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REALITY

*From Entertainment to
Education... The
Remarkable Impact
Of Yamaha's Disklavier*

PLUS...

HOW YAMAHA'S DISKLAVIER CHANGED THE PIANO MARKET

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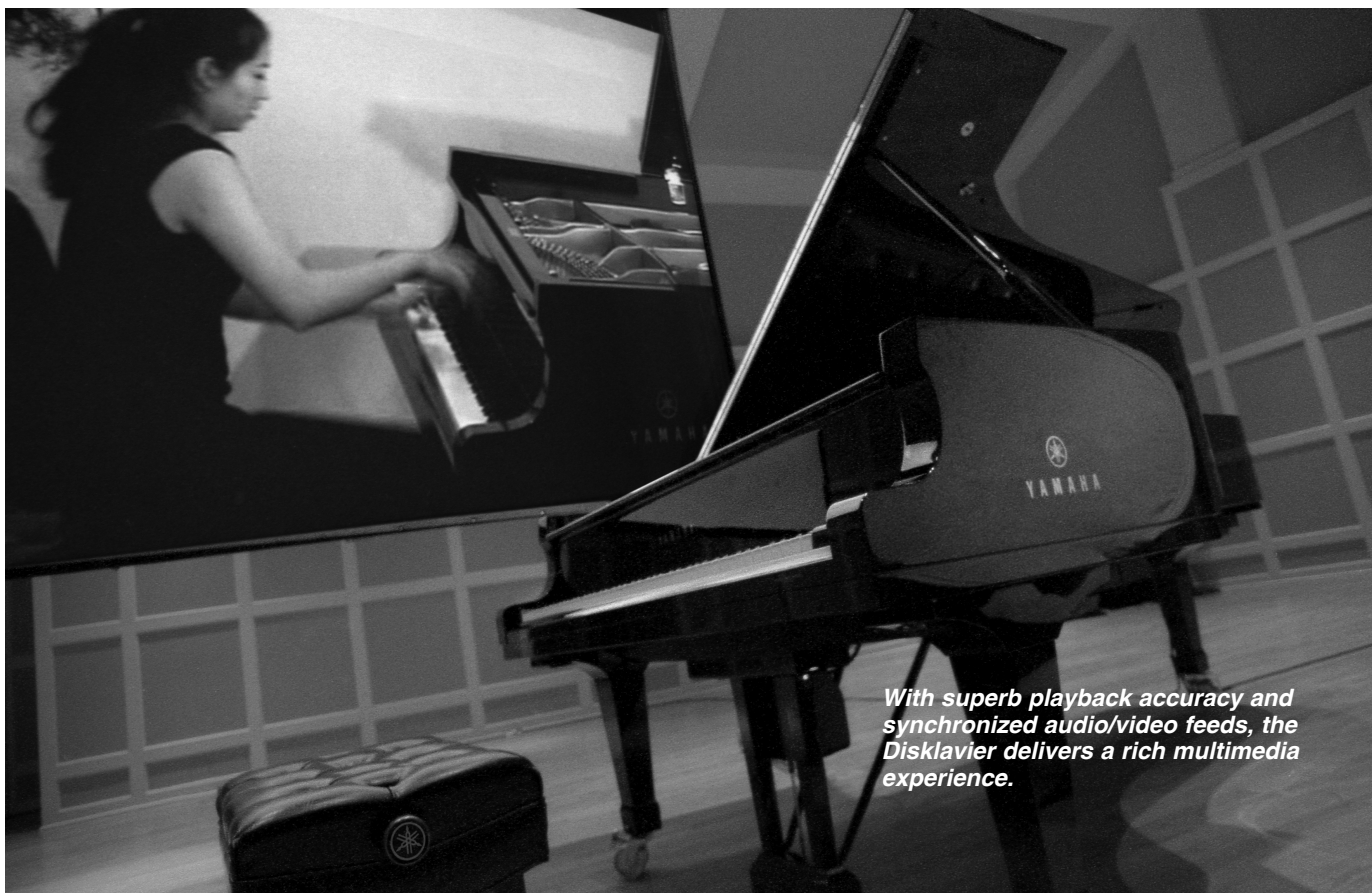
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With superb playback accuracy and synchronized audio/video feeds, the Disklavier delivers a rich multimedia experience.

