Radio World

Category of the Month

Buyers Guide

Consoles & Related Equipment

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Broadcast Console Development

by Len Hall/GM-SPD
McCurdy Radio Industries

Toronto ONT ... The development of a new range of audio consoles involves many separate steps, each requiring careful study and evaluation if the design is to be successful. This development process normally requires approximately 1 year from project inception to completion and delivery of the first production units to the customer.

Market study

At McCurdy Radio Industries, the first step in this process is an evaluation by the technical marketing committee outlining the market segment to be covered by the new product, the type of product required, the estimated annual sales of the proposed product and the selling price necessary to achieve this level of sales. Existing products of competing manufacturers may be appraised at this time relative to our own design proposals to assess what features and specifications are required for a successful project.

The overriding consideration in this evaluation is that of product quality. Company standards pertaining to quality of construction and operation must be met by any new design or it will not be built. Top quality components, materials and assembly procedures combined with reliable, servicable circuitry are required to maintain the high standards adhered to by the company. In any broadcast audio console we build, our philosophy is to cater to the "top end" of any particular market segment, offering the highest technology, quality, reliability and flexibility available, at a competitive price.

Once the technical marketing committee determines that all these parameters have been met by the new design proposals, a package of drawings, including functionals, front panel and mechanical layouts, is presented to the field sales personnel. After these have been reviewed and discussed, the technical marketing committee is advised of the sales department's opinion of the design, including any criticisms or recommendations for changes. These suggestions are then considered by the technical marketing committee and, if necessary, a new proposal is made. Often, several rounds of proposals, discussions, and design changes are made before a project is approved for development.

Next steps

After the proposed design has received the go-ahead, a schedule is drawn up covering all aspects of the project: circuit

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Quality Audio for Broadcasters

by Dave Purple/VP Mktg
Harrison Systems, Inc.

Nashville TN ... Most manufacturers of professional audio mixing consoles have been watching with interest the blossoming trend among high-end broadcasters and video production people for the marriage of quality audio with their broadcast and video. Finally.

As with standard FM stereo broadcast, the television audio carrier has been capable of 15 kHz audio signals since Day 1. Regretfully, though, most manufacturers of radio and television units rarely equip their products with an audio chain capable of broad bandwidth response.

How can one expect the end-user to become excited when he sees a movie at home in glorious monaural sound, when, only 2 months before, he has seen the same movie at a theater, in 4 channel stereo?

New technology

Apparently the demand for this "new revolution" for quality audio has been triggered by the advent of the new sateilite technology, the expanding market for video software (both disc and tape), and maybe even the affordability of the home earth-base antennas. As little as 2 years ago, if one could hear the audio, it was considered acceptable.

Today, things are changing. People involved with video production, and those concerned with quality audio for radio broadcast, are turning to those with knowledge of how to deliver quality audio. Who better to turn to than companies like us, the manufacturers of professional audio recording products. Over the years, our products have grown by leaps and bounds in keeping up with the professional recording industry. We have been instrumental in making music and dialogue sound better and better for decades.

This month's Buyers Guide takes a look at consoles and at what some manufacturers are doing that's new. Console design was revolutionized by the introduction of the active combiner (ACN) and the VCA. The ACN makes possible high-performance, low cross-talk consoles of extreme flexibility and ease of expansion. The VCA (voltage-controlled-amplifier) has made stereo tracking predictable, allowed remote (DC) fader control, and pretty much eliminated switch transients. And when you add active inputs and outputs to today's boards, it's a sure bet any console more than 10 years old is obsolete!

Not only do today's consoles measure better, but they SOUND better! When you begin to address the human engineering problems, as some manufacturers are doing, and you offer solid-state or microprocessor-based control logic, it's actually possible to produce equipment that's ready for the challenges of digital and satellite technology. It's no wonder the console field is becoming so competitive. And we're happy to report to you that much of the current thinking in console design is represented in these pages.

But are these high-technology music recording products compatible with the needs of today's video and broadcast markets? Apparently, here lies some confusion.

In a typical multitrack situation, information has been previously recorded on

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Logitek's Custom Audio Series

by L. Scott Hochberg/President
Logitek Electronic Systems

Houston TX ... The wide variety of formats, studio designs and talent levels in today's radio industry leads each broadcaster to place unique requirements on his audio equipment. No 2 broadcast stations are exactly alike; consequently the optimum situation would allow each broadcaster to "fine tune" his on-air and production equipment to his exact needs. Our Custom Audio Series consoles have been designed to provide this fine-tuning at prices competitive with off-the-rack consoles of similar performance.

Modular construction

Custom Audio Series consoles are totally modular in construction, using plug-in mixing panels and card-cage-mounted printed circuits to achieve their unique flexibility. We currently offer 36 different variations of mixing panels, including such options as built-in mic preamps, equalization, sub-mastering and split-stereo faders for panning and special effects. Working from our standard designs, we have also supplied other variations for customers who wanted to change "just a few things." Since our circuits are liberally sprinkled with unity-gain buffer amplifiers, we can easily change feed configurations to do a "special" without degrading overall circuit performance.

Custom Audio Series mixing panels offer one other major advantage over those in other consoles: the ability to troubleshoot each panel without removing it from the console and without adding special extender cables. We have developed a proprietary process for shielding individual conductors of flexible ribbon cable, which allows us to equip each mixing panel with its own ribbon cable bus.

This multiple conductor bus carries all the audio, power and control signals for the panel. The mixing panel can be removed from the console's chassis without disconnecting the ribbon cable bus, allowing in-circuit debugging. If the panel needs to be taken to the test bench, the whole assembly can be removed from the console by releasing 2 latches on a ribbon cable connector on the console's mainframe.

Other options

In addition to our wide variety of mixing panels, we offer a large number of other unique built-in options. Our new 6 output distribution amplifier card instantly provides fully-isolated program feeds for recording and monitoring use. Our 8 in, 2 out preselector panel has an exclusive phase-reverse pushbutton to greatly simplify set-up of stereo remotes. Other available built-ins include a 15 watt/channel headphone amp, stereo cue system, solid-state variable-delay reverb, intercom, clock and timer, any or all of which can be ordered on most versions of our consoles.

Our desire to give each broadcaster exactly what he needs extends beyond the options to the nuts and bolts of the board itself. For full redundancy our program and audition sections are totally identical. Muting selections are determined by 3 sets of DIP rocker switches, allowing any combination of mixing panels to mute speakers differently in 3 studios. Our unique "speaker-diminish" circuit drops the level of the control room speakers by about 20 dB whenever any mixer is placed in CUE, saving operator hassle and wear on the speaker volume pot.

Each mixing panel is arranged for 1 button control, further simplifying operation to avoid DJ screw-ups. By pressing the PGM pushbutton, the operator turns on the mixing panel's audio, sends the feed to the console's program amplifier, starts remote devices, and, if desired, mutes speakers, turns on warning lights and resets the console's timer. Pressing the OFF pushbutton reverses all these functions. Program and audition channels can be fed individually or simultaneously and either can be turned on or off without affecting the other.

After going through all this effort to build flexibility and operational simplicity into the console, we would be foolish to "cheap-out" on the performance end of the design. Thus, we use top-quality parts throughout, including Hall effect solid-state switches and rugged conductive plastic faders. All parts are off-the-shelf items from well-known manufacturers, which we list in our manual. Our audio specifications meet or exceed industry norms.

Custom Audio Series consoles come in 2 basic sizes: a 44" wide mainframe which houses up to 12 mixing panels for 24 inputs (28 inputs with our optional preselector panel,) and a 20" wide mainframe which houses up to 5 mixing panels for 10 inputs. Both mainframes are designed for table-top mounting and are totally self-contained, eliminating the need to cut holes in studio furniture or to mount extra boxes in external racks.

A Revolution in Audio Quality

(continued from page 1)

the multitrack master, either all in 1 pass or in layers (overdubbed). If tied into the video medium, SMPTE synchronizing equipment latches the multitrack machine(s) to the necessary video gear.

The process of "sweetening" the audio can involve replacing any or all of the audio channels, making equalization changes, adding reverberation or effects, changing levels, etc. After all the modifications have been made, these 16+ audio tracks must be combined into a meaningful format (mono or stereo) for the medium being used. Simply put, this sweetening and mixing operation is something that we in the professional audio business have been doing for years; it's "old hat" to most of us, a part of our day-to-day routine.

The Harrison approach

Harrison Systems has been a manufacturer of sophisticated multitrack recording/remix consoles for over 6 years. Our products have been instrumental in the production of hundreds of gold and platinum records, and Harrison consoles were used in the production of 2 Grammy Award-winning albums for "Best Engineered Recording (Nonclassical)."

Over the years, the people at Harrison have remained constantly attuned to the needs of the professional audio field. This continues to be true today, as, interestingly enough, our newest multitrack console, the MR-3, is perfectly suited to meet the needs of not only the multitrack recording studio, but those of the high-end broadcaster and the video production house.

About the MR-3

As semiconductor and other allied component technology advanced, so did Harrison recording consoles. (The MR-3 is, in effect, a culmination of all of these technological advances.) However, as the noise floor and distortion products kept getting lower and lower, Harrison engineers realized that existing grounding procedures were inadequate for a state-of-the-art multitrack product.

