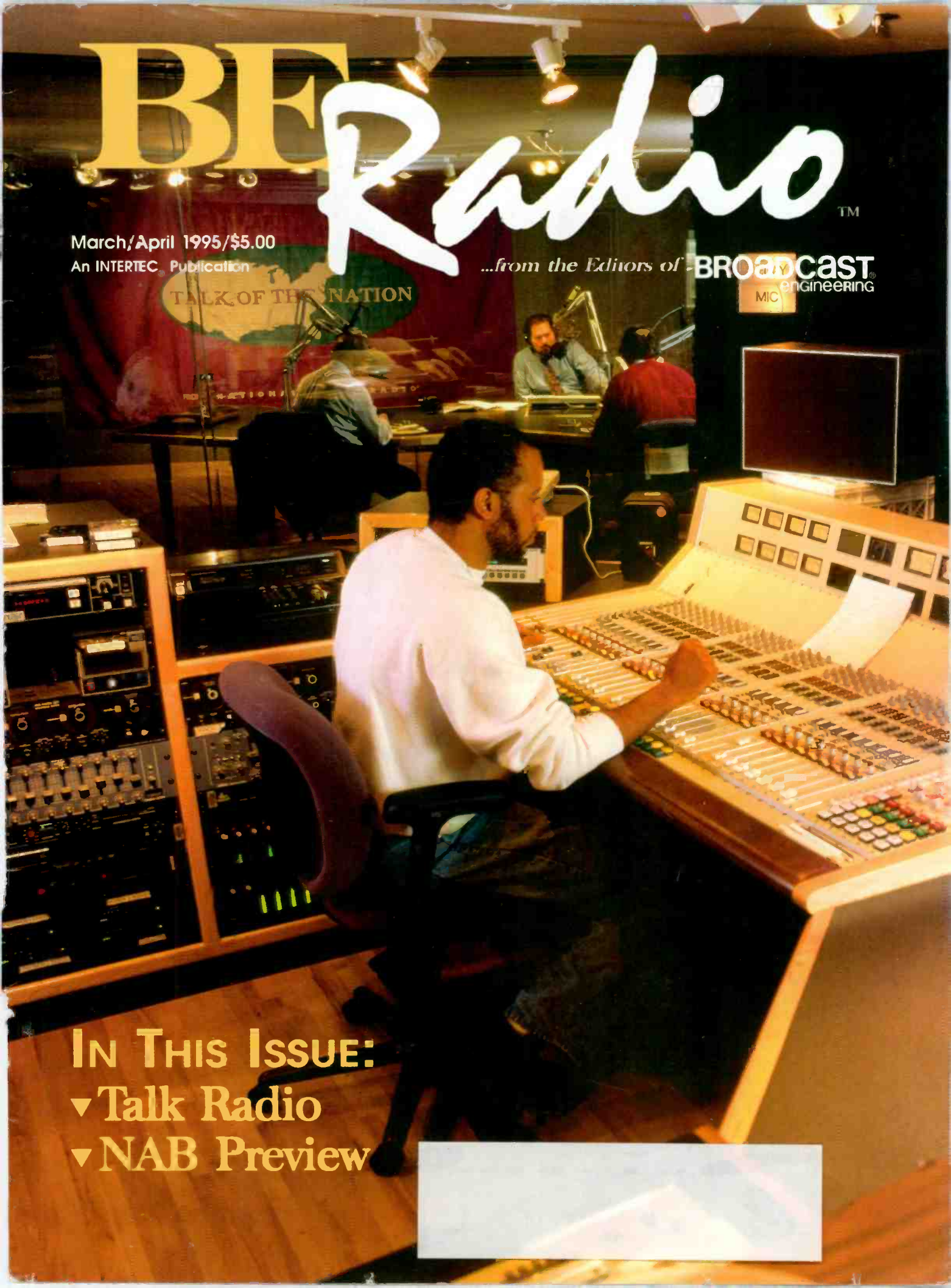
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▼Talk Radio
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ON THE COVER: At National Public Radio's headquarters in Washington, DC, Studio 3A is the home of "Talk of the Nation," a daily talk-radio show aired on about 100 U.S. stations, and via DBS radio in Europe. (Photo ©1995 Harlee Little.)

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Editorial:

Tuning through cyberspace

It seems a week doesn't pass without another story that puts the words "radio" and "Internet" in the same sentence. So far this phenomenon seems not much more than a hacker's toy, but I can't help thinking there may be something of radio's future in it.

Think about how people use radio today. The AM/FM receiver is usually packaged as part of a multiformat entertainment/information audio platform, either in the home, in the car or on a portable product. Radio is with us wherever we spend time.

The fast growth of multimedia and on-line services has made the home computer another home entertainment/information platform, and increasingly this hardware includes hi-fi sound capability. With the growing amount of time people spend at the computer, shouldn't a radio receiver be in there, too? Sure, you could just turn on a portable radio next to the computer, but I'm thinking of more than that – an interactive or multimedia form of radio. Why should all of this new platform's input come from pre-recorded sources (like CD-ROM) or dial-up on-line services (like CompuServe, AOL and Prodigy)?

Of course, those services have all been designed with the new platform's capabilities in mind. It's a seeker's (not a surfer's) world. Today's radio may have a lot of positive attributes, but interactivity isn't among them. Even proposed future DAB services won't offer this important media component. A radio service that comes to your computer, either in a wired or a wireless form, will have to include some measure of interactivity to be successful.

