This includes locations of control panels and jacks on walls, procedures to start and stop the attraction and graphical user interfaces on computer screens. It is also important to have a common scheme for the cable and component labeling, speaker and projector mounting and systems documentation.

KEY TWO: COOPERATION

There were three primary audio-video integrator companies and several other technology vendors working on the attractions. The three primary integrators are: David Carroll Associates for The Way Things Work, Baker Audio for Airtight Garage and the Intellisys Group for Where the Wild Things Are.

in some places. Designers compensated by leaving the spaces without ceilings and painting out the elements overhead; specifying compact, versatile fixtures; working closely with fabricators to keep weight and load-bearing at a minimum; and generally adjusting and readjusting their work.

"Show design with a lot of theming was happening on top of standard building construction," said York Kennedy of Gallegos Lighting, which did lighting design for Wild Things and the interiors of all the movie theaters. "There was the HVAC, which kept moving around. There was lots of hanging foliage. There was rock work and character work, including swinging characters in the air. Our lighting installation and everything else had to go in before the swinging things went in.

We formed the Metreon Attraction Technologies Team and handled issues of attraction standards. It was a great forum to discuss ongoing design and installation challenges, in addition to the key city code issues that needed to be constantly addressed: wheelchair accessibility, seismic bracing for hanging systems and the Underwriters Laboratories approval of custom technology items like robots, animated

While the crew was working on those, they'd knock our stuff back up into the ceiling. Then we'd have to reposition and refocus everything."

"HVAC is always a problem," concurs Dawn Hollingsworth of Moody Ravitz Hollingsworth, which provided lighting design and service for the Way Things Work attraction. "It never gets coordinated properly. What engineers put on drawings is never what gets built in the space. But everyone needs to have a fair chance to have the ceiling space. The reason you're selling tickets — the reason you're there in the first place — is actually being impacted by these changes. But these things do happen on a construction site. The most amazing thing is that they get built at all."

The Airtight Garage is an interactive arcade based on the work of sci-fi graphic novelist Moebius.

"You have to enjoy thinking on your feet," says Scott Sinclair, the project's concept designer and a member of the Sony team that decided what to put into the building. "You have to be able to deal with someone saying 'I hate to tell you this, but there's a piece of ductwork going through your sky.'" Sinclair found the process very different from what he'd been used to in his days as a Disney engineer, where "the building would be shaped around the show." He also found it educational. "I learned a lot about HVAC and building codes. The architectural firms had to do some learning, too."

Sinclair continues, "The San Francisco code restrictions are based on fear of earthquakes. The resulting building is a huge truss with heavy diagonal bracing and really large columns. The city may fall down someday, but Metreon will still be standing! I respect architects a lot more now than I used to. The codes are so restrictive that if they can make a building that looks good, it's quite an achievement."

Each attraction team relied on one or more peacemakers to coordinate tasks and keep people communicating and finding solutions. York Kennedy credits Gus Sanchez of Cupertino Electric, Paul Strangmeyer, the floor foreman and Dave Clare, vice president of Sony Entertainment group production, for keeping things from getting too wild in Wild Things. For playing valuable coordination roles on The Way Things work, Delphi cited Hathaway Dinwiddie Construction, the tenant improvement construction managers, and MRH praised Chris Collins of Yeager Design. Audio providers Intellisys Group and David Carroll Associates both mentioned Sony's Mike Haimson (see sidebar).

TO THE MAX

The Wild Things show starts in the bedroom of the main character, Max, where through a combination of scrim work and Pepper's Ghost effects, using a 50% mirror and a Sony VPL-1800 projector, the scene magically changes into a moody child's night forest. Guests progress through a Sendakian gallery of art, visual effects and interactive elements. Images mysteriously arise from a goblin's smoking cauldron, thrown onto the smoke (a fog effect supplied by

Besides its amusement attractions, Metreon offers retail stores and cinemas in an environment that's at once futuristic and distinctly San Franciscan.

props and motion-controlled simulators. This multivendor team worked well together toward the success of *all* of the attractions.