We finally "read and rewrote the book" on analog grounding. In fact, the entire MR "family" of music recording consoles utilize a revolutionary new concept in analog grounding.

The MR-3 has 6 separate ground systems: analog ground, frame ground, CMOS logic and LED ground, line-driver ground, a ground-reference buss, and a ground-reference amplifier. The ground-reference amplifier "looks" at the ground-reference buss and compensates for any anomalies which may be present.

The line-driver ground was established separately from normal analog grounds, thus preventing the high-current swings in the high-level output stages from modulating the lower-level analog grounds. Also present in the MR-3 is a unique type of differential summing in the multitrack output assigns.

As a result of these innovative changes, the noise floor in the MR-3 is 7 to 8 dB better than in previous Harrison consoles, and cross-talk figures are improved, in some cases by as much as 25 dB.

The MR-3 comes equipped with VCA faders, which enable the operator to establish VCA groups when recording or mixing. Because all necessary interface harnessing is included, installation of a console automation system is rapidly accomplished by merely plugging in the system, via rear-panel connectors. (MR-3 will accept 3 different automation systems!)

Included in the MR-3 is a full 24 track, output-assign matrix and 3 band parametric EQ with variable bandwidth control in the mid-band. (Optional bandwidth control is available for the hi and low bands.)

All switching functions under logical control are accomplished with high-speed, digitally controlled CMOS devices. Major console status changes (record to overdub to mixdown, etc) are executed with the push of only 1 button. There are 6 main console states available, and, with the addition of the "PING" (mic/line reversal) switch, these 6 states can be expanded to 12. No relays. No switch noise. Low power. Low heat. Low maintenance. Nice.

As the new revolution in high-quality audio takes off, we feel that the MR-3 will become a big part of this movement. The MR-3 is surprisingly affordable, because Harrison has underpriced it, not underbuilt it. It's all the console that anyone will need as the new revolution gathers momentum.

VCA's: High Performance & Low Cost

by William E. Stacey/President
Micro-Trak Corp.

Holyoke MA ... A recent *Radio World* article about VCAs and their usefulness in audio consoles piqued my interest. VCAs are voltage controlled attenuators; active circuit devices which replace passive attenuator potentiometers used in many audio consoles. As practically applied they are integrated circuit chips or discrete transistors arranged to allow variable amplifier gain to be controlled by simple DC voltage. Micro-Trak has used voltage controlled attenuation in its consoles since 1975.

Trade-offs

In the broadcast audio console market there's a constant trade-off between cost and performance. Some stations in the larger markets need the ultimate in performance to satisfy a very sophisticated audience. Often in these markets the listener has test equipment equal to or better than that of the station. Strong competition also dictates the need for better sounding audio to be a first consideration

Smaller market stations, on the other hand, are often limited by tight budgets for console purchases, and generally have difficulty justifying high cost, highly sophisticated audio equipment. These stations, the vast majority in numbers, are more concerned with a simpler, reliable, high performance console that they can afford. All of Micro-Trak's studio consoles are designed to satisfy this need and VCA technology is the key that makes it possible Why VCAs? In a nutshell, they offer excellent performance and greater reliability at lower cost than other approaches. VCAs allow more flexibility for the design engineer. The low level audio in the mixer control circuits is removed from the front panel and limited to the preamp card. Thus, it's not necessary to use shielded cable for control lines. Simple DC logic switching can be used to apply audio sources to the mix buss. Single element control potentiometers instead of duals can be used for stereo (this alone represents a substantial cost saving). Better stereo tracking is also more easily achieved than with the dual pot approach.

Lower cost potentiometers can be used too, as the voltage impressed across them is high, and the noise voltage contributed by the pot or it's action is very low. A few microvolts of noise relative to a control voltage of about 18 volts is insignificant. Another major cost saving. We use sealed conductive plastic units in all larger consoles.

The Series D

Micro-Trak's D Series console is a small size package design developed originally for use in the D System remote/production packages, but now widely used in news studio, TV van and other applications. In 1975, 4 channel stereo and mono units were introduced and later discontinued in favor of the current 5 channel packages. The metamorphasis from the first units to the present equipment has seen many improvements as new technology has become available. Improved IC chips have allowed optimization of the cost/performance position of the D consoles. To date more than 300 units are in use throughout the world.

The Model 6618 six channel stereo-mono console was next to receive the benefit of low cost, high performance VCA audio control. Engineered to be totally serviceable, simple plug-in preamp cards and components make it especially suitable for the smaller market station. In its latest form all components except the front panel meters plug in for easy service. Cards are retained by simple pull-to-release fasteners which hold them reliably in place, but can be removed in seconds. (A good common sense approach especially if you are considering operating your station without a first class engineer.) The 6618 shares the same VCA preamps of the D consoles, and offers many additional innovations. "Latch Logic" control of individual channels, accomplished by switching the DC control voltage of the VCA, allows noiseless selection of audio sources to the mixing buss. A simple push-push switch signals a flip-flop circuit which presents or removes the control voltage to the VCA, thus switching the audio. This unique circuit uses a double throw contact to insure that the logic chips will not switch unless positively told to do so by the operator. The switches also have tactile feel to let the operator know by touch when switching has been accomplished.

The 6618 advancements also include DIP switch control for assignment of 2 separate muting systems. The 2 monitor outputs, one 10 watts per channel, the second at line level, are independently muted. The assignment of muted channels can be changed at will, in seconds, simply by operating the DIP switch selector.

"Why VCA's? In a nutshell, they offer excellent performance and greater flexibility for the design engineer."

The Model 6509

The newest console to use Micro-Trak's established VCA technique is the Model 6509. This new, low profile package design is offered with rotary or linear pots, in stereo or mono configurations, incorporating the same VCA preamps of the 6618 and D consoles, plus it adds some new technology of it's own. Flexible printed circuits are used to carry the audio inputs of 2 of 5 channels to input selector switches.

These switches are bracket mounted to the rear panel and remain stationary while projecting through the front panel and allowing it to open and close. The flex printed circuits terminate all input switches directly to the 6 input terminal strips on the rear panel eliminating 30 wires over 24" long, a highly reliable, trouble free approach. The 6509 shares muting technology with the 6618, using one DIP selected mute relay. Again, the proven plug-in component system is used throughout the 6509 for simple service.

Micro-Trak's cost effective, high performance approach to VCA console design has met the test of time in the field. It provides high immunity to RF, ease of service, and uncomplicated control methods; coupled with low cost and high reliability. The value is excellent for any station, large or small, where their input-output configurations apply. "On-Air" studio applications, remote broadcast, and production are all normal applications for Micro-Trak's VCA console technology. VCA techniques used in a practical way make it happen.

Buyers Guide: Category of the Month

Each month **Radio World's** Buyers Guide section will highlight one area of radio broadcast equipment.

JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Test & Monitoring Equipment	Automation Equipment	Microphones & Turntables (NAB Preview)	Transmitters (NAB Show)	Antennas Towers & Cables (NAB Review)	Program Audio Processing
JULY	**AUGUST**	**SEPTEMBER**	**OCTOBER**	**NOVEMBER**	**DECEMBER**
Studio Audio Equipment	Consoles	Reel-Reel Recorders (NABA Preview)	STLs & Telco Equipment (NABA Review)	Stereo Generators Exciters, & SCAs	Cart Machines

BMX: High Performance Console

by Mike Uhle
Pacific Recorders

San Diego CA . . . The BMX series of consoles were designed for the broadcaster who wants first quality design with the performance and features of a custom console, at an "off-the-shelf" console price. Every effort was made to optimize and maintain quality through manufacturing efficiency. By utilizing advanced and efficient construction techniques, the BMX design has minimized hand-made cable harnesses and costly manual assembly operations.

First quality components, the basis for a high performance product, are featured throughout. Advanced discrete and integrated circuitry yields low noise and distortion, and provides excellent frequency response and headroom/overload capability. At least 30 dB of microphone and line input headroom is maintained to provide that extra margin for "hot" levels and operator error.

Mixers are full-travel Penny and Giles conductive-plastic faders. Their conductive-plastic elements and precious metal wipers are extremely linear and are impervious to the environment. The faders' mechanical components are non-corrodible nylon and stainless steel. All button switches are Honeywell and Schadow, chosen for their extended life ratings. All the audio transformers are designed by Deane Jensen. The VU meters conform to ASA specifications and are driven by isolation bridging buffer amplifiers.

The sophisticated control logic of the BMX utilizes CMOS integrated circuits. CMOS provides silent and flexible control. Operating on 12 volt, low current power, CMOS circuits generate little electrical noise, so you won't hear "chirps" or "clicks" in the audio as the logic operates.

FET switches invariably introduce some form of non-linear distortion, even if slight, and the BMX is so clean that you might hear the difference. We, therefore, go a step further and use miniature, sealed, gold contact relays for all logic controlled audio switching. The relays are quiet, reliable and cannot degrade audio performance. CMOS control logic is also easy to interface to external equipment (logic interface/translator units are available from Pacific Recorders & Engineering). The outputs of the control logic to external equipment are buffered by short-proof discrete transistor circuitry.