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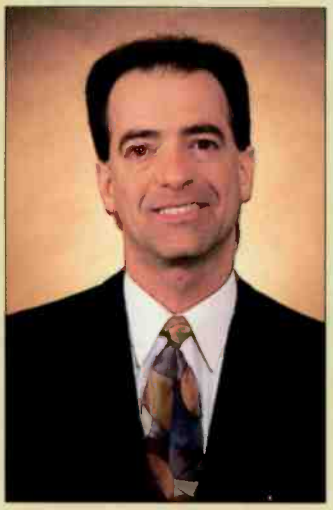
This is what intrigues the more forward-thinking folks about a computer-based radio receiver. The convergence of radio and computer could bring some powerful new functionalities. Such a *cyberadio* could operate either as an on-demand downloading device for audio (plus text/graphics) files, or as a "skimmer" of selected programming from one or more continuously broadcast streams. (The latter is not a new idea. It was originally espoused by the MIT Media Lab's Nicholas Negroponte, who dubbed it "broadcatching." More recently, Microsoft's Greg Riker presented a compellingly real portrayal of the concept at the 1994 NAB Radio Conference.)

Assuming any of this is a future possibility, getting from here to there won't be easy if current offerings are any indication. Today's Internet audio services are not hi-fi. To hear programs in real time you generally need wideband (Ethernet or ISDN) access to the network backbone. Some services also require decoding software that is platform-specific. Connections are unreliable and at the mercy of the network's throughput capacity. Most important, on-line radio services are not yet interactive. Typically, they are nothing more than lo-fi duplications of a radio station's existing "surfer" (i.e., on-air) service – with one important exception: They can be received *around the world*, which brings up some interesting regulatory questions regarding broadcast rights. (Current radio station clearances for most programming cover local distribution only.)

But these problems seem soluble, and if you take things to their logical extreme, practically *anybody* can become a radio station in cyberspace. New wired services would not be limited by scarce spectrum, so providers could offer them almost at will. The only problem in gaining listeners to your service will be in letting them know you're there. Radio stations have a great advantage in this area – they can use their on-air signal to promote their cyberspace address. They also have massive archives and substantial audio programming/production expertise to draw from, unlike most other cybernaut radio-wannabees.

Of course, this short discussion barely scratches the surface of the issues involved here. But it might make you think about moving to a digital production environment in your facility just a little more quickly. NAB '95 is a good place to shop around for this technology. You may also want to peek in over at the Multimedia World, too, and see how the traffic's flowing on the highway that broadcasters may be merging into.

Cyberspace audio probably won't ever *replace* radio as we know it, but it might add a nice new supplemental element to the industry. Or maybe it's all just a passing fad. But isn't that what the buggy-whip makers said?



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Managing Technology:

Filing minor changes

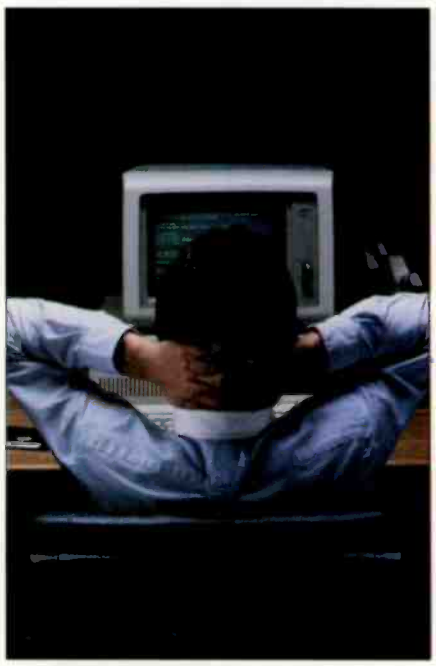
By Kirk Harnack and Larry G. Fuss

When is it OK to make a technical change at your transmitter site without asking or telling the FCC? The answer, of course, depends on the nature of the modification.

Because of a lack of awareness about "minor modifications," many radio stations are operating illegally today. Operating outside your station's *instrument of authorization* (its license) not only places you at risk of receiving a *Notice of Apparent Liability* (a fine), but it also places your license renewal at additional risk.

Filing for a minor modification is typically a detailed process, but not a difficult one. Knowing when to file and how to proceed is a subject that's best handled by your FCC consulting engineer.

Every station or station group should have a good working relationship with a trusted consulting engineer. This relationship is just as important as the association with your attorney. In fact, heeding good advice from a competent FCC consulting engineer may reduce the need to retain an attorney for most minor modifications.



Here's how a consulting engineer keeps your station out of trouble. Consider WAAA in Anytown, USA. The FCC granted WAAA an automatic upgrade from 3kW to 6kW. A few months later, WAAA installed a new transmitter, transmission line and antenna to effect the upgrade. Because it was the FCC that had informed WAAA about the upgrade, the station never thought to inform the FCC that the upgrade had been completed and what the specifics of the installation were.

The station should have filed FCC Form 302-FM within 10 days of the upgrade's completion. In fact, this form, along with an environmental impact statement, were *required* to be filed. Interestingly, no filing fee was necessary in this particular case. WAAA did not file the Form 302-FM, however, and was fined by the FCC after a routine inspection for operating outside the parameters of its license.

What triggers the requirement to file with the FCC for a minor change? The answers are different for AM and FM radio stations, and only a qualified FCC consulting engineer should be relied upon for definitive information. However, here are some basic rules of thumb:

AM stations

Any time a non-directional AM station's antenna is modified, the base impedance must be measured. If this impedance has changed by more than 2% from the licensed value, a new, complete measurement must be performed and submitted to the FCC. This is done on FCC Form 302 and, in this case, is called an *Application for Direct Measurement of Power*. After the FCC processes this form, the station will receive a modified license reflecting the impedance change. There is no fee associated with Form 302 when it's used for this purpose.