KEY THREE: CONTROLS

Show control was key in making the attractions easy to operate and maintain. We chose the Anitech Systems Media Pro 4000 as the show control system for all attractions. It is rugged yet flexible and easily expandable. Typically the Media Pro system is programmed and the show run from a single start button. We used a custom operator control console to control the primary functions of each attraction. The OCC consists of several

pushbutton switches, a telephone and a paging microphone. It also has a 4-line display for showing system health information and usage statistics. A standard Metreon OCC was developed and deployed throughout each attraction.

The OCC also has another very important button: the emergency stop. Since many of the attractions in Metreon contain mechanical systems with moving parts, an emergency stop was needed for safety purposes. Again, a standard Metreon emergency stop circuit was developed and used throughout all the attractions. The Anitech manages an emergency stop voltage bus that is released when the OCC button is pressed. This bus release

does not use software; it is driven by the release of relays that cannot be reset without a key. Before a Metreon attraction is restarted after an emergency stop, procedure calls for a thorough visual inspection and an interview with whomever pressed the emergency stop. Since the city of San Francisco classified Metreon as a public amusement building, a fire alarm event must also trigger an immediate shutdown of all the attractions and bring the lights up. This was built in to the Metreon emergency stop unit and the Anitech system.

The OCC provides a convenient user interface for the attractions with only a few buttons designed for the show operations staff. The technical operations staff also needs to use the OCC, mainly

In the Night Kitchen **is family-friendly dining after** *Wild Things* **wakes up kids' appetites.**

IST's Ultrasonic Fog) by a sensor-activated Sony VPL-900 video projector triggered when a person leans or reaches over the pot. Footprints on the carpet talk back when stepped on. In the echo chamber, your voice is hilariously distorted by Sony microphone processors. More Pepper's Ghost effects and theatrical illusions provide shifting pictures along the corridors.

Proceeding gradually upward, you emerge onto a balcony overlooking the lower level. The balcony is a play area with fake-out viewing devices that show you your own rear end, speaking tubes that let you communicate with the folks on the lower level and wisecracking little goblins that poke their heads out of holes and taunt you to push them back down. There are also devices that let upstairs guests manipulate characters to interact with unsuspecting guests below, who don't realize others enjoying the attraction are manually creating the effects on the spot. The various mechanisms were produced by Sony. From the balcony area, guests descend by slide or ramp to the jungle playground. Here, accompanied by vibrant klezmer music (Sendak himself specified all the music in the attraction) and with the cityscape visible through the huge windows, you can operate parts of the giant Wild Thing character on the

wall by pulling ropes and stepping on spots on the rug. There are also blocks to play with, made of dense foam painted to resemble wood; caverns to duck into, made of fiberglass finished as rock; and Wild Things flora and fauna to grab onto, sculpted of steel and fiberglass for endurance.

This 15,000-square-foot attraction is complemented by a retail space of equal size. The space is themed as an old theater, with a stage for readings and performances, and a collection of Sendak characters as flats, dolls and sculptures, some suspended from the ceiling and some leaning over catwalk railings. The items for sale include tools for fostering children's creativity, such as high-quality art supplies, mixes for bak-

ing crunchy eyeball cookies and a fine selection of classic children's literature handpicked by Sendak. In addition to his own titles are works by James Thurber, Beatrix Potter, Laura Ingalls Wilder and others. There are also licensed merchandise and high-ticket, one-of-a-kind items by artisans who work with Sendak.

SOUND SYSTEM
Paul Chavez of Intellisys Group was audio engineer and project manager for Wild Things, working with Sony's sound designer Aaron Richards. Others on the audio team were Intellisys' James Renney as programmer/show control designer and John Neff, field supervisor/chief installer. All

to get information about the "health" of the attractions. This is particularly important during system start-up, shut-down and diagnostics. To accommodate this need, we created a Microsoft Visual Basic application that uses the RSView software from Allen Bradley to talk to the Media Pro 4000. Each Metreon attraction has an administration PC that has an RS-232 interface to the Media Pro 4000 Intelligent Control Module. Since the attraction show runs entirely on the microprocessors within the Media Pro 4000, the administration PC is only used for system updates and as an attraction graphical user interface. The RSView software uses the DF1 protocol to talk to the Media Pro 4000 as a SLC 500 slave. Using Visual Basic, we were able to add many nice graphical control and status

display features for each attraction.