The BMX is a compact, low profile console. Plenty of room is available for the broadcaster to arrange his peripheral equipment. All active electronics are accessible from the face of the console. Panel modules simply unplug from the housing. The separate power supply is rack mountable and is supplied with a 6' interconnecting cable.

All audio input/output and logic wiring is done with easy-to-use connectors; time-consuming hard wiring to terminal blocks is eliminated. We supply mating connectors, pins, pin crimp tool, and full wiring information. By pre-wiring the studio connectors, a BMX console can be installed and on-the-air in a few hours. Input assignments can be changed in the future with ease by just moving the connector plugs.

The BMX is available in 4 mainframe sizes to accommodate 10, 14, 22 and 26 input modules. Every BMX is factory wired and tested for the full complement of modules. Use fewer inputs if you wish. Expand the system at any time by plugging in the extra modules. Universal layout enables any input position to accept a mic or line module.

The microphone input module provides for external remote control of ON, OFF, COUGH and TALKBACK functions for each of 2 inputs. The line input module provides the remote control commands for turntable, cart and tape decks. In addition, the ON, OFF and CUE status of the module is remote controllable. A pre-fader patch point on each input and output is provided for convenient insertion of auxiliary signal processing.

Reliability starts with a tough housing. BMX is fabricated from precision milled ¼" anodized aluminum alloy end plates that are joined and extensively reinforced by extruded rails. Sheet metal is then fastened to this precision frame, providing a "skin tensioning" effect for extra stiffness. Front panels are constructed on anodized aluminum extrusions, coated with durable polyurethane paint, and silk screened with clearly legible nomenclature.

Hand wiring is minimized by the use of plug-in circuit boards and a "motherboard." The summing busses are 100% encased by a continuous ground plane for the ultimate in RF and noise isolation. Only glass epoxy, double-sided circuit boards are used, allowing the use of ground plane shielding technology to reduce susceptibility to RF interference, noise and crosstalk.

The components on each board are identified with silk screened designations. All circuit card fingers and mating edge connectors are gold plated. Complemented by solid oak endpanels, the BMX has an attractive appearance that will withstand the rigors of continuous professional use.

BMX is the human engineered console well suited to broadcasters. It is easy to install, easy to service and it provides good reliability and performance.

The Alpha II From Sphere

by David Holmes/Sales Manager
Sphere Electronics, Inc.

Chatsworth CA . . . The editorial direction for this piece was described to me as, "Write something that explains what's happening at Sphere with respect to the state-of-the-art of consoling for radio broadcast engineers." That sounds clear enough, at first. But then the question pops to mind, "What's art?" And its classic sequel, "I don't know what art is but I know it when I see it!"

Our attitude at Sphere could be summed up like this. Sometimes we lead the field in any given electronic development (digital faders and attenuators), and sometimes we hold back until we are quite sure one is better than another (IC vs. discrete op-amps). Often what one man describes as art can turn out to be another's headache. The bandwagon effect is hard to resist and many a console is bought mainly for that reason. Often it's a bad decision.

Other problems

Quality is another hanger. So is reliability. Almost every pro audio console ad you see is shot through with these concepts so that what to believe becomes a major hurdle. What passes for quality in the recording studio might be a disaster on the air (especially if the console isn't). The inconvenience of an hour's down time in a recording studio isn't quite the same to broadcasters.

Signal quality at the receiving end is an increasingly important variable in the increasingly competitive search for advertising. Improving on the console is a good place to begin to hone that edge. Now that that's been said, what does Sphere offer toward that goal?

Some history

Sphere began building high quality, high reliability consoles about 7 years ago for clients like the White House and the Los Angeles Music Center. Following the early "custom" years, most of our sales were to recording studios where Sphere has established a reputation for hard working, "transparent" consoles. Because broadcast production room consoles are very similar to recording/mixdown versions, many of our medium sized units went to broadcast facilities with excellent results

The fact that most of our efforts went to recording rooms wasn't due to a lack of interest in broadcasters, it was simply that our sales personnel felt more at home in that industry. A variety of factors have intervened to change that emphasis. The recording studio "boom" has softened (to say the least) and the excellent reception our products received at the latest NAB show, which was the first we have attended, was encouraging.

In case anyone doubts our ability to design and build the finest electronic circuitry, let me mention that one of the most critical applications of the consoling art occurs in the record mastering rooms. Two of the finest independent mastering facilities in the world, Kendun Recorders and Nashville Record Productions, have depended on Sphere mastering consoles for years. The number of "hot 100" acts that were cut on a Sphere would fill pages

Our equalizers are so good many studios use them as outboard gear to handle their most critical requirements. I don't mean to give the impression that all we build are big, complicated consoles, such is not the case. We also devote the same degree of attention, and much the same electronics, to very small, simple units.

Our recently re-designed Alpha II on-air and production series is a wonderful blend of the most advanced electronics and operational simplicity. Which prompts me to mention our latest breakthrough for the industry: a digital fader and attenuator that has no moving parts at all and that theoretically should never break, get scratchy or change its work attitude when coffee gets spilled into it.

Broadcast engineers who saw it at the NAB were very excited, "It's the first one that really works." We are offering "the fader" along with similar technology CMOS switching on our Alpha II console. A jock-proof console may be close to reality.

One further element of Sphere's attitude toward "the state-of-the-art of consoling" is worth mention. We listen very well and aren't grumpy about custom work. Usually our standard console line is more than adequate to fill a given need. Why? Because much of it has been designed by those of you on the receiving end, our customers. The lack, at Sphere, of an overactive marketing department may be one reason we are still small and responsive (and responsible). All of us here feel that our engineering comes first. We enjoy the challenge of working with you to insure your long term satisfaction.

the trendsetters

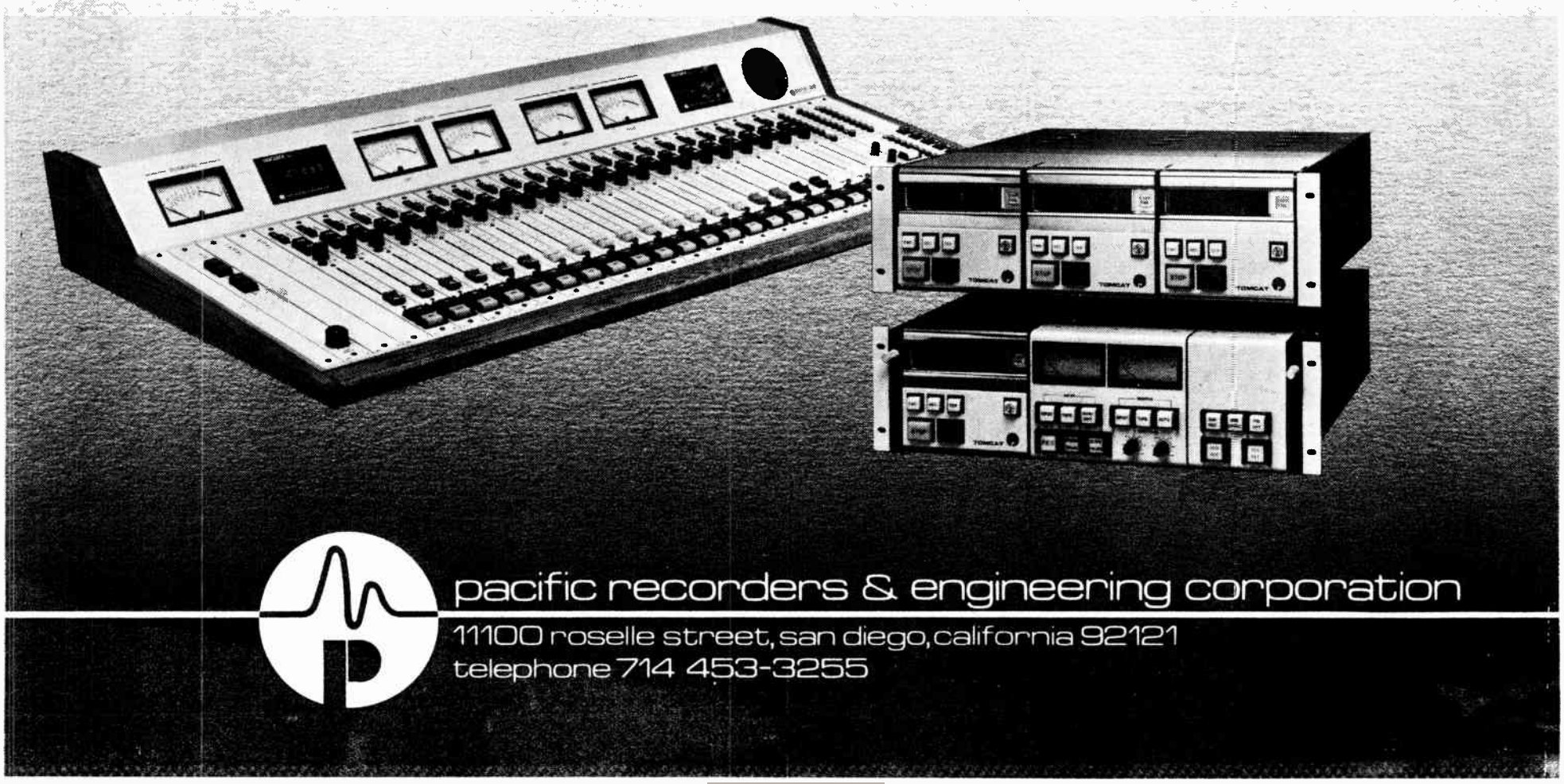
Unquestionably the industry's standard of excellence in broadcast equipment

Most manufacturers know how to meet industry standards when designing their broadcast equipment; we only know how to exceed them. Our TOMCAT series of cartridge recorders/reproducers and BMX series of broadcast consoles deliver what you've wanted and asked for: smooth, reliable operation, with superb on-line performance. Look at the specs and see why we are consistently two steps ahead of the competition and used in broadcasting systems worldwide, from Boston to San Francisco, and Australia to Great Britain.