Almost any modification to the AM antenna will trigger the need to measure base impedance. This includes adding or changing any other antennas, coax cables or isolation transformers. Changing the lighting choke, Austin ring transformer, lighting fixtures or conduit also brings up the need for remeasurement.

Because an AM tower's base impedance is required to be close to its licensed value anyway, it's not a bad idea to check this parameter from time to time, even if no changes are made. If the measured value is within 2% of the licensed value, nothing has to be filed.

> Filing for a minor modification is typically a detailed process but not a difficult one.

Changes in the station's ground system are also likely to put the actual antenna system at variance with what's specified in the license. Rely on your consulting engineer for advice when any changes are proposed for the physical area around your AM tower.

AM directional stations require even more diligence to remain legal. The same rules of thumb apply as set forth above. Additionally, AM directional stations usually must perform a Partial Proof of their transmitted pattern after changes are made in the antenna system or on the towers.

FM stations

Anything that changes a station's transmission system requires applying for a construction permit (CP). Some examples are:

- A change in tower site (location).
- A change in tower height (see below).
- A change in the antenna system that changes the height of the center of radiation more than 3m.
- Any change in effective radiated power (with certain exceptions in Class A 6kW upgrades).

For any of the above items, a station must file FCC Form 301 and obtain a construction permit before making any such changes. Once the change is effected, a station must file FCC Form 302-FM for a modified license. Many broadcasters forget this important second step after making the changes they were authorized to make, and have had

Kirk Harnack is president of Harnack Engineering, a broadcast contract engineering firm in Memphis, TN. Larry G. Fuss is president of Contemporary Communications, a broadcast consulting engineering firm in Cleveland, MS. Respond via the *BE Radio* FAXback line at 913-967-1905 or via e-mail to beradio@intertec.com.

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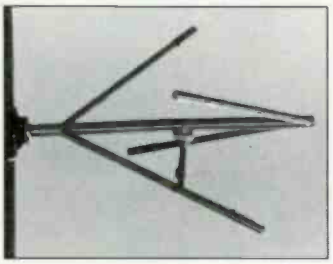

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their construction permit canceled for failure to file Form 302-FM. As far as anyone at the FCC knew, the change was never implemented.

Some changes can be made without prior approval, such as the following:

- Replacing an FM antenna with another model (as long as the height of the center of radiation does not change).
- Replacing the transmission line.
- Replacing the transmitter.

Nevertheless, after making any such changes, a station must still file FCC Form 302-FM for a modified license. For changes that do not require prior approval, there is no filing fee when submitting Form 302-FM.

Gotcha!

One often-overlooked requirement is that a construction permit is required whenever the height of the tower is changed – even if your station doesn't own the tower. If a station operates an FM antenna side-mounted on a communications tower and the tower owner decides to add an extra 50 feet to the top of the tower to accommodate new antennas, that station must file an application for a construction permit to modify the height of the supporting structure, even if the height of the FM antenna remains unchanged. If there are multiple broadcast stations on the tower, they must all file separately. It may sound unfair, but it's required.

Here's another rule of thumb: If your application includes a filing fee, don't send it to the FCC in Washington, DC. All applications involving fees must be sent to the proper lock-box in Pittsburgh, PA. A good FCC consulting engineer will have the proper address, filing fee code, and fee amount for each type of application. An application sent to the wrong address will be returned by the FCC, as will any application made with incorrect information about the applicant, an incorrect fee code, or an incorrect or missing fee payment. Years ago, the FCC would assist applicants in correcting minor mistakes and omissions on applications, but this is rarely the case nowadays. Applicants are required to dot every "i" and cross every "t" – properly.

> Years ago, the FCC would assist applicants on applications, but this is rarely the case nowadays.

Summary

Establish and maintain a good relationship with an FCC consulting engineer. Look for a consulting engineer with expertise in your area of need. Because rules and procedures change from time to time, try to use a consulting engineer who files successful applications frequently. Most important, don't hesitate to call your consulting engineer, attorney or knowledgeable staff engineer for advice on FCC filing. Inaction or the wrong action can jeopardize your station's license and financial position.

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Contract Engineering:

The contract part of contract engineering

By Mike Starling

Some legal theorists argue that the best contract may be the handshake. Either party can walk away from the handshake when the circumstances are no longer to their liking. Also, both parties will tend to be more flexible and proactive in retaining the benefits that led them to the original undertaking. These same theorists would argue that approaching a joint endeavor with premeditation about remedies triggered by any problems leads to an atmosphere ripe for resort to legal action.

A cursory look at the attorneys' section of the yellow pages tells you that many intelligent people apparently forgot Lincoln's admonition that the courts are "places of absolute last resort." Far too many matters that wind up in court result in outcomes that benefit only the lawyers.

Of course, the problem with a handshake or oral agreement is the lack of tangible evidence of the parties' original intentions. This is why almost no one uses handshake-based personal service contracts anymore. In many states, most personal services agreements must be in writing to be enforceable. So, although a few handshake service agreements still exist, the parties of any "arms length" personal services transactions are best protected by a written agreement that contemplates, as specifically as possible, the details of the bargain.

Contracts 101

It's not surprising that among legal scholars no single definition of a contract exists. But among the better definitions for non-lawyers is that a contract is "an agreement creating legally binding obligations of the parties." A binding contract has six essential elements:

1. An agreement containing definite terms;
2. drawn between competent parties;
3. based upon genuine assent (best evidenced by active bargaining);
4. supported by consideration (exchanging any thing of value, such as a promise not already required or provided);
5. made for a lawful objective;
6. existing in the form required, if any (such as in writing).

