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The ins and outs of on-air consoles

By Chriss Scherer, editor

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When it comes time to install a new on-air audio console, where will you begin? Determining the number of source inputs and is only a small part of the process. The audio console, which sits at the focal point in any studio, serves a valuable function, but unlike audio source equipment and peripherals, which can be easily upgraded and modified as the station's needs change, the audio console is a long-term commitment.

Determining the basic needs and then specifying the piece of equipment to fill these needs is not always a simple process. The on-air audio consoles available today offer many choices and configurations.

In addition, the console itself is undergoing an evolution that changes its function as a central routing point to an interface control point. This new flexibility makes the selection process more involved as the console becomes an integrated part of a facility's audio routing system.



The basic starting point is deciding on an analog or digital console. Digital designs, once high-priced items practical only for larger installations, have become affordable and rival the costs of analog designs. In addition, many digital designs have moved beyond the stand-alone equipment phase and become a part of the consolidated audio networking system. We used to categorize audio consoles as analog or digital, but now it makes more sense to categorize them as stand-alone or integrated.

Solo player

A console that functions on its own, without the need for a routing system or audio engine qualifies as a stand-alone console. The conventional analog design typifies this approach. All audio sources are connected directly to the console, and the outputs of the console are routed to their final destination. In smaller installations, this approach is still practical. These systems are simpler to install and usually simpler to maintain than integrated systems, primarily because they can be isolated in their function.

All the analog designs and some digital designs fit into the stand-alone category. The stand-alone approach will work well for smaller, stand-alone stations that may only have one or two studios. Stand-alone consoles may play a role in a larger system, however.

Integration of resources

The integrated console approach changes the function of the audio console. Instead of serving as the central wiring and control point of a studio, the console becomes a controller for a much larger system. The console is no longer a mixer, but a control surface, which changes the way that a facility is designed.

The integrated approach is generally more complicated to set up, but offers a great deal of flexibility to future changes. By connecting all the sources within a facility to a central audio network, sources can be called on as needed without additional wiring. Frequently used console configurations can be stored and recalled as a preset. The number of output buses can also be changed dynamically, assigning outputs as needed.

In reality, switching audio sources and destinations is just a small advantage. With source switching usually comes the need to switch control logic. Most current integrated designs allow for this. In addition, special mix-minus feeds can be established so that when a device is assigned to a console control, the necessary mix-minus switching is also made.

The console usually presents the greatest challenge if it needs to be replaced in a studio. The integrated approach removes this obstacle. If a larger control surface is needed at a later time, the entire studio does not need to be rewired. In most cases, the old control surface can be unplugged and new one put in its place. Some additional programming may be required.

The initial integrated designs required all the audio sources to be connected to a central audio frame or engine. It makes no sense to route the output of a CD player to the central rack room only to have it assigned back to the studio where it is installed. Most, if not all, integrated systems today provide remote source input frames. These allow the sources within a studio to be connected to a module or mini-engine within the studio. That mini-engine is then attached to the audio network. These mini-engines are connected to the audio network via CAT-5, fiber optic or some other high-capacity cable. In the end, the overall cable requirements are greatly reduced by using an integrated system. When several studios are involved, this can be a significant savings in labor and cable.

Further considerations

Stand-alone consoles can be incorporated into integrated systems. While the full advantages of logic and audio routing may not be realized, the integrated design will provide an audio router to the stand-alone studio. Most integrated systems offer controller units that function like source and destination selectors.

As an added bonus, the integrated system can likely provide a facility intercom as well. The studio mics are already in the audio network; with a little additional programming, a momentary closure and talkback output can provide a facility-wide intercom.

Integrated systems can be programmed and reprogrammed as a facility's needs change. An important

element to understand is the method used to make these programming changes. Make sure you understand the method and the philosophy behind a system's method before making the final purchase decision. If the system is impossible to program, its potential flexibility is worthless.

Logic control can be a confusing element. Switching the audio is the easiest part. Learn how a system assigns and controls various logic inputs and outputs to a single source. It's not always a one-to-one correlation.

Regardless of a system's design and flexibility, the console surface itself is an important consideration. Evaluate the tactile feel of the switch and faders. A control surface will still be treated like the battleship-built consoles from years ago, so be sure that it will stand up to the use (and occasional abuse) in a studio. Don't forget the lesser elements such as indicator lamps and component replacement.