TOMCAT – simply the finest cartridge machine in the world. Its innovative design offers significant improvements in sound quality, reliability, and low noise operation. Its features include our Maxtrax™ wide-track precision fixed azimuth tape heads to yield more signal, less noise, and lowest phase error; our unique fast start silent DC servo capstan motor; and outstanding low distortion electronics with excellent headroom and full range frequency response.

BMX, Series II – internationally accepted as the ultimate in high performance broadcast mixing consoles. This compact, easily installed unit features proven RF immunity and CMOS remote control logic for remarkable flexibility, plus a choice of 10, 14, 22, and 26 input mainframe configurations. A new mix module is available to provide two separate mix-minus busses for telephone talk show feeds. Panel layout offers an efficient, no-nonsense, human engineered format with amazing flexibility and ease of servicing.

Discerning broadcast engineers have made TOMCAT and the BMX series the industry standard. There must be a reason. You can learn for yourself why ease of operation and servicing, superb reliability, and brilliant performance have made Pacific Recorders & Engineering Corporation THE industry trademark. Call or write today for free information on our complete line of unique professional broadcasting equipment.



pacific recorders & engineering corporation

11100 roselle street, san diego, california 92121
telephone 714 453-3255

Auditronics Introduces 200 Series

by Keith Arnett
Auditronics, Inc.

Memphis TN ... Continuing the expansion of its line of high-quality, high performance equipment for broadcasters, Auditronics has introduced the 200 Series On-Air Audio Mixing Consoles, available in 6, 12, 18 and 24 input configurations. Specifically designed for ease of operation and state-of-the-art performance, the 200 Series incorporates a number of technological advances not available to broadcasters before.

Foremost among these is VCA (Voltage Controlled Amplifier) input control, now a common feature in high performance recording consoles. The input fader varies only a DC control voltage to the VCA, thus completely removing noise from dirty or worn faders from the signal path. The use of VCAs also allows precise stereo tracking, within 0.25 dB over a 90 dB range of attenuation.

Includes CMOS logic

Furthermore, a comprehensive CMOS logic system controls all critical switching functions and provides the user with a number of operational benefits. A complete 2 way intercommunications system between the console and 2 studios is designed into each model in the 200 Series, and the CMOS switching also eliminates signal degradation and noise caused by dirty or corroded switch contacts.

All switching circuits external to the console carry DC control voltages only; no audio ever leaves the console for remote switching purposes, further adding to signal integrity. Program, audition and mono outputs are transformer isolated and will deliver an output signal of +30 dBm. This output capability provides the broadcaster with enough headroom to cover virtually any situation.

A highly refined mechanical package brings further benefits to the broadcaster. Nearly all hand wiring has been eliminated, lowering the cost and further enhancing the high reliability of the 200 Series, and the flip-up control surface allows all wiring and maintenance to be done while seated in the operator's position.

Complete cueing, talkback and control room monitoring is provided, and each module in the console has its own current limited voltage regulator, yielding excellent isolation. low cross-talk and rejection of spurious signals. The console's headphone output features a high and low band equalizer circuit and compatibility with 8 ohm headphones. Optional modules include a voice equalizer module with plug-in modules for each announcer on the staff, a noise gate/compressor module for use with both line and mic inputs, digital clock and timer and analog peak meters.

Auditronics continues to offer its highly popular Model 110A Production Console in 18 input and 26 input configurations, both featuring 4 channel and 2 channel mixdown capability, complete control room and studio monitoring, 2 echo sends, 2 foldbacks and cueing on all inputs. Like all Auditronics products, the Model 110A is modular; allowing the user to purchase exactly the package needed.

Users Participate in Console Design

by Dave Evans/Pres
Broadcast Audio Associates

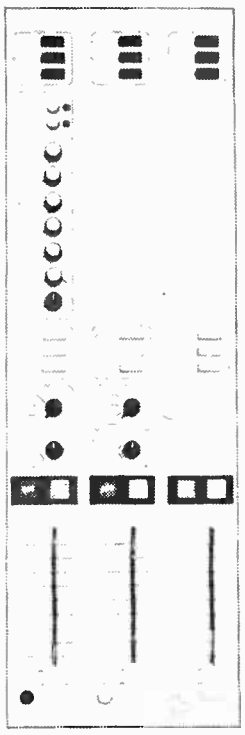
Rancho Cordova CA . . . After introducing our first audio console, System 16, we were concerned that a 16 mixer board might be somewhat of an overkill. Consequently, our next 2 products were somewhat smaller, with 8 and 12 mixer capacity. Although all 3 versions sold well, we received repeated inquiries about an even larger console with added features.

We proceeded cautiously, because once a new design is "frozen," a manufacturer will have to live with the new product for a considerable period of time in order to recover the high R&D costs associated with today's high technology. Old broadcast "Buyer's Guides" are filled with names of ex-companies that guessed wrong when they assessed the needs of the marketplace. So, for 2 years we kept notes on the most requested features and finally combined them in a new product which is truly "user-designed," the System 20.

Those features requested most often were: differential balanced line level inputs, patch points for external EQ or audio processing, optional comprehensive EQ on mixers, optional pan pots and stereo mono mode switch, remote input selector switches, separate studio-selected monitor control, and momentary "stop" signal for tapes and turntables.

Implementation

Differential or active inputs work very well at line levels, giving excellent common mode rejection, with wider frequency response, lower distortion, and better transient response than obtainable with transformers. We opted for 10k ohm active stereo inputs which will accomodate almost any audio source, including 600 ohm balanced or unbalanced. The use of 5532/34 low noise, high slew rate bipolar IC's as the active input amplifier assures the highest possible performance, with less than 6



microsecond rise time, line input to program output.

Patch points, once the domain of recording studios, are becoming increasingly popular in today's sophisticated broadcast station. System 20 has pre-fader patch points on each mixer, which are brought out to wafer connectors near each mixer input on the mixer mother board.

Thus, an external EQ or audio processing amplifier can actually plug into a mixer. If the patch point is not used, a shorting connector completes the audio path. Additional patch points are provided before the line output amplifiers, so that master gain controls can be inserted.

Although equalization is often used in broadcasting, not every station wants it, and most don't need it on every mixer. Therefore, we decided on 3 types of mixers: Type A has in/out selectors, graphic equalizer, low-cut filter, stereo/mono switch and pan pot; Type B has in/out selectors, stereo/mono mode switch and pan pot; Type C has in/out selectors only.

For the EQ function we selected a 7 frequency graphic equalizer which covers the frequency spectrum actually used in broadcasting. Center frequencies from 125 Hz to 8 kHz, with 12 dB cut/boost, shape the entire broadcast audio spectrum to the user's satisfaction and produce quite remarkable results with easy setup.

Pan pots are used to position an audio source, usually a single mic, horizontally across the stereo field. With a stereo source, ours acts like a stereo balance control. This option, in combination with the stereo/mono mode switch is very handy in production, since a stereo input can be summed to mono and then moved to one side of the stereo field.

