A Holiday Wish List for Training Operators

On the first day of training, my simulator vendor gave to me... (using the word 'gave' rather loosely, of course). Rick Adams unwraps some of the gifts that flight crews, instructors, and training center managers might like a jolly old purchasing director to order for them this season.

It has often been said that the only difference between men and boys is the price of their toys. And what adult doesn’t like to receive the latest electronic gadget or game in the oversized stocking they have hung from the fireplace mantel?

Most simulator electronics won’t fit in a stocking, and they are a bit pricier than a 1080p high-def widescreen television at Circuit City. Nonetheless the R&D elves have been hunched over their workbenches the past year, designing enhancements that improve the quality and efficiency of the civil aviation training process.

Here’s a wish list of just some of the sim subsystems you might consider for those trainees who have been on good behavior all year.

On the 1st day of training... Air Traffic Control Simulation. The next step in training realism and a critical element of ICAO’s new multi-crew pilot license (MPL) program.

Adacel’s ATC in a Box is designed to relieve the instructor of the prep time currently required to set up the air traffic environment for a simulation scenario – both automating the task and applying advanced speech recognition algorithms and artificial intelligence to yield far more realistic feedback to the student. Typical simulations have the instructor role-playing an air traffic controller, according to Adacel’s Gary Pearson. But that’s only one of dozens of voices a flight crew would hear in the real world. Some instructors play an audio CD of canned background chatter, but it’s mere noise and does not relate to the student’s situation. With ATC in a Box (actually two boxes, a pair of low-power PCs), the student not only hears all communications traffic, it’s ‘contextually correct’, and he can see the other aircraft around the airport that the chatter is directed to and from. “The instructor gets to concentrate on teaching and evaluating,” says Pearson.

Adacel engineers have developed a speech recognition system that can handle ‘trillions of permutations’ of speech phrases and pilot accents from various cultures for whom English is not the native language – including lengthy transmissions spoken rapidly – with nearly 98% accuracy. (In fact, it will roll out a new laptop-based product in February to help teach and assess English proficiency for pilots, controllers, and ground personnel.)

CAE has an exclusive license from Adacel to market ATC in a Box under the brand name ‘True Environment.’ The ATC simulation can accommodate differences between ICAO and FAA procedures, and will interface with simulators from most manufacturers.

Frasca International is also developing ‘several levels’ of products to provide a realistic ATC environment, according to Peggy Prichard. Automatic Terminal Information Service (ATIS), ATC chatter, traffic in visuals, terrain/collision avoidance, and interactive ATC with voice recognition, will all be incorporated. “Our product will be fully integrated with the simulator, allowing entire lessons to be scripted with setup, failures, ATC environment, traffic, etc,” Prichard says.

On the 2nd day of training... High-Fidelity Comms. The Royal Aeronautical Society’s International Working Group on “Manual of Criteria for the Qualification of Flight Simulators,” which was originally expected to issue its draft report in November, now delayed until late March, is likely to feature a clearer definition of the aural cue sounds required for Level D certification, including all aircraft radios and navigation receivers, as well as warnings.
and tones heard through the communication system.

ASTI has an enhancement road map for its Telestr 4 product line over the next several months that includes integrated speech recognition. Level D requires objective assessment of spectral frequency plot data obtained from flight test recordings against identical recordings taken in the simulator. Among ASTI’s capabilities: “Level D Engine,” “Runway Thump,” and “Auto-DRED.”

New Breed
On the 3rd day of training... Brighter, Blacker Visual Projectors. “Calligraphy is dying,” declares SEOS’s Owen Wynn. “There’s a whole new breed of projection and display systems.” Available to simulator operators. The UK company’s custom-designed ‘Zero’ LCOS (liquid crystal on silicon) projectors with a patented four-panel architecture incorporate three features, which Wynn claims “nobody can match”: enhanced bit depth (for more gray scale), true black, and electronic blending. “The blacks are so good you don’t need blending for a night scene.”

The first units are starting to roll out with the initial installation on a Saab 2000 simulator for an undisclosed customer. Orders are in the “hundreds” but constrained temporarily by panel supply issues.