Technical services agreement

Point 1: Definite terms. The essence of a technical services agreement is the detailed spelling out of the services to be provided. An agreement that does not contain definite terms is not enforceable.

A broadcast technical services agreement should specify whether the contractor is to serve in the capacity of the chief operator for the licensee. If so, the duties stated in the FCC Rules, Section 73.1870 should be listed in the agreement (inspections, calibrations, repairs and adjustments, weekly log entries, etc.).

Depending on the needs of the station and the expertise of the contractor, non-routine services should be specifically included or excluded from the contract.

Among these services are studio design (or redesign), equipment specification, installation, construction services, consultant or contractor liaison, tower work, FCC applications and renewals, frequency searches and assessments of potential facility purchases.

If the contract is merely to keep the station on-the-air and operational, such non-routine services should be specifically excluded and detailed as services to be provided at an agreed-upon hourly rate. They could also be quoted separately from the maintenance services agreement.

In the absence of evidence to the contrary, it will be assumed that the contractor and manager are both of sound mind. Don't worry about this requirement – any lawyer can easily contest this point for most people working in radio!

Point 2: Intention and mutual assent – the role of bargaining. The law favors commerce and will make every effort to enforce a contract, provided there is evidence of what the parties intended. Some courts will ignore provisions of written agreements, especially "form-type" agreements, where the intentions of the parties are shown to be different from the terms in writing. This primarily occurs when the parties have effectively modified the agreement by their subsequent actions.

> The intention of the parties is the cornerstone of contract interpretation.

So the *intention* of the parties is the cornerstone of contract interpretation. In most cases, contract validity and enforcement remedies depend on intention alone. It is essential for anyone entering a personal services agreement to make sure that the important points are understood and agreed to by the other party. This is the essence of bargaining. The law considers evidence of bargaining as an assurance that genuine willingness to be bound was given by the parties involved.

Failure to actually bargain – and failure of the written agreement to state as clearly as possible what is intended – can be detrimental. For this reason, some lawyers insist that personal services agreements be drafted from scratch. This is not necessary, but a local attorney's review is always advisable.

A good "boilerplate" agreement form, jointly modified by the parties as necessary and preferably with each paragraph initialed by both parties, will normally be sufficient to

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show the intention to be bound by the terms of the agreement. The SBE has made such a form available for use by its members. This document is a good starting point for most broadcast engineering services agreements. Contact SBE at 317-253-1640 for a copy.

Proper written services contracts will, therefore, contain definite provisions on as many aspects of the undertaking as the owner/manager and contract engineer can reasonably anticipate.

Point 3: Recommended clauses. In addition to detailing the duties to be performed, the following areas also should be addressed:

• *Independence clause* – Broadcast technical services agreements should state that the contractor is an independent agent, performing the described services based on how and when his/her judgment dictates. The agreement should say that the contractor will be solely responsible for payment of employment-related taxes, workmen's compensation, disability, social security and unemployment payments required for contractor and contractor's employees.

• *Equipment, materials and incidental expenditures* – Who will provide which tools and specialized equipment should be spelled out. If equipment will have to be rented periodically (such as field-strength meters or instrument-calibration gear), such expectations should be listed. The contract should also state who will pay for any required incidental materials such as cable, connectors, tape and solder. Some contractors have been caught short, being billed for nitrogen tanks because "the previous engineer provided for that." If the contractor is to be reimbursed for mileage, that rate should be stated.

If the station is to pay for a pager and/or cellular phone, that should also be stated. For tax reasons, it is recommended that use of station-provided equipment, such as a pager, be minimized because it enhances the view that the contractor is actually engaged in employment rather than independent contracting.

• *Compensation (payment schedule and conditions)* -- The date that payments are due should be specified (first of the month, the 15th or bi-weekly). If the agreement is based on time and materials instead of a retainer, the contractor will need to submit his/her time sheet and receipts at a specified time prior to expected payment.

• *Availability* – Most broadcast technical services contracts provide for the contractor to be on call for "7/24" emergency services (i.e., at all times). Any limitations on the contractor's commitment to provide emergency services should be disclosed and agreed to on the face of the agreement. Broadcast technical services agreements usually provide for the substitution of a contractor-designated backup engineer.

If the contractor works for several stations and has committed to his 'primary client' that he will give them first call during a widespread emergency, the agreement should state this so that other stations understand that they will receive emergency services only after attention to the primary client.

• *Dispute resolution* -- The document should specify a mechanism for resolving any disputes that arise from the agreement. Referral to an arbitrator is becoming more common, but regardless of whether an arbitrator or court is to be the forum for dispute resolution, most agreements allow the successful party to recover for arbitration costs and reasonable attorney's fees. This discourages a reckless breach when problems arise. If the arbitration is to be binding, the agreement should state so explicitly and specify that such arbitration will conform with the rules of the American Arbitration Association.

• *Liabilities and limitations ('best efforts')* – Many broadcast technical contractors carry a large general liability policy on operations and vehicles. This can protect the contractor and give the owner/manager peace of mind about possible problem situations. Of course, maintaining such policies will drive up the contractor's costs. The agreement should contain language to the effect that the contractor is familiar with rules applicable to the broadcast service of the FCC and FAA. The agreement should also state that the contractor will perform work using "best efforts" in conformance with generally accepted good engineering practice within the broadcast industry.