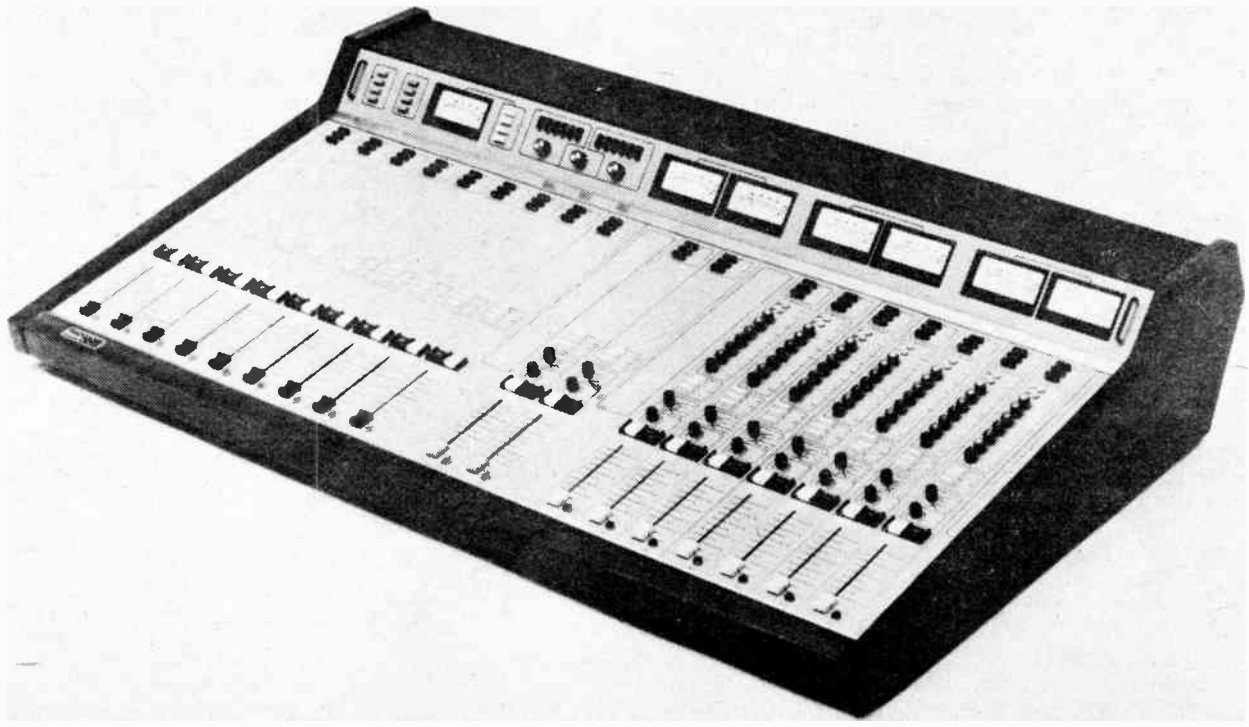
Nearly all stations have several audio sources, such as remote lines, that are infrequently used but still must be readily available to the operator. We decided that 2 sets of 4 input selector switches would be a standard feature, located somewhat out of the way of more frequently used functions, at the right edge of the meter panel. These switches can be wired to user-selected mixer input positions, and button color-coding can be provided for operator convenience.

For a variety of reasons it is sometimes necessary to monitor a different audio output in the studio than what is being listened to in the control room. The System 20 studio monitor is unusual in that there is a control box in the studio which remotely selects the monitor audio. A level control and mixer on/off push buttons are provided so that the studio announcer can also turn on his mic mixer.

Many consoles have provisions to start external devices. System 20 has 8 momentary or maintained contacts, plus muting. But, users also wanted to be able to stop reel or cassette decks and electronic drive turntables. Our answer was to add 4 relays which will produce momentary "stop" contacts when certain user-selected mixers are turned off.

Finished product

To achieve a family appearance with our other products, System 20 was scaled to the same dimensional ratios as our popular System 12 console. However, it is about one and a half times larger. In fact, the solid walnut end panels are a full 1" thick!



Each of the 3 mixer types has a transformer balanced mono mic input and active balanced line input. Separate preamps are used for mic and line inputs, with 3 inputs per mixer. There are significant advantages gained by using mic input transformers in the broadcast environment, because of the superior isolation they provide. Ground loops and RFI are much less likely to be a problem than with active mic inputs. Also, a transformer is a neat way to get voltage gain, without noise.

The mixers are constructed on aluminum extrusions, which are covered with mylar overlays, silkscreened on the underside for durability and lasting appearance. The power supply is rack mounted, but all audio and control circuits are within the console, which does not require recessed mounting. As in our other audio consoles, a plug-in wiring harness is used to connect the various motherboards, which feature computer-generated ground planes.

Designing and getting a new product into production is both an exciting and exasperating experience, with the excitement part limited almost entirely to the start and finish of the project! System 20 was a particularly satisfying project, because of the participation of so many broadcasters in its final design.

Howe Features Simplicity & Reliability

by Quinn Morrison/Sales Manager
Howe Audio/BCP

Boulder CO ... At the 1979 NAB Convention in Dallas, the Howe 7000 series console made its first appearance. In 2 years, many stations across the country have selected a 7000 for their studios, and comments from management to engineering to programing have been very favorable.

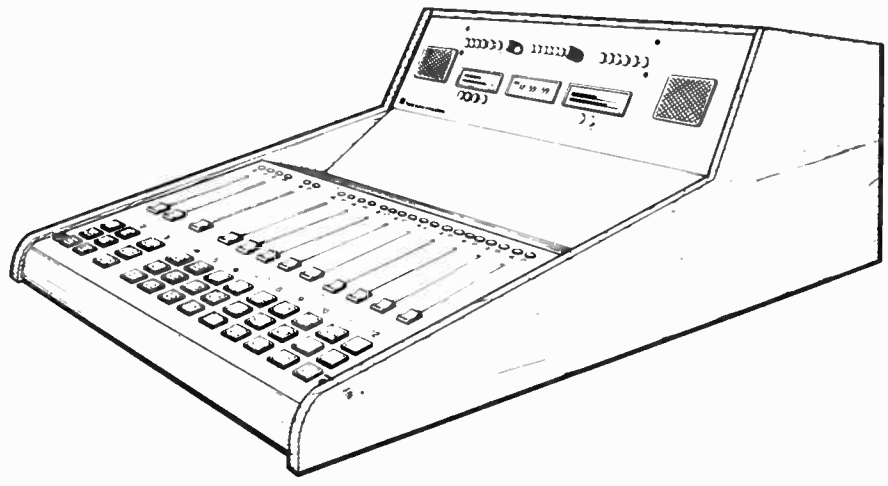
A lot has happened at Howe Audio since 1979, and at this year's NAB Convention in Las Vegas, the new Howe 8000 series console was first displayed. The Howe 8000 has numerous features that go many steps beyond the 7000 series, although the audio systems are interchangeable. The Howe 8000 has slide faders, and is fully logic-controlled.

The Howe Audio philosophy is still simplicity and reliability. To that end, an entirely new concept was designed to accomodate the needs of the broadcaster. Besides the slide faders, the 8000 has vacuum-flourescent meters and a real-time clock included on the front panel. Ease of operation, low profile, and an option panel all make their contributions. You can even simultaneously use program and audition on any of the 12 channels.

TTL logic interfaces start/stop control of a turntable, cart machine, or anything else you can think of, and is totally field programmable. A programmable velocity sensor is an integral part of the input module. When the fader is moved above a predetermined speed, the audio will turn on, and issue a start command. The Howe 8000 is also VCA operated, no audio in the faders.

The original configuration of the Howe optically-coupled VCA (voltage controlled attenuator) has proven to be an unbeatable concept. In the VCA portion of the console, each input is mixed to common output sum busses by means of a voltage control which comes from the fader section. Each VCA is composed of 6 optically-coupled field effect transistors. The optically-coupled FET is equivalent to a resistance which varies as a function of the light intensity of an internal LED.

Control of audio volume is through a "T-pad" of variable "pass" and "shunt" resistances (FET's) which respond to variable LED light intensity. At the bottom of the fader, the shunt resistance is at a minimum, and the pass resistances are at a maximum. When the fader is full up, the shunt resistance is at a maximum, and the pass resistances are at a minimum. With proper design, a dynamic range in excess of 100 dB can be derived.



Naturally, that dynamic range is dependent on other components of the Howe console, in addition to the VCA's. Some methods and specifications are worthy of mention. For example, the input amplifiers are active-balanced instrumentation amplifiers that provide several functions.

Coarse gain for signals from microphone to line is selected by the use of specific resistor networks. These determine the current delivered to the input opamps, and thus overall gain. Just plug one in. A fine-adjust trimmer for each channel's left and right element completes the process of establishing gain level. All 22 inputs have individual left and right trimmers.

Next, the input amplifier provides an active-balanced output through use of an additional opamp phase inverter at normal output. This circuit design, combined with the choice of a high-speed, BiFET opamp provides good common-mode rejection against RF, other electro-magnetic interference, and audio crosstalk in later stages of the console.

Another contributing factor to the noise floor of better than -70 dBm is the use of a current or virtual earth mixing scheme. The sum bus is nearly 0 impedance. This scheme provides high source-to-source isolation.

The Howe consoles provide user-programmable +15 VDC phantom power on inputs. This power can be used to operate additional devices such as phono preamps, telephone interfaces, etc, manufactured by Howe Audio. This system allows for peripherals to be purchased at a lower cost and use less energy to operate, as there are no additional power supplies involved. Some condensor microphones can also be operated through phantom power rather than battery or external power supplies.

The Howe 8000 now takes all of the audio techniques developed in the 7000 series, and adds a TTL-based, slide fader control panel. The control panel employs long travel faders with a high life expectancy Resilon element. A cue detent is located at the bottom end of the fader, but cue can also be accessed with a push button, rather than pulling the slide fader into the detent position. Two additional buttons below each fader are for audio on/off, and remote start/stop of mechanical devices.