In Airtight Garage, more controls are needed for the show operator than the OCC can provide to support the virtual reality game systems. When Metreon opened, there were 41 Quaternia game units, 29 Badlands motion simulator pods, 21 Hyperbowl game units and 12 miscellaneous game units. To control this enormous number of networked game systems, a Metreon operator control panel was developed. The OCP consists of a touchscreen display with a Visual Basic application running on a computer. The Badlands area has an OCP, and a second OCP is shared between the Hyperbowl and Quaternia game area. The OCP is used to verify the health of each game system, to allow an operator to abort a game or reset the

whole game system, and to assist with customer team scheduling.

Each OCP computer is interfaced to both the Media Pro 4000 show control system and the game server for each of the groups of networked virtual reality games. Since the OCP can "talk" to the game server and the show control system, an event in the game can control room lighting and other special effects. The main function of the game servers is to process the virtual world, coordinating data for each networked player in a game. As players move or shoot weapons, their positions in the virtual world are calculated and updated by the game server. The game system graphics and audio effects are processed by the local game PC located in the custom-built cabinet. Each Badlands motion sim-

ulator system also has a motion control PC that controls the DC motors for the 2-axis pod and the vehicle electronics.

In The Way Things Work and Where the Wild Things Are, there are maintenance control panels for the animated props. These panels are called Hand-Off-Auto switches. In the Auto position, the prop is controlled by the show control system. In the Off position, the prop may not be triggered. In the Hand position, the switch triggers the prop once and the show control system is still disconnected. The HOA switches are used to test props that may be faulty or to isolate faulty props from the show before they can be repaired. There are also HOA-like switches for the automatic doors in these attractions.

Another convenient and standard Metreon attraction maintenance panel is the remote programming panel. Each attraction has two or three RPPs with programming jacks for the lighting system, show control system and audio system. A show programmer can sit with the creative designer and adjust lighting, show timing and audio parameters while in the middle of the show space. The RPPs were used extensively to program and commission each attraction. They are available now to assist in changing any show parameters or to test major pieces of new equipment from within the show environment.

KEY FOUR: A/V PROCESSING

The next step after standardizing the show control system and strategy is defining an audio processing and distribution strategy. We standardized on the MediaMatrix system from Peavey. Each attraction has its own Mainframe 980. The audio is processed by the mainframe and distributed as digital signals via CobraNet to I/O devices throughout the attraction. Audio analog-to-digital conversion and digital-to-analog conversion is provided by CAB 8is and CAB 8os, respectively. The MediaMatrix system allows the show's audio routing and processing to be designed graphically on a PC and compiled into the mainframe. Real-time event control, such as audio ducking for paging, can also be handled by the MediaMatrix system. Real event control from the show is accomplished via an RS-232 interface between the Anitech Show Control system and the MediaMatrix Mainframe. On an emergency stop event, the attraction audio is muted. When a building fire alarm is triggered, the attraction audio is also muted, and the building-wide emergency paging may be injected into audio signal path.

Developing a video processing and distribution strategy is also important. Most video at Metreon was stored as compressed M-JPEG composite video on hard-disk recorders and played directly to a monitor or projector. For compressed video storage, we used the V1m from Doremi Labs. The Way Things Work main theater required a higher level of video quality. The theater uses three 18-foot-diagonal screens and we wanted to play back uncompressed video from a D1 original source. To meet this demand, we used four Diskcovery hard-disk recorders from Sierra Design Labs.

Audio storage is the last key item in our audio-video decision strategy kit. At Metreon, background music is stored on CDs and played on Sony CDP-D500 industrial CD players. Audio for looping sound effects are stored on PC cards that plug into Digital Sound Modules within the Anitech show control system main cage. Sound effects that are triggered and/or may overlap with sounds on the same device are stored on PC cards that are in the Liberty system from Maris Ltd. Audio that must be synchronized to video or other audio tracks is stored on Tascam MMP-16 16-track hard-disk recorders. Simple stereo audio tracks for video were stored on the Doremi video disk recorders.

Crown amplifiers are used exclusively throughout the attractions. Background and specialty speakers used include JBL, Renkus-Heinz and Bose. ATK AudioTek makes the front main theater speakers and subwoofer in The Way Things Work attraction. Video projectors and video monitors were manufactured by Sony.