25 YEARS OF DISKLAVIER

In a quarter-century, Yamaha has transformed its signature player piano into a dazzling live performance instrument and a revolutionary teaching tool

Live from the stage of Disney's Hyperion Theater in Anaheim, Sir Elton John sent the first piano chords of his 1970 hit "Your Song" echoing into a packed house. Almost in the same moment his performance was replicated, note for note and nuance for nuance, on pianos in at least 11 countries. Beneath the keys of a Yamaha Disklavier piano, fiber-optic beams captured each keystroke in MIDI data that was shot through the internet to Disklavier pianos in living rooms as far away as Singapore and Japan—and reproduced as if Sir Elton himself were in the room.

It was the most ambitious demonstration to date of the technology known as DisklavierTV, and the best part was that it went as exactly as planned. In extensive beta testing, the Yamaha team had mastered the concept of capturing a performance on one Disklavier and replicating it on others, with a synced-up audio/video feed of the performance to complete the experience. What they didn't yet know was how the technology would hold up to disparate web connections around the world. "It was a huge challenge, and when you consider all the variables in other countries, we weren't sure what would happen," says Disklavier Marketing Manager Jim



With Sir Elton John's performance during the 2013 Winter NAMM Show, Yamaha achieved the first international broadcast of DisklavierTV, re-creating the concert with live video and note-for-note playback on Disklaviers in at least 11 countries.

Levesque. "But it could not have gone any better. It was amazing." Or in the words of Paul Calvin, vice president and general manager of Yamaha's Keyboard Division, "I work with this technology every day and I still get shivers thinking about it."

Staged at the end of Yamaha's blowout concert during the 2013 Winter NAMM show, the Elton John extravaganza was the latest frame in a long highlight reel for Disklavier, now marking the 25th anniversary of its introduction in the United States. Memorably unveiled at a McDonald's in Limon, Colorado in 1988, Yamaha's groundbreaking player piano would later be inducted into the Smithsonian Institution's Hall of Musical Instruments. It would provide the special effects for the movie *The Preacher's Wife*, in which an angel played by Denzel Washington appears to play the piano from several feet away. Its technology would even be used by medical researcher Dr. Kathleen Riley to diagnose focal dystonia, a neuro-muscular condition known to strike musicians.

By comparison, Yamaha's original vision for the instrument seems far simpler. In basic terms, the Disklavier is an acoustic piano factory-fitted with a sophisticated system of optical sensors that record every dimension of a performance, from pitch to dynamics, phrasing, and pedaling. The captured data can then be stored and recalled for later playback—like the old paper-roll player pianos, only with far more nuance and accuracy. With its capacity to record and reproduce a per-

formance, the developers viewed Disklavier as an ideal educational tool, allowing students to hear their own performances and see their own key and pedal strokes while taking in a teacher's critique. Inevitably, though, other applications would emerge. As a range of streaming and archived content was developed, the Disklavier became a stylish entertainment option for consumers who want to hear live piano music in the home, whether anyone in the family plays or not. It would be marketed to hotels and restaurants as a constant piano soundtrack and source of ambience. Dancers and instrumentalists have used it as an accompanist. Composers have used it as a sophisticated input and output device—sometimes for works that are too demanding for human performers.

A quarter-century in, however, the Disklavier team says the instrument has come full circle, re-emerging as an ultra-modern educational resource above all. In its Remote Lesson application, Yamaha has pioneered a system whereby a piano student can study with a teacher anywhere in the world, each watching the movements of the other's keys and pedals through networked Disklaviers while interacting through Skype or any video chat service. More recently, Yamaha founded the Disklavier Education Network, or DEN, which taps the technology in the Disklavier to forge high levels of collaboration among music schools and educators. Yamaha believes this infrastructure can revolutionize student auditions and help schools share resources as never before.

“Based on our deep relations with academic institutions and private teachers, we know that the DEN will remove barriers and create a global community of educators,” says Levesque. “If you think back to the beginning, Disklavier was always intended as an educational instrument.”

First introduced in Japan under the name Piano Player, Yamaha’s first player piano system reached the U.S. a few years later in the form of the MX100A model. Because the system played and stored its media using floppy disks, Yamaha’s U.S. side fused the word “disk” with the German-inspired “klavier” to create what they felt was a catchier name. “Disklavier” was soon approved by the Japanese home office as the instrument’s worldwide trademark. Yamaha went on to purchase the encoded media of an early competitor, stored on cassette-like tapes, and converted it to disk format to create Disklavier’s first content library. “We knew right away that quality content would be key for someone thinking of buying a player piano, so we got right on that,” says Calvin. First available in upright form, the Disklavier has also been offered as a grand piano since 1989.