Contractors should not accept responsibility for acts of God, severe weather, civil unrest, acts of third parties or other unforeseeable conditions and circumstances. Neither should the contractor accept consequential damages for any work performed, such as damages for lost airtime. An agreement that "guarantees" specific levels of performance or promises "absolute best service" invites problems because of the higher standard of care and diligence that the contractor will be obligated to deliver.

• Termination – The agreement should state conditions and terms for future termination. Termination clauses often allow either party to be released from the agreement upon 30 days notice to the other party. Some agreements also require a fixed sum payment for termination prior to a stated end date for the agreement.

Point 4: Likely station-imposed limitations. The following areas of protection for the station owner are generally provided in service agreements:

• *Limits on purchasing authority* – Most agreements will state a specific dollar amount over which the contractor may not spend without written approval of the management. The varieties range from no purchasing authority whatsoever to emergency spending authority only to all necessary expenditures. Especially for new relationships, purchasing authority limitations protect both parties from financial surprises.

• *Confidentiality and non-disclosure requirement* – Many stations will require engineering contractors to keep all matters related to the station's business practices and procedures confidential. This should be discussed in detail with station management. Some managers will insist that no information be divulged to outside parties – even at local SBE meetings on relevant topics. This can range from obvious "keep any information you see about our sales accounts to yourself" to a prohibition on discussing processor settings and even wiring configurations. As with all sections of the agreement, actual discussion and bargaining will steer the parties away from future misunderstandings.

The contract can work for you

Once an agreement has been entered, make it work. Remember Lincoln's "last resort" admonition. Business professionals should expect some changes in plans, requirements, and agreements as events and circumstances change. If the conditions surrounding the contract engineering agreement change, a written modification to the agreement should be executed by the station and contractor.

As with most situations, positive attitudes, a sense of teamwork and possibility thinking (the glass is half full) will resolve most disputes without any transfer of wealth to the legal profession.

The law of contracts varies throughout the 50 states and federal jurisdictions. This article is intended for general information and educational use only. Consult a local attorney before entering into a personal services agreement.

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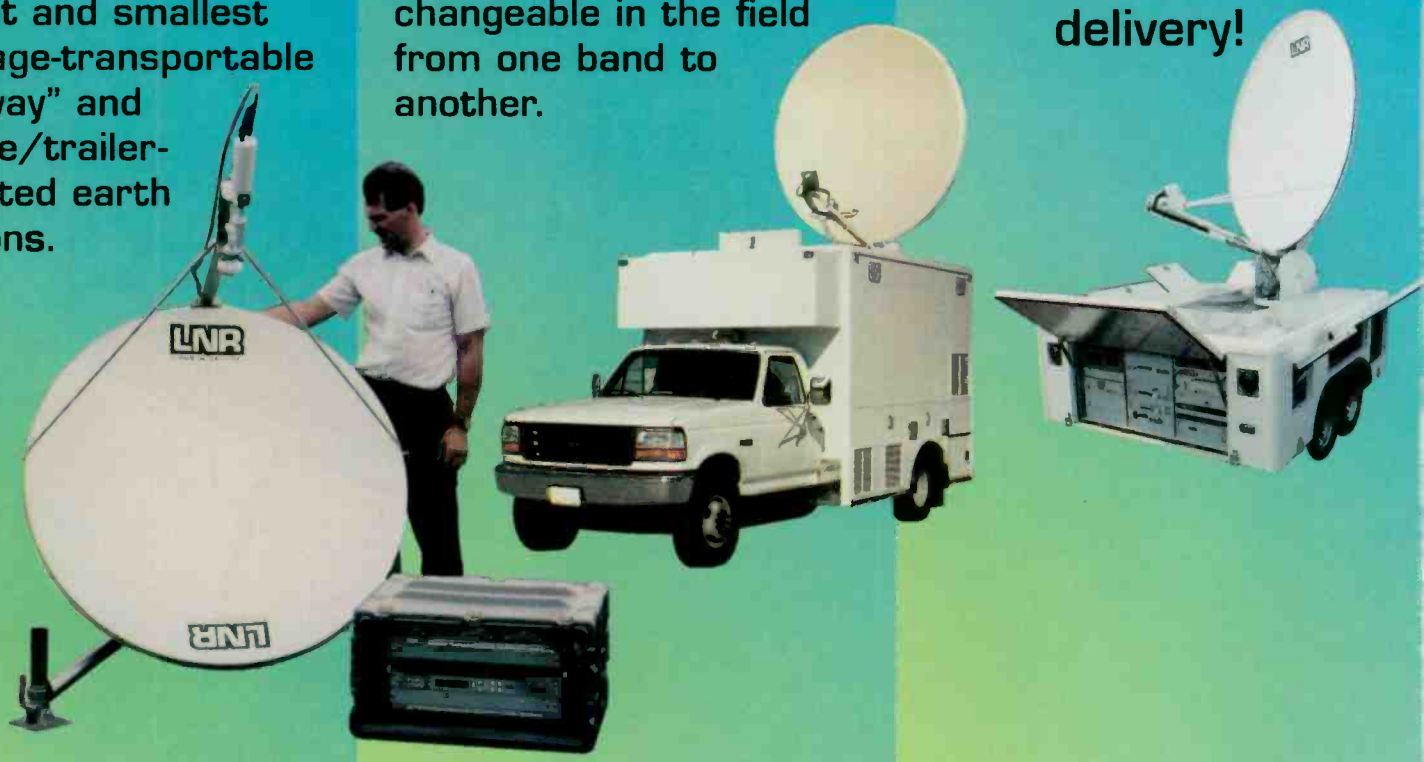