There are practical applications for stand-alone and integrated router console designs. As you evaluate your station's needs, keep an eye on the big picture and the potential for future growth. Be prepared to change your approach once all the factors have been considered.

Resource Guide

A sample of available on-air audio consoles

The **Telos Systems Livewire** conveys audio and peripheral data streams over standard Ethernet hardware and cable, reducing the infrastructure costs. A single CAT-5 or fiber conveys multiple audio channels, control, program-associated-data, VoIP telephone and computer data. A Livewire 100Base-T link can carry 50 bi-directional stereo channels of 48kHz, 24-bit linear PCM audio. Multiple audio terminals can be distributed around the network to provide audio routing and control. Mixing functions are controlled with the **Smart Surface**, a console control surface that provides a familiar console controller for adjusting levels and assigning inputs and outputs.

www.telos-systems.com



The **Harris BMX Digital** is an all-digital design that features 48 digital buses that can be configured for program mixes and talkback channels. It has four program buses, four utility buses and two send buses, each with analog and digital outputs. It supports as many as six telco modules with their own off-line mixes, with two additional off-line mixes for other mix-minus uses.

The meter assembly features stereo bargraph meters, a digital clock and a timer. The modules are hot-swappable and have alphanumeric displays for input labels. The console surface can directly communicate with **Vistamax** audio network frames to provide a comprehensive routing system.

www.harris.com



The **Audioarts Engineering D-16** digital console features a compact footprint and a built-in router that assigns any source to any input or monitor. The D-16 controls 16 input channels and two caller phone channels. It is equipped with digital bargraph metering, alpha source displays, provides analog and digital stereo PGM and AUD, Mono 1 and 2 output buses in addition to four mix-minus outputs. Assignable machine control ports are opto-isolated. The D-16's direct access to rear DB-25 I/O connectors facilitates easy countertop installation.

www.wheatstone.com



LPB Communications manufactures the **MX Series** of analog consoles, from the MX A Series with as few as four channels to the fully loaded 18-channel MX18EW. The consoles are designed for small to medium market use. Solid-steel frames build the foundation, and reverse-screened Lexan overlays on the modules protect the labeling. The modules are interchangeable and carry all of the channel electronics; no active components are mounted on the console's motherboard. Each module uses VCAs for noise-free operation. Consoles are available with rotary or linear faders and feature active-balanced line inputs, a cue amp with speaker, headphone output and remote module on/off control.

www.lpbinc.com



The **Arrakis Systems 12,000** series consoles are available in 8-, 18-and 28-channel mainframes. Featuring analog electronics for on-site service and support, the modular channel strips have polycarbonate overlays to protect the painted surfaces from wear. VCAs and dc on and off switching eliminate scratchy faders or popping switches. Optional modules include remote selectors and distribution amps. Optional input modules add panning or stereo mode selection. The 12,000 supports a master control room and two studios with monitor feeds, muting and talkback. All input modules feature two active balanced inputs, output assignments to program, audition and utility buses, stereo cue by fader detent and control logic.

www.arrakis-systems.com



Wheatstone's GEN-9 digital on-air control surface adds a significant tool to the Wheatstone radio line as an extension of the established Bridge digital audio network routing system. The Bridge provides a practical and compact cost-saving solution for new and growing studios with mixed audio standards. The Bridge engine components allow up to 256 mix buses in one rack-mount system. Multiple GEN-9 components can be linked to form a networked system, making it useful for large station integration projects. The GEN-9 system provides total integration of routing, machine logic and communications.

www.wheatstone.com



The **Ward-Beck Systems R2K** is available in three studio frame sizes (12, 20 or 28 modules) and one rack-mount configuration (eight modules). All connections are made with Phoenix connectors. The power supply is housed in a Ward-Beck 8200 series rack-mount frame, which can also host other 8200 accessory modules. The meter bridge sits low on the console to permit a clear view. The console features a modular design, a RS-422 serial port for turret or automation control, A/B input selectors on all modules, four stereo program outputs, two assignable mono mix buses, six telephone mix-minus feeds, and a timer and clock that supports all time-code standards.