Several logic safety features are built into each input module to prevent inadvertent airing of a source. The start impulse to a turntable, cart machine, etc can be

(continued on page 10)

Console Design for the Real World

by Hank Landsberg
Gregg Laboratories

Anaheim CA ... Although there have been numerous changes in the broadcasting industry over the past few decades, the operation of a typical "On-Air" radio studio hasn't changed significantly since the '40s. DJ's still play music and commercials, talk, and ride gain. Hence the functions of radio consoles haven't changed much, most "boards" do essentially the same thing.

Here we will not concern ourselves with the functions of consoles, and since most consoles quote nearly identical electrical specs, we won't even address audio performance. What will be discussed are the changes in console design that have occurred in the past 10 years. Unfortunately, many of these changes have been for the worse!

Way things were

Back in the "olden days," professional equipment manufacturers took a professional attitude in producing products for a professional industry. Consoles built in the '50s and '60s reflected this. They were "bulletproof," designed to do the job 24 hours per day, 7 days a week, for at least 20 years. A quick survey will reveal hundreds of '50s vintage console still reliably on the air.

About a decade ago, equipment manufacturers discovered a terrific way to cut costs and increase profits! Instead of building consoles with professional, commercial grade parts, they substituted consumer "hi-fi" components. Heavy-duty "Lever Keys," step attenuators, VU meters, barrier strips and the like were replaced with cheap plastic switches, poor quality slide pots, inaccurate voltmeters with VU scales and PCB mounted solder terminals.

Then there was the "New Improved Technology." FET's and relays were used for audio bus switching because they were "quieter and more reliable." DC controlled VCA's were used for gain control because they were "more accurate." Hi-Tech horse manure! In reality, FET's were used to justify the use of a cheap, plastic "toaster switch" in place of a commercial quality switch. VCA's allowed the manufacturer to substitute a $3 pot in place of a legitimate attenuator.

This "New Improved" circuitry looked good on the drawing board (and balance sheet), but it failed miserably in the field. All the FET's in the world won't prevent a consumer-grade switch from jamming. A "volume control" pot will fail mechanically despite the VCA it controls. The "Plastic Special DeLuxe" console worked for about 1 year before major parts replacement was necessary. This is not my idea of "Broadcast Quality."

A few years ago, I decided that the industry was ready for a broadcast console designed for the real world of radio. After consulting with numerous LA area Chief Engineers and console operators (and having been a DJ, production man, and CE myself) I generated the design of a "Typical On-The-Air Console." Here is an overview of the input that was incorporated into the design.

For the console operator

Keep it simple so that an average DJ can't make mistakes! No more controls than are actually necessary for daily use. Input gains, output masters, and other "set once and forget" adjustments should be internal. Controls should be arranged logically, according to frequency of use. Remote "start" buttons are a must! Don't have more than 1 source feeding each pot. Instead, put multi-input selectors on a couple of channels.

Make it versatile with plenty of remote line inputs, mode selectors on stereo line channels, and defeatable pots on mic channels. Include 3 external monitor inputs, a digital timer with auto-reset, multi-input headphone and cue systems. Three stereo output buses, each with a summed monaural output would be ideal.

For the chief engineer

Make it bulletproof with sturdy construction, and coffeeproof, without cracks between modules. (A solid metal main panel keeps coffee and smoke out better.) Make it reliable by using only commercial grade parts: sealed switches with gold plated contacts, premium line faders, and a minimum of mechanical connectors.

Keep it simple inside with no VCA's, no relays, a minimum of things to go wrong. Don't use a bunch of TTL chips where 2 transistors will do. Use straight forward circuitry because it works. Barrier strips are a must for all audio connections.

Make it sound good with state-of-the-art audio performance: perfect square wave response, differential transformerless input amplifiers with variable gain (no pads!) on each channel. The output amplifiers must be differential transformerless also, and capable of driving ten 600 ohm loads without the need for an external DA. Use real VU (or peak program) meters.

Make it easy to service and change inputs from mic to line by using plug-in circuitry, but only where necessary. Make it affordable so that the "average" station can have reliability and professional quality in the control room.

Good combination

The design is (not surprisingly) a product of 2 generations of broadcast equipment: the flexibility and audio performance of the '80s, and the quality and integrity of the '60s. Three prototype consoles have been built and were immediately sold to major LA area stations, where they're happily on the air today.

Due to a real need for a "better mousetrap," a superior product evolved, the Gregg Laboratories Model 2014 Broadcast Audio Console. Emphasis has been placed on the use of only high grade components: Penny & Giles premium line faders, Honeywell-Microswitch pushbutton switches, Grayhill mil-spec rotary switches, Dixson VU meters, Bourns conductive plastic rotary controls, and Signetics NE-5532 amplifier ICs mounted in sockets.

While space does not allow a complete description of the console, let it suffice to say that many broadcasters are in agreement with our design philosophy, and have placed orders to prove it! Several units are now in production, with deliveries to begin in the Fall.

Console Development

(continued from page 1)

design, testing, specification approval, mechanical design, packaging design, along with the deadlines required and personnel responsible for each.

This initial phase of development, where the basic standards required of the particular project are determined, is the most important aspect of the entire job. Considerable thought must be expended by everyone concerned to ensure that all considerations are complied with. The thoroughness of the planning at this stage will have a very great effect on all subsequent phases of the development. If everything has been adequately allowed for, then the job will go smoothly and on schedule; if not, then problems can be expected to arise. In the course of any new development, both time and money are saved by careful consideration at each level, before going ahead with the engineering of the hardware.

The technical marketing committee, consisting of the company president and representatives of the sales, engineering and production departments, will continue to review the progress of the development at its bi-weekly meetings until completion of the prototype unit. At each of these reviews, reconsiderations and changes in the course of the design may be made in order to meet the original objectives.

The completed prototype unit is then analyzed and tested by the engineering, production and test departments to verify that it is, indeed, a viable product. Along with this, an accurate cost accounting is prepared to check that competitive pricing objectives can be met. If any changes are deemed necessary, they are incorporated into the prototype and tested before release to production.

After proper consideration has been given to each stage of this lengthy development process, the resulting console will be one which meets the original objectives and gives the company a competitive, quality product and which provides the quality, features and longevity that the broadcast industry has come to expect from McCurdy.

Build it yourself

The Modular Console Kit

by **Brad McClanahan**
Professional Systems Exchange

Annapolis MD ... How many times have you drooled at the sight of a big 32-in, 32-out, 32-monitor console, and literally cried at the mega-buck price tag attached? Or perhaps while taking a stroll down Broadway you pass one of many large studios and as you peer into their window you spot a computerized console that almost seems to be crying out to you, "Put me in your shopping bag and take me home with you"!

Why is it that so many studios have to rely on lesser clientel due to the lack of tracks on their console? Particularly when the trend of the stars is "bigger means better!" Now we recognize that this is not always true, and in some instances not true at all. But how many times have you convinced a client of this? I heard of one case here in Washington, DC, where a major recording star came to her favorite studio with a 24 track master and the studio had to hand the contract to another studio because they were only set up for 16 track operation!

New concept

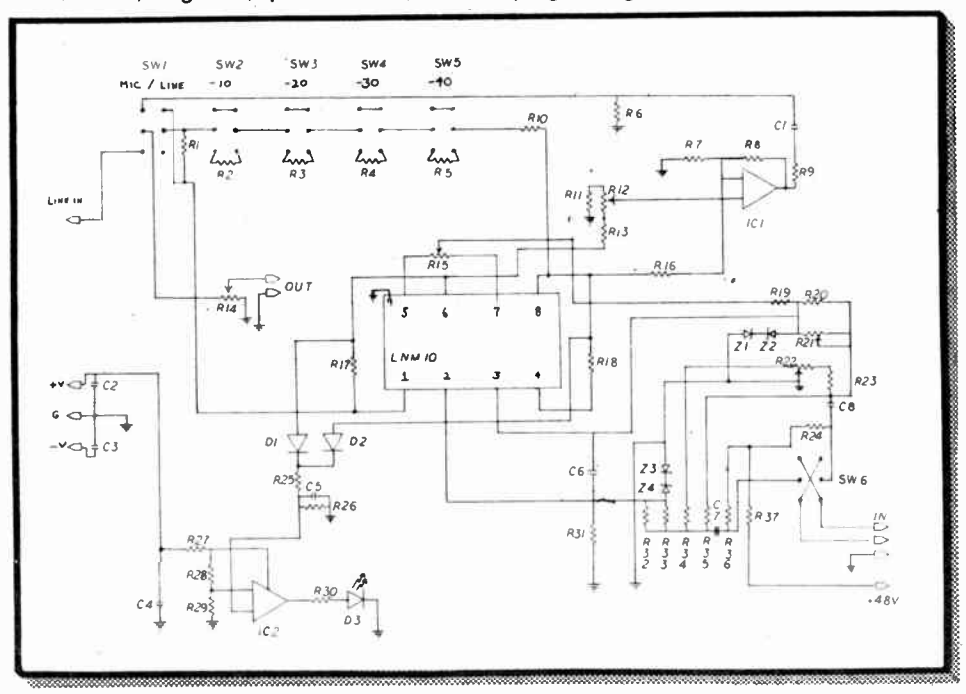
Thousands of situations like this are what prompted Bob Lloyd of Precision Electromagnetics, in Bowie, Maryland, to introduce a revolutionary new concept that promises to change the recording industry. "We are going to help individual studio's build their own recording console. Just as big as their imagination and just as small as their need," says Bob

This project began in the early '60s when Bob became aware through his own recording efforts that many recording studio consoles were not only overpriced, but in many instances overrated. As Bob puts it, "The industry needs a machine, and needs one they can afford. I'm going to give them a console, a professional console, that studios and radio stations won't have to sell their first born male child into slavery to buy."