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DVF-K	Video	Digital	1.2	Ku	8 MHz	Intelsat
AVF-C	Video	Analog	2.4	C	22 to 36 MHz	Regional
AVF-K	Video	Analog	1.9	Ku	22 to 36 MHz	All
TRILITE™	Data/Voice/Fax	Digital	1.2 / 1.9 / 2.4	C, X, and/or Ku		All
X-LITE™	Data/Voice/Fax	Digital	2.4	X		DSCS/NATO
DVF-CI	Disaster Recovery	2.Mb Duplex	2.4	C	5 MHz	Intelsat
MVC-10	Data/Voice/Fax Order Wire	128Kb Duplex		C, X, and/or Ku		All

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RF Engineering:

Spring tune-up

By John Battison, P.E

As the poet said, "In spring, a young man's fancy turns to love." Today, the forward-looking engineer's fancy should turn to repairing the ravages of winter and to a spring tune-up.

Thoughts turn first to AM transmission ground systems that have heaved in freeze-ups, frozen and cracked base insulators, lightning strikes that have burned out and shorted base-current meters that were left in circuit by mistake or even burned out by just a voltage flashover, and similar events.

Usually the conductivity has been higher during winter cold spells, and this may have been reflected in higher than normal monitor-point readings. Spring is the time to make a circuit of all monitor points and carefully check compliance with the station's license.

For a non-directional AM station, a checklist should include a look at base operating impedance and base current. ATU coils and connections should be cleaned, including grounding and copper strap connections to the ground system.

For a directional AM system, measure common-point impedance and current. A check of operating logs over the winter is a good idea. If they show a trend of wandering phaser settings to maintain monitor points, a thorough cleaning of all connections is in order. If the phaser dial settings are considerably different from those at the beginning of the winter and returning the dials to the original fall readings puts the system out of limits, find out why. This could be an indication of capacitors changing value or a deteriorating tuning system.

It is also worth running an audio proof with the antenna and one using a dummy load. If the dummy high-frequency response is alright, but the response with the antenna falls off, suspect that something in the antenna system is limiting your bandwidth.

Cleaning and ventilation checks

It goes without saying that final tube operating parameters should be checked and that filters, ductwork and blowers should be cleaned and lubricated appropriately. Watch out for oily residue and dust on fan blades. Such accumulations can reduce the fan's effectiveness much more than you might think. After filling oil wells, be sure to wipe off any overflow.

Air-cooled tubes are extremely unhappy with overly hot operating conditions. Check airflow butterflies to be sure that vane-operated microswitches in the control network are not frozen closed and giving a false OK. Some engineers even will secure a thermometer to a tube to check its ambient temperature. This may be going a little far, but it makes sense when dealing with expensive tubes.

Dirt and dust, the transmitter's archenemies, are always attracted by high potentials. After making sure that power is off and high voltage is grounded, clean and dust all connections in the RF stages. It is helpful to use two vacuum cleaners: one blowing, with its brush dislodging dust from components, and the other sucking away the dust that is dislodged. There is no point in just moving dust from point A to point B. (Often one vacuum cleaner with hoses in its inlet and outlet ports will work well.) Don't forget to get between tuning-capacitor plates where dust can cause breakdowns, which in turn create pitting and tiny sharp points on the plates that can themselves initiate more sparks.

> In spring, the engineer's fancy should turn to repairing the ravages of winter.

Coverage checks

A directional station has an automatic signal check in the form of regular monitor point measurements. Non-directional stations should make field-intensity measurements twice a year at important points. These measurements should be done in the fall and spring, and the results compared. It is best not to perform these measurements during exceptional weather conditions, such as a drought or a heavy snowfall. Try to measure during similar conditions so that the conductivity increase associated with long intense cold will not influence results.

Probably, most stations have suffered from a gradual decline in conductivity in many areas. This has resulted from urban sprawl, which is not within the purview of the station engineer to cure – assuming the transmitting system is operating at maximum efficiency.

Antenna and grounding systems

Ground systems are subject to damage in winter. This occurs not only from traffic over the wet and muddy ground, but from heaving that can occur in wet and frozen areas. For example, in one case, a set of radials crosses a normally quiet stream that flows between two towers of a 4-in-line array. In the winter, when the stream floods, it is usual to find many radials broken off by flotsam coming down the stream, which becomes a raging river at times.

Continued on page 20

John Battison, *BE Radio's* consultant on antennas and radiation, owns John H. Battison and Associates, a consulting engineering company in Loudonville, near Columbus, OH. Respond via the *BE Radio* FaxBack line at 913-967-1905 or via e-mail to beradio@intertec.com.

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3 Which of the following best describes your title?

(Please check only ONE box.)

A. Company Management:

- 01 ❑ Chairman of the Board
- 02 ❑ President
- 03 ❑ Owner
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- 05 ❑ Director
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- 19 ❑ Vice President Engineering
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- 11 ❑ Other Engineering or Technical Title

C. Operations & Station Management/ Production & Programming:

- 12 ❑ Vice President Operations
- 13 ❑ Operations Manager/Director
- 14 ❑ Station Manager
- 15 ❑ Production Manager
- 16 ❑ Program Manager
- 17 ❑ News Director
- 18 ❑ Other Operations Title

D. Other _____ (please specify)

4 Which statement best describes your role in the purchase of equipment, components and accessories?

- A ❑ **Make final decision** to buy specific makes, models, services or programs
- B ❑ **Specify** or make **recommendations** on makes, models, services or programs
- C ❑ Have **no part** in specifying or buying

5 Which of the following types of equipment will you be evaluating for purchase in the next 12 months? (Check ALL that apply.)