— MIKE HAIMSON

Mike Haimson, principal of Carousel Interactive Technologies, worked for Sony Development as the senior project engineer for the Metreon attractions. He was responsible for the overall design and installation for the audio, video, show control and other technologies involved in the three main attractions. He can be reached at mike@carouseltech.com.
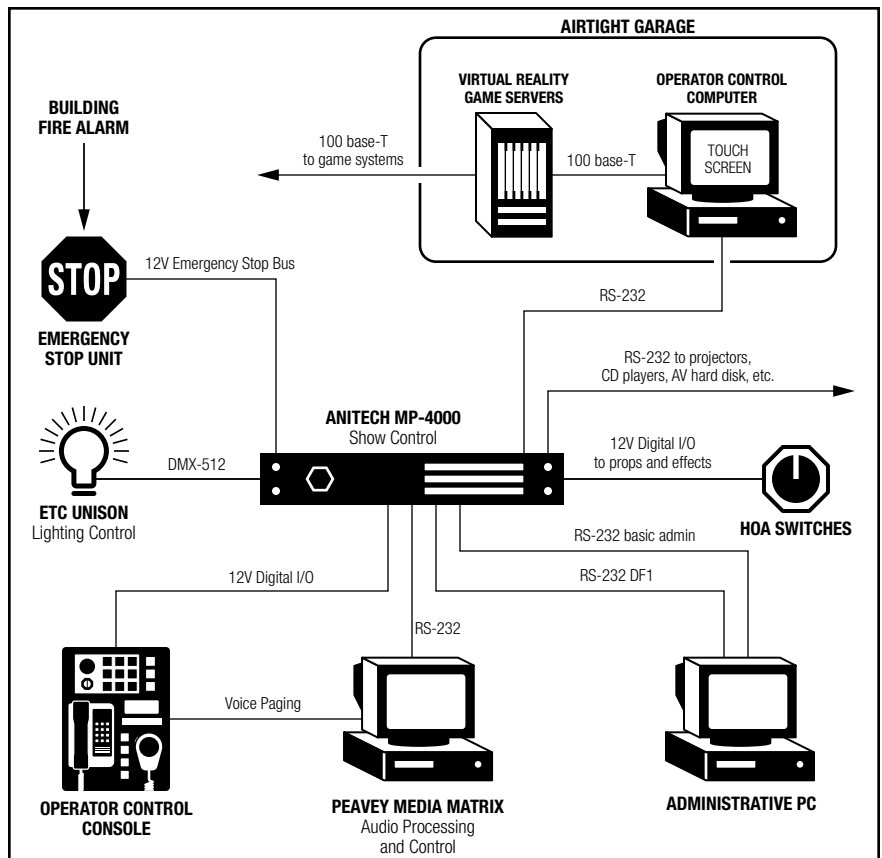
High level control diagram.

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the audio processing is done via a Peavey Media Matrix system. The Media Matrix is Windows NT-based and has an audio-to-Ethernet interface that involves a Media Matrix 980 mainframe CPU to hold CobraNet digital sound processor cards, which plug into 100 base-T computer hubs that plug into standard audio interfaces. Peavey-supplied software enables custom setup of a user-friendly graphical interface for remote monitor and control.

Audio effects emitting from props play on PC card digital playback units from Maris. Background music runs on Sony RS-232 CD players. Speakers used in the attraction include EAW JF60s and JBL Control 25s for props and Renkus-Heinz TRC 61s for background music, plus some JBL Control 24 CT ceiling speakers and some Renkus-Heinz TRC-81s. Amplifiers are mostly Crown ComTech. Everything feeds into an Anitech show control system that includes a custom hands-off audio panel. The show control system alone includes some 2,000 wire pulls, 90 loudspeakers, 88 inputs and 80 outputs.

To streamline the audio work and sim-

plify installation and maintenance, Sony's Mike Haimson brought all the audio engineers together for weekly meetings to exchange ideas and establish some overall audio standards. The Anitech show control systems and Media Matrix processors and operator control panels, for instance, are used building-wide. "It was an economy of brainpower," comments Paul Chavez. "If the audio had been developed separately from space to space, it could have been a disaster. Mike made sure that didn't happen. Every team didn't have to develop every single thing, and the operator benefited from the standardization."