The identification of this need led to the concept of a modular, console kit. In this article I will critique the machine, its functions, and outline rigid specifications utilized in its manufacture.

Unique system

The construction of the recording console and the purchase of the necessary parts will be handled by Professional Systems Exchange (PSE). Each month, through the PSE publication, "audience," instructions, diagrams, specifications, and



parts lists, will enable you to build the console step-by-step. You can purchase all or some of the parts through PSE or buy them anywhere you wish.

The only Catch-22, if there is one, is that you must have a subscription to PSE's "audience" in order to obtain the instructions. *(Ed Note: See ad on this page.)* However, in building your console you will obtain a great savings as opposed to the conventional "bought off the store floor" model.

The next issue of "audience" will bring you Phase I of the construction of the console, "The Preamp." The preamp is a state-of-the-art, industry first which incorporates such features as independent modular construction, machined brushed aluminum casing, with black anodized coating and screened. It truly has a beautiful cosmetic appearance. The rest of the external specs are as follows: front panel controls, mic line switching, -10 thru -40 push button selectable gain, LED overload indicator, 4¼" mechanical travel Duncan slider, plug-in edge connectors with gold plated fingers, and an overall outside size 1½" × 7".

The electrical specifications are impressive: gain range, lines in var. to +60 dB; noise, at 60 dB gain, -1 dB (EIN = -129.8 dBV re 0.775 V); slew rate, 13 V/microsec; CMMR, over 100 dB; output, +22.5 dBV into 600 ohms or greater (w/5534); THD = 0.006% at +22 dBV out; IM dist, 0.006% at +22 dBV out; power, plus or minus 18 V; also includes phantom microphone powering.

The preamp is Step 1 in the construction of the console and they are currently available through PSE at $149.95 each. An excellent price for the quality of such an elaborately designed item. The preamp being the heart of every console I can't stress enough choosing the appropriate preamp for your console. The PEI model has been designed with quality control in mind, and should provide its purchasers with the utmost in satisfaction.

Next modules

Next we will consider Phase II of the PEI console kit, the Effects/Sends Module. The conventional board has an average of 3 sends, with the PEI console kit, Bob Lloyd is introducing 8 busses. Substantially more than the average well structured board. Also incorporated into the effects/sends is solo/mute switching, panning, and echo sends. As you can see expense wasn't spared to produce an excellent product.

Phase III will cover equalization. PEI's EQ will be fully parametric with carefully designed low noise circuitry, provide a frequency response of plus or minus 0.5 dB, 10 Hz to 45 kHz. More specs are: signal-to-noise EQ in, 99 dB (max-out); THD at 1000 Hz, EQ in, equals 0.025%. This represents one of the best equalizers on the market.

Following equalization in Phase IV, the compressor limiter modules will be introduced. Phase V will cover output switching. Phase VI will deal with the summing amps. Phase VII introduces light metering. Phase VIII will describe the computer interface option. Plus we expect many other options too numerous to detail.

The PEI Recording Console Kit has already received attention from hundreds of interested studios, radio stations, and folks just plain interested in building a professional quality board. No one before has ever attempted producing, in kit form, a truly professional recording console. "The only kit I've ever seen besides mine was certainly not designed for professionals and what good is a console kit if it is not even adequate for a band!" boasts Bob Lloyd. I feel the console kit Bob has put together will become serious competition for the major name brands.

Howe

(continued from page 8)

field-selected as momentary, or continuous, and is in TTL format. (Interface cards for units not accepting this format will be offered by Howe Audio.) The impulse can be set to occur with audio-on, or can precede audio by up to 1 second (this time period is also field adjustable). To aid in operation, 7 LED's indicate status of each channel at a glance.

The top portion of the Howe 8000 contains 3 vacuum-flourescent displays. The middle unit is a 6 digit real-time clock. The other displays are bar graphs of stereo program and audition. The meter action is fast and accurate and easy to read, even in high light levels. The meters can be set for either peak or VU display ballistics.

All the electronics are modular in design for ease of service. A full width (31" × 4") option panel of aluminum is provided between the faders and the displays for customizing the 8000 for a station's specific applications.

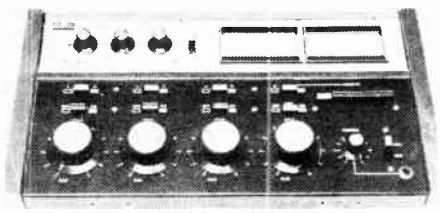
The Howe 8000 is a console that may satisfy many of your needs in one package. The 12 fader, 22 input configuration with stereo audition and program, and mono program outputs as standard features, sells for under $9,000.

PRESS RELEASES

Arrakis Systems

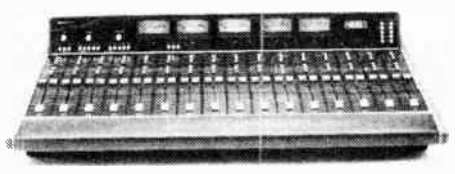
Arrakis Systems does more than make a line of fine audio consoles, it represents a new marketing philosophy. Arrakis intends on supplying the industry with the broadest line of audio consoles imaginable. Arrakis consoles provide professional features, innovative engineering, and the ultimate in quality.

Despite this, Arrakis consoles are the least expensive in the industry. This reflects Arrakis marketing philosophy of only factory direct cash sales. The 20% distributor markup and 5% cash discount are passed on as savings to the buyer.



Broadcast Electronics

BE's family of 4 mixer, rotary-fader models include the 4V50, Versa Console, intended for rack-mount installations, primarily for production and semi-permanent remote broadcast installations. Desk-mount 4 mixer models are available in either mono or stereo configurations, and are designated Models 4M50 and 4S50 respectively. BE consoles also go up to a 12 mixer, vertical fader, dual channel model, in mono and stereo.



Cetec Broadcast Group

After careful review of the broadcast industry and its studio needs, Cetec Broadcast Group has incorporated the optimum design features most frequently requested by broadcasters and combined them into one audio console for use in an "on-air" studio or "off-air" production facility. That console is the Cetec 8000 Series console and operates with 16 channels in full range stereo.

MCI

MCI recently announced the release of the JH-500D series of professional recording/remixing consoles. The JH-500D is descended from the earlier JH-500's which were one of the best selling lines ever created. The new series features totally transformerless microphone inputs and multitrack recorder interface; and with expanded features, this console is unsurpassed in capability.

Six frame sizes of 28-56 inputs are available. All include 32 output buses, in-line monitoring with quad/stereo/mono outputs, full 4 band equalization on each input, 6 effect/foldback sends, VCA grouping with 8 dedicated group master faders, and the MCI plasma display featuring VU, PPM, and DC bargraph metering. Level and mute automation are optionally available.

ProTech Audio

Employing the latest in audio technology, ProTech Audio 3000 Series broadcast consoles incorporate "custom" features and "state-of-the-art" performance, along with traditional functional requirements for AM/FM radio broadcasting and production. Including both monaural and stereo versions, they are equally suitable for television audio and large disco installations. Handsome, "big board" styling and "human engineered" control panel layouts will enhance the appearance and smooth operation of any control room.

Harris Corporation

The Harris Micro-Mac console incorporates a "start from scratch" philosophy that makes it unique. The first broadcast audio console with digital microprocessor memory, it is also the first offering automatic logging in a live operation. With microprocessor control and revolutionary linear attenuators, the Micro-Mac represents a major breakthrough in audio console design.

Excalibur

The Excalibur AC-6 stereo console was displayed in prototype form at the 1981 NAB Convention where it received a good response from those in attendance. The AC-6 was designed for production room use in smaller markets, but is of appropriate audio quality for use in any size market where a 6 mixer console could be used.

The technical specifications are superb for a console in its price range: +24 dBm output capability on both program and audition outputs; 50 Hz to 15 kHz, plus or minus 0.5 dB, frequency response; total harmonic distortion, less than 0.1% at rated output; intermodulation distortion (SMPTE method), less than 0.1% at rated output.

It is intended to provide technical and operational features usually found in higher priced consoles at a price that can be afforded by smaller market stations. Excalibur also makes a large 8 mixer console, the AC-8.

Autogram Corporation

Autogram consoles are available in 3 different standard models, the IC-10, 10 channel; the AC-8, 8 channel; and the AC-6, 6 channel. Our equipment features all modular construction, input at low, high, or line level, hand wired on the stereo console, remote start function, 5 program outputs, and quality parts throughout with a human engineered front panel format.

LPB Inc.

LPB Signature II audio consoles are designed and manufactured to a high level of operational capability and electronic/mechanical reliability for the master control requirements of broadcasting and production. Extensive human engineering and years of experience in console design have been combined to provide the operator with a console which is both visually appealing and easy to operate.