1. Audio Products

- A ❑ Audio consoles
- B ❑ Audio recorders/players
- C ❑ Microphones
- D ❑ Digital audio workstations

2. RF Products

- E ❑ Transmitters/antenna systems/towers
- F ❑ Test & measurement equipment
- G ❑ Program transmission systems, STL/fiber
- H ❑ Satellite equipment/services

3. Other Products

- I ❑ Monitors
- J ❑ ENG/EFP equipment
- K ❑ Tape/optical storage
- L ❑ Cases, consoles, cabinets, racks, wire, cable
- M ❑ Automation equipment

4. ❑ None of the above

6 What is the budget for equipment you are evaluating for purchase in the next 12 months?

- 1 ❑ Less than $10,000
- 2 ❑ $10,000 - $24,999
- 3 ❑ $25,000 - $49,999
- 4 ❑ $50,000 - $99,999
- 5 ❑ $100,000 - $299,999
- 6 ❑ $300,000 - $499,999
- 7 ❑ $500,000 and up

7 If you checked A on question #2, what is the ADI rank of your market?

- A ❑ Top 20
- B ❑ 21 to 50
- C ❑ 51 to 100
- D ❑ Over 100

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Circle (13) on Reply Card

Continued from page 16

Falling ice can damage transmission lines if unprotected, and although not common, strange line currents can often be traced to lines damaged by ice slivers.

Snowplows clearing snow from traffic paths that are crossed by radials are common offenders. The plows sometimes tear up lengths of radial, then drag them away so that the damage is not seen at the time. Some "buried" lines have been cut or partially cut by heavy traffic, which causes random effects.

Corrosion and rust nearly always occur on tower and inter-leg connections during the winter months. For that reason, tower sections should be bound together. If an erratic noise is heard in a station's signal during winter, and it is not originating in the audio circuits up to the transmitter, it is worth looking at the tower connections and RF continuity. Cracks in a base insulator filled with conducting dirt or a loose RF connection will produce arcs and sparks that will have audible effects. So will ball gaps that are dirty or too close, which arc over on heavy modulation.

While performing all these maintenance checks, it is a good time to do the quarterly tower and lighting inspections. Be sure they are properly entered in the maintenace log.

Remote transmitters require a stricter check. First, it's usually much harder to get to one in the middle of the night while a storm rages. Second, such outages usually last longer and create greater repercussions. Control systems, auto-on power supplies, fuel tanks, heating and cooling systems, wiring inspections and even a close scan of utility poles to the site should be part of this check. The latter is suggested because if this is a single-user line, the utility company may not inspect pole conditions as often as they do in more populated areas. If a weak pole can be spotted, they may get it repaired before the next storm brings it down.

Power system

Speaking of AC power, it's not a bad idea to run an overall check on that part of your system. This is particularly important if your transmitter uses 3-phase power, and the rest of the operation is supplied by the same transformer. Even with single-phase operation, line balance is important. Take your clamp-on ammeter and measure the current in each phase or leg at the transformer or other suitable location. Measure the voltage in the same way – it's safer than using probes on hot connections. A check like this might save a 3-phase motor. A 5% unbalance in a 3-phase motor can raise operating temperatures as much as 50% and lead to burnout.

Increased audio noise can also be caused by line unbalance. In a large transmitter that uses a multiphase high-voltage supply line, unbalance can double ripple frequency and raise audio noise.

Now is also a good time to check on the condition of your instantaneous spike protection equipment. Metal oxide varistors or other types of semi-conductor protection do not always show signs of firing to destruction, and they may just be sitting there giving no protection.

Detuning skirts

If your antenna system is a folded unipole, you should check all the skirt connections. Sometimes these connections open or become corroded, and sometimes skirt wires short to the tower. Such an event would normally show up on the operating log. But sometimes automatic shutdowns occur because of random events, such as a loose skirt wire that flaps in the wind, hits the tower, dumps the transmitter and then moves out of contact.

If there is a tower in the antenna field that is detuned by one of the usual detuning skirt systems, make a similar check on its continuity. Also, check that it is still doing its job. The way this is done depends on the detuning circuitry and how it was designed.

If it is a simple skirt with a tuning box connecting the skirt to ground, check its operation by placing a field-intensity meter (FIM) close to the lead of the tuning box and measuring the radiation from the lead. It was probably tuned for maximum current in the skirt, so the FIM reading should be fairly high. Good engineering practice says that the FIM reading at the initial installation should have been recorded somewhere. Don't expect to obtain the same reading as the original because that depends on FIM placement and other variables, but there should be at least a ballpark reading.

If you decide to adjust the tuning, be sure to record exactly the coil and/or capacitor settings (so they can be returned to if it becomes fouled up). Then try a very slight adjustment, looking for an increase. If there is no increase or not much change, it is probably set right.

If there is a large change required, it is best to return the settings to those previously noted, and consult the engineer who installed the system. You might expect an interaction with the tuning of the transmitter's antenna system if the detuned tower is close to the antenna array and changes are made in the antenna tuning. If antenna tuning adjustments have not been required during the winter, however, the detuner is probably working properly and no adjustment is needed. In that case, "it ain't broke, so don't fix it."

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FCC Update:

New antenna rules and procedures

By Harry C. Martin and Andrew S. Kersting

The FCC has begun a proceeding to streamline its antenna clearance procedures. It will also revise Part 17 concerning construction, marking and lighting of antennas. The FCC wants to significantly reduce the number of filings requesting changes to antennas, expedite application and notification processing, and increase safety in air navigation.