www.ward-beck.com



The **AEQ BC-2000 D** accepts up to 2,048 inputs and provides up to 2,048 outputs. Multiple control surfaces can be connected to multiple engine frames to tailor the size of the system. The routing engine handles all the input and output routing as well as dynamics and equalization controls. A studio configuration is built on a five-fader main module, and additional faders can be added with five-fader or 10-fader expansions. The audio network communicates via MADI, Ethernet and RS-422. An LCD display shows current console-channel status.

www.aeq.es



The **Klotz Vadis D.C. II** supports the decentralized **Vadis 880** and **Vadis 220** audio/media network frames. The surface provides a user-configurable modular digital audio console for live and production broadcast applications with as many as 24 fader positions. Through the audio network, the system accesses a variety of input and output cards to route any source to any fader position. Multiple mix buses and mix-minus feeds can be created. In addition, DSP audio frame modules provide EQ and dynamics. Audio frames can be networked via fiber-optic cable to reduce wiring needs.

www.klotzdigital.com



The **Autogram Pacemaker IIk PM228** is a modular, table-top mount analog console. It can accept as many as 60 stereo inputs and four or eight microphones. The output complement includes two stereo program outputs (program and audition), one mix-minus output, one mono output, two monitor outputs, two headphone outputs and a cue output with internal speaker. The console is also available in a smaller frame as the Pacemaker IIk PM218. All indicator lamps are LEDs. Modules can be replaced while powered without pops or clicks. It features all electronic switching, P and G faders, four lighted meters and an autoclock.

www.autogramcorp.com

Available in six, 12, 18 and 24 channel sizes, **Radio Systems Millennium** consoles all feature three output buses, remote control and metering, a comprehensive monitor section with standard eight-position selector and a clock and timer. Models differ only in their channel count and number of meters on the overbridge. The soft touch rubber keypads are illuminated by LEDs and are rated for 1,000,000 operations. Audio is controlled with VCAs and electronic switching. By keeping audio path short, the console maintains a high RFI immunity. All input and output audio wiring is via removable barrier strips. Each input module accepts a mic or line-level source.



www.radiosystems.com

The **Logitek Audio Engine** router functions as a full X-Y router, permitting selection of any input to any output. A separate X-Y router controller is also available. The Supervisor software, included with the Audio Engine, provides the Matrix IP router controller, which offers complete X-Y routing functions. The DSP cards can provide equalization and dynamics processing, a 10-second talk show delay double dump feature and pre-fader input meters with a compression indicator. Up to 24 mix-minus buses can be established. A slave fader was recently added, which allows a fader to be slaved to another for use in split advertising applications on two stations running the same programming.



www.logitekaudio.com

The **Studer On Air 2000M2** series is a second-generation digital console with an input configuration router. The M2 can be equipped with six, 12, 18 or 24 channel faders and with as many as 24 input modules. A maximum of 24 input modules and 64 input signals can be controlled by the router. Each module can be analog or digital offering two or six inputs, equipped with or without transformers and suitable for mic or line levels.



The modular design allows the self-contained desk components to be arranged as desired with the I/O section separate from the surface. The On Air series also includes the model 1000 and 5000 consoles.

www.studer.ch

The **Otari DB-10** has a range of AES-3 and S/PDIF inputs and outputs, and it supports 32kHz to 96kHz sampling. Inputs are controlled with the 10 input-channel faders. Channels five through 10 have an A/B input switching function. The internal memory can store 99 snapshots, nine projects (console settings) and 20 compressor presets. Snapshots and projects can be saved and loaded to an external PC via RS-232. With the password-protect function, certain items in the menu system are accessible to only specified users. Pressing the EMG button connects one mic and one line input to the program bus.



www.otari.com

A stand-alone control surface, the **Sierra Automated Systems Rubicon** integrates into the SAS 32KD digital audio network to control mixing, switching, level control and effects. Completely modular, customizable and fully programmable, the control surface is designed for a medium- or large-market facility. Frame sizes can house from four to 40 modules. Each module provides full router selection of all the sources on the 32KD. Each module has four program assign switches and four effects/aux assign switches, but the actual number of assignable buses is unlimited.

www.sasaudio.com



The Resource Guide provides a brief look at some of the products available in the equipment category. While this is far from a complete list, it should provide enough basic information to help you get started.

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