For Yamaha’s Keyboard Division, Disklavier’s significance was always bigger than one instrument among many. As three decades of sales data now show, its introduction and development coincided with a downhill trend for pianos overall. In Disklavier, Yamaha saw a means of expanding the piano’s role and customer base, and outside observers agreed. In David Aaker’s 2011 book *Brand Relevance: Making Competitors Irrelevant*, it was featured as an example of how traditional products could be reinvented to create new markets. “The Disklavier has without question expanded the market,” Aaker wrote. “Over half of its home buyers do not play the piano, suggesting that the player piano’s legacy is an important driver of purchase decisions.” In the early years, however, Yamaha’s challenge was creating demand for a product most customers hadn’t heard of yet. Its marketing team would place Disklaviers in malls, restaurants, and airports, inviting passersby to imagine how the instrument could fit into their lives, says Calvin. “We had a vision that we could find new customers with an instrument that they could either play or listen to,” he explains. “And that was exactly what happened. It’s created a whole new segment in the piano industry.”

From an early stage Yamaha had a vision for linking Disklaviers for remote playback, and experiments in that realm were tried even before the technology existed to do it easily. Starting in the early '90s, the company tinkered with sending MIDI and video signals by satellite, once staging a snazzy demo in which a pianist in L.A. opened a jazz club in Sweden by satellite-linked pianos. The first web-enabled Disklavier came in 2000 with the PRO 2000 model, or “Disklavier of the future.” “That was the first time we used the internet to send performances between pianos,” says Calvin. “We toured that piano around the U.S.—actually had it in science museums because it was so unheard of that you could actually play a piano in one place and it would play in another.”



A cutaway of Yamaha’s E3 model illustrates how fiber-optic beams capture each keystroke played on the Disklavier.

With the popular adoption of the internet, Disklavier’s applications continued to multiply. Web connectivity yielded both the Remote Lesson concept, which Yamaha describes as a “one-to-one” connection (though actually up to four pianos can be connected in this way), and a technology known as RemoteLive—a “one-to-many,” or “broadcast” connection. By synchronizing a MIDI feed with video and audio feeds of a live performance, RemoteLive provided the underlying technology behind DisklavierTV—touted as the next best thing to a live concert in your living room. For Disklavier owners who subscribe to the service, a live piano performance plays on their Disklavier exactly as it’s being played at the concert venue, while video and audio, including vocals and other instrument parts, are streamed to the owner’s TV and stereo system. “It’s an amazing technology,” says Calvin. “Everybody asks how we bring everything back together in sync. Well that’s the magic! That’s the secret sauce.” While Elton John’s performance at the Hyperion was DisklavierTV’s biggest bang to date, the service has broadcast more than 100 other events in three years, including annual broadcast schedules from the Monterey Jazz Festival and the Newport Music Festival. In another high-profile program, Yamaha artist Sarah McLachlan performed from her home studio in Vancouver, British Columbia in a private event for DisklavierTV viewers.

In addition to DisklavierTV, still a recent addition to the menu, Disklavier content has branched out into many forms. While any standard MIDI file will play on the instrument, Yamaha provides a vast archive of downloadable content at its MusicSoft site—which is something like iTunes for the Disklavier and other Yamaha products. Through its DisklavierRadio service, the company now offers more than 30 channels of 24/7 streaming content in every category,



from jazz and classical to an all-holiday channel and an all-Elton John channel. In one of its more recent ventures, Yamaha has partnered with the Musical Instrument Museum (MIM) to provide Disklavier users with content created by MIM from artist performances at its home base in Phoenix, Arizona. While Disklavier broadcasts to this point have been managed in person by a crew from Yamaha, the new arrangement empowers MIM to create its own content. One of the first Disklavier performances from the Musical Instrument Museum featured Marty Ashby and Sean Jones in a Christmas concert held December 21. Yamaha expects to form other such partnerships in the future, says Levesque, adding, "We'll be gaining access to a lot of phenomenal artists."

It almost goes without saying that for every update in Disklavier content, there's been a corresponding advance in the Disklavier itself. Looking back on the original Disklavier, the Yamaha team still says its technology was "very, very good." It's the incremental steps forward that have taken it from very good to almost total realism. Probably its biggest single advance came with the 1998 launch of the Disklavier



A potent educational tool, the Disklavier can record and play back practice sessions and facilitate remote lessons. Students can also use it to record auditions and upload them to the Cloud, where they can be retrieved and judged by music schools where the student has applied.