HOW DOES IT WORK?

The Way Things Work is a three-part experience that begins with Melvin the Talking Robot working the crowd. Next is a gallery filled with humming mechanical exhibits *a la* Rube Goldberg — with pulleys, gears and rope, plus a booth where you see Melvin's human operator. A video preshow is broadcast on a 50-inch diagonal front projection screen by Stewart Filmscreen with a Sony VPL-1800 projector,

and on two Sony PGM-200 R1U monitors. There are hundreds of these monitors, able to display both computer and video input, throughout the Metreon complex.

The pre-show sets you up for the main show, which is a 9-minute, 3-screen, "live" session in the 199-seat theater equipped with eight Sony VPL-1800s. One is used for each of the outer screens and two for the 3-D center screen. The original plan was to have double the number of projectors working on each screen for more brightness, but this was found to be unnecessary. The show includes in-theater effects such as seat rumbles created by Aura transducers and a water spray provided by Mee Fog nozzles. Animation sequences were by Bob Kurtz & Friends; Sony's Valerie Johnson produced the video, which is stored on Sierra Design Lab uncompressed digital video disk playback units that process 270 megabits per second and feed the data stream to the projectors.

Audio playback is also digital, using a Tascam MMP 16 digital dubber specified by David Carroll & Associates, which provided project management and system integration for audio, video and show control throughout the attraction. The Way Things Work uses speaker equipment including C-6 three-way P.A. front cabinet speakers from AudioTek, Control 25Ts, Control SB subwoofers, and SP 212s and SP 222s from JBL, as well as Renkus-Heinz TRC 61s and TRC 81s. Amplifiers are Crown CT and Macro series. In this attraction, as well as many satellite equipment rooms in the complex, engineers saved precious space by using front-mounted, swing out equipment racks from Signal Transport. The pre-show audio playback is done with a pair of V-1M digital disk recorders from Doremi Labs.

AIRTIGHT OPERATION

An interesting effect is seen at the front of the Airtight Garage. As you enter the 15,000-square-foot attraction created in collaboration with Moebius and themed as a slightly moth-eaten game room, watering hole and intergalactic space portal, you encounter a sculpture of Malvina, the mythic female who colors Moebius' books, holding a trapezoidal screen that flashes video images at the entrance. The picture is rear-projected through a piece of

privacy glass using a Sony VPL 900 projector. The featured sports are Quaternia, a video console game; HyperBowl, a virtual bowling alley; and Badlands, an outer-space treasure hunt. Quaternia is what's playing on the bulk of the 105 stand-up game stations, each equipped with a Sony PGM 200 R1U monitor. Putting you in charge of a bowling-ball-sized trackball custom engineered by Sony Development Inc., Hyperbowl lets you knock down virtual pins on the streets of San Francisco. Sony VPL 900 video units project onto tall vertical screens that allow spectators an easy view. The screens were painted right onto the walls with a special substance from Stewart Filmscreen. Badlands is a competitive game played in individual motion simulator pods, themed as space travel vehicles housed in a "garage." Jesler supplied the 28 ride vehicles. Each is equipped with a Sony VPL-600 rear projector that provides real-time CGI views of the game environment.

These multi-user games provide CGI 3-D-rendered environments using Intel Pentium 3500 motherboards, RIVA TNT2 3-D graphics processors from NVIDIA, Diamond Viper V770 AGP video cards and Diamond Monster sound cards. The games are linked through an Ethernet network. Game controls were developed and manufactured by Sony.

Lighting design for The Airtight Garage was done by Lightswitch, relying heavily on the Lightolier 8201 track fixture. Lightswitch principal Abigail Rosen Holmes also specified a few pendant fixtures from Abo Light and Limburg Glass. There is no natural light in this space; illumination is low and dramatic in keeping with a game-room atmosphere. The audio vendor was Baker Entertainment Integrators.

"This was the most exciting project I've ever done," says Douglas Knab, project manager with Sunbelt Scenic Studios, who worked on Airtight Garage. As a longtime Moebius fan, Knab said, "For me, it was the culmination of a lifetime of effort and artwork. It fit with the way I draw and think and work; and I tried to make it better than they ever expected it could be." **S&VC**

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