“It’s such a compelling feature set (all-electronic blending, highly accurate color processing, grayscale tracking, automatic corrections and diagnostics, and motion blur reduction), that people are prepared to wait,” Wynn says. The current 2015HC QXGA variant projector offers 3 megapixels, but Wynn predicts 8-10 megapixel devices “could come into the marketplace in the not too distant future.”

Rockwell Collins lists 13 customer simulators, which it says have been certified with LCOS displays and its EP1000-CT image generator, including what it claims as the “first raster-only FAA Level D / ICAO 9625 certification” – an Alten 8777 in Seattle in December 2006. Eight others of the 13 are Level D from various regulators; one is Level B, two Level C, and one Level G. Rockwell currently uses IVC HV2K projectors. Barco also believes its SIM 7 series QXGA LCOS projectors produce the “deepest” black levels, like the ones training operators have “come to rely on with CRT-based visual systems,” according to Jay Luis. The sim-specific design boasts a “unique smear reduction feature to maintain the sharpness of fast-moving images.” Unless you are a CAE customer though, you may have to wait for a future holiday season – the Montreal manufacturer is first in the queue for Barco’s initial production capacity.

Barco’s VRACU remote alignment control unit (hand-held controller).

RSI (Rediff Simulation) says it was the first to use commercial off-the-shelf (COTS) LCOS projectors for simulation, three years ago, and the first to receive regulatory certification using COTS LCOS. RSI received its first FAA Level D certification earlier this year on a GCAT flight Academy (Bega, Latham) B737-300 upgrade.

Of course, LCOS is not the only option for your light show. Rheinmetall’s Avior LD laser projection system has achieved JAA Level D certification on an A340 sim at Lufthansa Flight Training. According to feedback from instructors and users, the Jenoptik-based laser system is reliable and offers advantages in depth of focus, brightness and contrast.

Wraparound
On the 4th day of training... More Compact Displays. Ready to replace those old wide-angle collimated (WAC) window monitor displays? Grab your chainsaw; SEOS can replace the WACs with a modern wraparound screen in pretty much the same footprint, except for the outriggers. And, yes, you can get that with either conventional LCOS, without the fourth panel technology, or with the higher-fidelity QXGA 2015HC. The Panorama Lightning upgrade package can extend the life of older simulators by 10-15 years, according to Wynn.

The design integrates the new projectors within the physical constraints of the mirror structure, so a special projector platform is not needed over the flight simulator cabin. And since there is no substantive structural change, downtime for the upgrade is minimized. One caveat: the new approach requires a non-collimated image generator.

Barco’s new CD Series cross-cockpit collimated display consists of an advanced, wide field-of-view collimating mirror, rear-projection screen, projector platform, and light-tight enclosures. The display is designed for use with its SIM 7 LCOS projectors and to be FAA/CAA Level-D compliant.

On the 5th day of training... Automation Tools. “Simulator center technicians have begged for display systems that are simple to operate and maintain,” Barco’s Luis says. The visual display specialist’s response includes the VRACU remote alignment control unit with a hand-held controller, as well as the Acuras realignment tool for brightness and color adjustments in a multi-channel SIM 7 system.

Christie has developed automatic display system calibration and motorized optical blending for projected arrays as part of its TrueMAGE solutions. The former keeps visual displays running without the need for a dedicated technician; the latter optimizes capabilities for dark-flight and bright/day scenarios, automatically adjusting image geometry and detailed edge blending on nearly any cylindrical, flat, or spherical screen.

Equipe’s ProMap Quattro digital warping, blending, and color correction system provides support for TXGA and QXGA projectors. Andy Robinson notes: “Coupled with our latest bicubic filtering algorithm, the result is supreme visual quality no matter what the degree of warp required.”

On the 6th day of training... A Worldwide Database. Frasca and Diamond Visions have teamed up on TruVision Global, compatible with Boeing’s CIGI protocol, and combining information and imagery from satellites, aerial photos, Openflight models, and GIS vector data to offer worldwide coverage of representative terrain and airports. CAE’s database program for every Jeppesen-mapped runway on the planet is known as True Airport.