PRO, which upgraded early consumer models to recording studio quality. The Disklavier PRO would be used by Zenph Studios to create a series of "re-performances," where scratchy vinyl recordings of Glenn Gould, Oscar Peterson, and Art Tatum were computer-analyzed in every detail and converted back into live performances that can be played on the Disklavier PRO. From there, Yamaha engineers have further refined the instrument's tonal expression, dynamic sensitivity, and nuances as subtle as the "upstroke," or release of a key after it's played. A 2011 descendant of the Disklavier PRO, the DCFX Disklavier PRO, fused Disklavier technology into Yamaha's flagship CFX, the elite concert grand that debuted a year earlier. The result was, in the words of the eminent classical pianist Byron Janis, "Quite remarkable. [Yamaha has] refined with superb artistry an instrument which was first developed in the 18th century, and seamlessly added to that the extraordinary 21st century Disklavier technology. To transmit a true piano sound with all the subtle nuances of touch and color is truly a revolutionary development for the piano, for music making, and for music education."

Without that hard-wired integration of technology and acoustic piano design, says Yamaha, there would be no Disklavier. Aaker wrote in his book that between its “credibility in anything piano” and its “in-house proficiency in digital electronics,” Yamaha came to the player piano market with advantages that would be difficult to match. “The competitors making retrofit products lack access to the piano side of the equation,” he noted. Some within Yamaha describe their approach as an “ecosystem” of essential pieces such as Apple has created with its family of devices and media—all designed from scratch to work in concert with each other. By comparison, they say, after-market retrofit systems can’t meet that standard of elegance in functionality. And no reproducing piano could hold the same possibilities as a standalone product that it would as part of a larger web. “The essence of the Disklavier piano’s success in education is that highly reliable, high performance technology is seamlessly integrated with a high performance acoustic instrument,” sums up Calvin. “One cannot exist without the other in the institutional world.”

Today, education via Disklavier means two major initiatives. Yamaha’s Remote Lesson interface connects a teacher with up to three students at their own Disklaviers, facilitating either one-on-one or small-group lessons. The system was notably used by Yamaha artist and educator Inna Faliks when the New York-based pianist accepted a position at UCLA’s School of Music. For a month before she was able to relocate, Faliks taught her students in Los Angeles by Remote Lesson from the East Coast. Faliks would later weigh in on the experience, saying, “The ability to see and hear every nuance of my students’ performances, replicated with such striking accuracy, is invaluable to me as a teacher. Teaching the myriad ways of pedaling is nothing short of incredible in this setup. It is such an amazing tool for someone like me who is active both as a performer and an educator. It also opens doors for endless communication and collaboration between artists.”

In the just-launched Disklavier Education Network (DEN) Yamaha envisions a broad forum where music institutions can share artist performances and master classes by eminent professors. Piano content, created by member schools and shared across the network, can be recorded and archived for students in years to come—or accessed on the spot by students on other campuses or in online learning programs. Offering an early

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look at the concept, Yamaha recently archived a New York City appearance by Janis, one of the world’s leading experts on Chopin. In a combination of MIDI and video recordings, Janis is shown playing, sharing his analysis, and even displaying the coat Chopin once wore at the piano, visibly worn at the places where it brushed up against the keys. “These recordings will be stored forever,” says Calvin, “so a student years from now will be able to look into the archive and find out what Byron Janis had to say about Chopin. We’re very excited about that part.”

Yamaha also expects the DEN’s impact to be felt in its application for remote piano auditions. Already launched in the U.S., the system allows students to come to a dedicated location and record an audition on the Disklavier, which is then uploaded to the Cloud. On the other end, any institution accepting DEN auditions can pull up the student’s performance on its own Disklavier, meaning the student can log auditions for multiple schools in a single performance. From an integrity standpoint, the recorded auditions are tamper-proof, says Calvin, affording audition judges the same authentic performance as they’d hear from a student playing in the room with them. And unlike an in-person audition, DEN auditions will let judges review the performance as needed, rewinding to critical sections or stepping closer to observe the student’s key and pedal work.

Eventually slated to be offered around the world, the technology is expected to reduce the geographic barriers between students and the schools they want to attend. “A student from China, Korea, or Russia will be able to apply to U.S. schools and vice versa, which would otherwise be very difficult, not to mention expensive when considering the travel that would be required,” says Calvin. “It evens the playing field for students and gives schools the outreach to pull in the best musicians.” Already, Yamaha has heard from one teacher in Alaska’s Aleutian Islands who plans to make the system available to her local students, allowing them to log auditions to top colleges without getting on a plane.

“Years ago when we would demonstrate the Disklavier for educators, they would say, ‘You know, that’s very close,’” says Calvin. “Now they just say ‘wow.’ They can’t believe how accurately it captures performances. We’ve been working toward this since 1987 and we’re not quitting now. We’re still trying to nudge it up that last tenth-of-a-percent to where it’s even better than it is today.”

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