Internally, the approach is similar with immediate visual identification and ease of access to every component and connection in the console. LPB Signature II audio consoles are available in 5, 8, and 10 mixer stereo-mono models.

And that's a look at how some console manufacturers are facing the challenges of an increasingly sophisticated audio market. The performance standards developed by the recording industry are finally being accepted by the broadcast folks. Perhaps it's small wonder that some of the leaders in "pro" audio have turned to the console market. And whatever their motives for doing so, we'll all benefit from their contribution!

Next month we'll look at reel-to-reel recorders. Analog recording systems have been greatly improved in the past half decade, again because of the recording industry. We'll look at what's new and what's planned in tape recording in next month's issue. Meanwhile, if you have any suggestions or would like to contribute to this monthly section, let us hear from you!

—Mark Durenberger

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VENDORS

Here are the names, addresses, phone numbers and contact personnel for all of the companies that submitted information for this issue of the Buyers Guide.

Arrakis Systems
PO Box 296
Bolivar MO 65613
417-756-2850
Mike Palmer

Autogram
PO Box 456
Plano TX 75074
214-424-8585
Ernest T. Ankele, Jr.

Auditronics, Inc.
3750 Old Getwell Road
Memphis TN 38118
901-362-1350
Keith Arnett

Broadcast Audio Associates
11355 Pyrites Way
Rancho Cordova CA 95670
916-635-1048
Dave Evans

Broadcast Electronics Inc.
4100 North 24th Street
Quincy IL 62301
217-224-9600
Tom Humphrey

Cetec Broadcast Group
1110 Mark Avenue
Carpinteria CA 93013
805-684-7686
Tony Mezey, Jr.

Excalibur Electronics Inc.
5645 Mount Burnside Way
Burke VA 22015
Bill Ashley

Gregg Laboratories
2120 E. Howell Ave. #505
Anaheim CA 92806
714-937-1100
Roy T. Mendoza

Harris Corp.
PO Box 4290
Quincy IL 62301
217-222-8200
Eric Jacobson

Harrison Systems Inc.
PO Box 22964
Nashville TN 37202
615-834-1184
Dave Purple

Howe Audio Marketing
3085 A Bluff Street
Boulder CO 80301
303-442-3231
Quinn Morrison

Logitek Electronic Systems
3320 Bering Drive
Houston TX 77057
713-781-4592
Scott Hockberg

LPB Inc.
28 Bacton Hill Road
Frazer PA 19355
215-644-1123
Harry Larkin

McCurdy Radio Industries
108 Carnforth Road
Toronto 16, Ontario
416-751-6262
Len Hall

MCI
1400 W. Commercial Blvd
Ft. Lauderdale FL 33309
305-491-0825
~~Larry Lamoray~~

Micro-Track Corp.
620 Race Street
Holyoke MA 01040
413-536-3551
Bill Stacy

Pacific Recorders & Engineering
11100 Roselle Street
San Diego CA 92121
712-453-3255
Mike Uhl

Professional Systems Exchange
1281 Cape St Claire Road
Annapolis MD 21401
301-262-6869
Brad McClanahan

ProTech Audio
Flowerfield, Bldg #1
St James NY 11780
516-584-5855
Rick Belmont

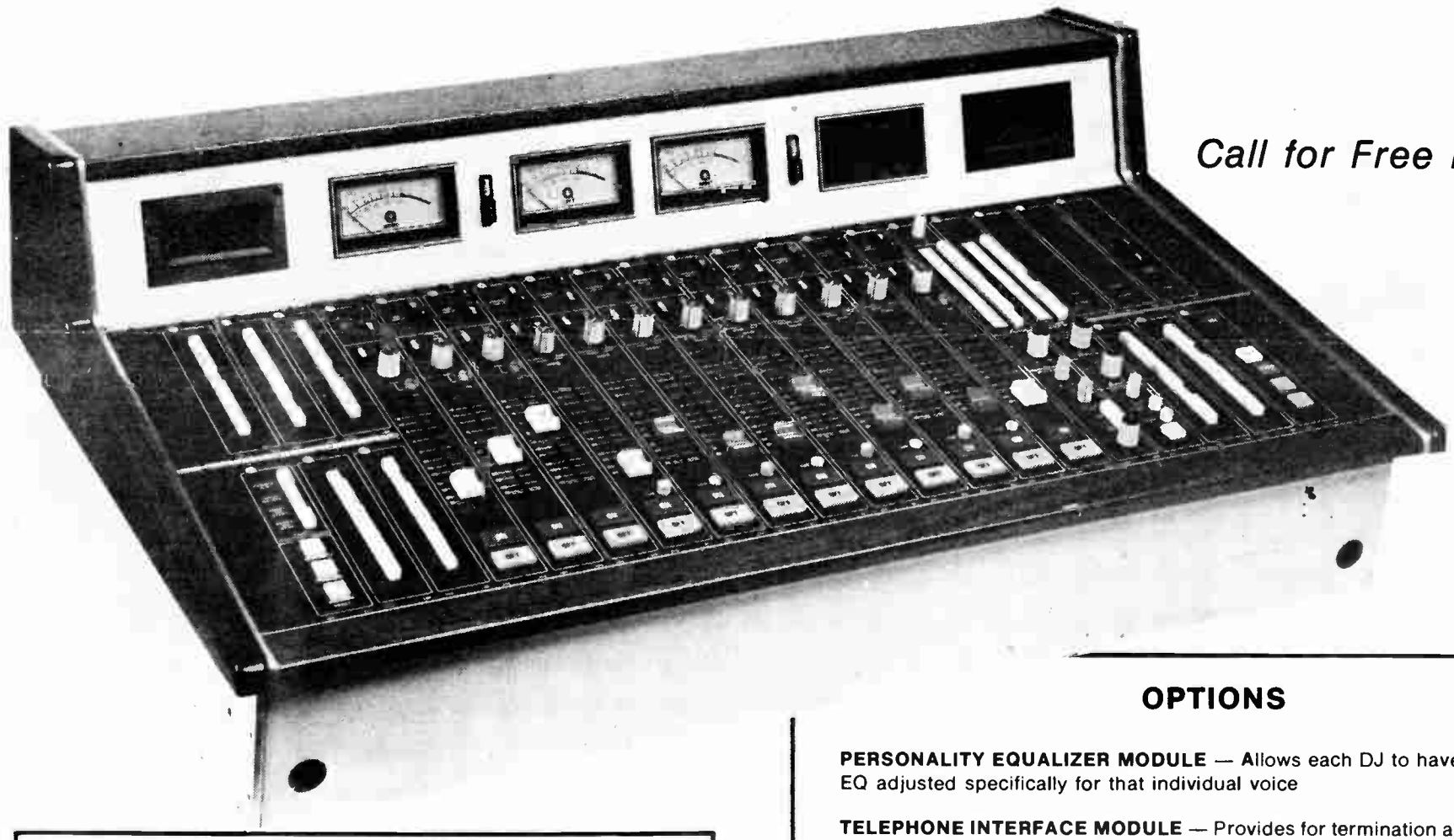
Sphere Electronics Inc.
20201 A Prairie
Chatsworth CA 91311
213-349-4747
David Holmes

INTRODUCING THE 200 SERIES ON/AIR BROADCAST MIXING CONSOLE FROM AUDITRONICS

Introduction of the 200 Series On-Air console brings a major advance to broadcast technology, offering a high degree of reliability along with simplicity of use in a compact, operator oriented package.

The design is based on information and data gathered from an extensive two year research program conducted throughout the broadcast industry. It satisfied the requirements of both engineering personnel and on-air personalities, while offering the station owner a highly cost effective investment.

The 200 Series is available in three basic configurations — the 6 input positon Model 206, the 12 input position Model 212, and the 18 input position Model 218. Together they cover a range of needs from newsroom applications to the largest multi-studio installation. A totally modular concept allows the user to buy only the equipment and options needed at the present time, while allowing for simple future expansion.



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MAJOR FEATURES

- **VCA input level control**
- **Equalized headphone module 2-Way communications from both studios to control room**
- **Precision adjustable stereo line input padding**
- **†30 dBm output capability**
- **Comprehensive and easy to use logic system**
- **Active transformerless stereo inputs**
- **On-card power regulation**

ONE YEAR WARRANTY

OPTIONS

PERSONALITY EQUALIZER MODULE — Allows each DJ to have a customized EQ adjusted specifically for that individual voice

TELEPHONE INTERFACE MODULE — Provides for termination and assignment of incoming phone lines, with side tone null, AGC, noise filter, optional connection to external delay devices, and other features

NOISE GATE/COMPRESSOR — Special application module for processing signals from locations with noisy backgrounds or with wide level variations

STEREO LINE INPUT SELECTOR — Allows any of eight stereo line sources to be assigned to a single stereo line input

- **DIGITAL CLOCK**
- **DIGITAL TIMER AND AUDITION OUTPUTS**
- **ANALOG PEAK METERS**
- **TRANSFORMERLESS PROGRAM**

BCA

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