The agency also wants to simplify the antenna clearance process. This would be done by revising FCC Form 854 to provide an application for registration to be filed by the tower owner rather than by licensees using the tower. Licensees would be responsible for compliance with all tower rules on a secondary basis by ensuring compliance if the tower owner fails to correct any violation. The registration application would set forth coordinates, height, a unique registration number, and painting and/or lighting specifications where applicable. The revised form also would be used by the tower owner to: 1) reflect an increase or decrease in the height; 2) correct coordinates; 3) reflect a change in existing painting and lighting specs; 4) notify the FCC of the dismantling of the tower; and 5) notify the FCC of a change in ownership.

Additionally, the agency proposed revising Part 17 to reflect changes to two FAA Advisory Circulars (AC 70/7460-H, August 1991; AC 150/5345-43D, July 1988) regarding painting and lighting of towers. The FCC also proposed to implement statutory language holding antenna owners primarily responsible for compliance with these requirements.

Comments sought on fine statement

The FCC is seeking comment on its 1991 Forfeiture Policy Statement, which set recommended fines for rule violations. It's proposing to amend Section 1.80 by adding a note that incorporates the guidelines for assessing fines. In July 1994, the U.S. Court of Appeals for the D.C. Circuit invalidated the fine policy statement because, although it had the effect of a rule, the statement was improperly issued without notice and comment.

The FCC is proposing fine guidelines that are virtually identical to those in effect prior to the D.C. Circuit's decision. The agency also is asking whether the different base fines for similar violations in different services is proper in light of the different maximum fine amounts for the different services.

Broadcast attribution rules reviewed

The FCC is reviewing its broadcast attribution rules, which specify how "ownership" of mass media entities is determined. The agency is requesting comment on the following:

- Whether to raise the voting stock attribution benchmarks from 5% to 10%, and the benchmarks for passive investors from 10% to 20%;
- Whether to restrict the following two exceptions to the current attribution rules: i) the non-attribution of non-voting stock interests; and ii) the single majority shareholder exception, whereby minority voting stock interests are not attributable if a single majority shareholder holds more than 50% of a corporate licensee's voting stock;
- Whether to relax the insulation standards for business development companies and other widely held limited partnerships;
- How to treat limited liability companies and other new forms of business entities for attribution purposes;
- Whether to eliminate or codify the remaining aspects of the cross-interest policy concerning key employees, non-attributable equity interests and joint venture arrangements that currently prohibit individuals from having such interests in, or relationships with, two media outlets serving substantially the same area;
- Whether to adopt a policy under which the FCC would scrutinize multiple cross interests or other business relationships among competing broadcasters to determine whether the combined interests raise diversity and competition concerns.

AM Stations

Arbitron Markets		Non-Arbitron (Non-Metro) Markets	
Class A	$1,525	Class A	$565
Class B	$850	Class B	$315
Class C	$340	Class C	$125
Class D	$425	Class D	$155
Broadcast Auxiliary License			$30
Construction Permit for New Station			$120

FM Stations

Arbitron Metro Markets		Non-Arbitron (Non-Metro) Markets	
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Classes A, B1, C3	$1,025	Classes A, B1, C3	$375
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The 1995 regulatory fees for radio.

Dateline

Commercial radio stations in the following states must file their annual ownership reports or ownership certifications by April 1: Delaware, Indiana, Kentucky, Pennsylvania, Tennessee and Texas. On or before April 10, all stations must place in their public files their first quarter listings of community issues and responsive programming.

Harry C. Martin and Andrew S. Kersting are attorneys with Reddy, Begley, Martin & McCormick, Washington, DC. Respond via the *BE Radio* FAXback line at 913-967-1905 or via e-mail to beradio@Intertec.com.

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[1] Mention in this ad denotes documented useage only. Mention is not intended to infer endorsement by any of the television shows listed.

[2] Price is slightly higher in Canada.

3-band equalization done right: ±15dB at 80Hz, ±12dB at 2.5kHz (perfect for voices), ±15dB at 12kHz. Far more useful than traditional 100Hz, 1Khz, 10Khz EQ.

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The Mackie Designs 16x2 **CR-1604 Mic/Line Mixer.** Suggested retail price, $1095[2]. Available at America's top broadcast supply houses.

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7 AUX Sends from 4 knobs. AUX 1 doubles as a headphone monitor cue via the MON. Sends 3 & 4 become AUXs 5 & 6 via the SHIFT button.

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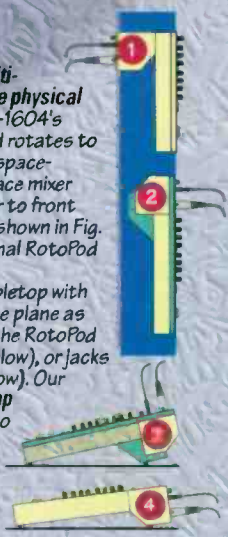

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DELAY
MIC

Talk radio

By Skip Pizzi, radio editor

People are talking — and listening, too.

Bottom Line: *The conversation is the original – and some might say, still the ultimate – interactive communication form. Talk radio broadcasts a live conversation for everyone to hear, then lets them join in. No wonder it's so popular. Talk-radio's tools are specialized, but they've never been more well-crafted and affordable. Just add a little talent on both sides of the glass, and you've got talk radio on the air.*

All the talk of "media convergence" and interactivity can make your head spin with possibilities for the telecommunications future. Yet, much of the promised interactive communication at the root of these systems is already here, and has been for some time. It's called *talk radio.*

Characterized in today's media-speak, talk radio is an ideal platform for convergence of 2-way voice communications and one-way point-to-multipoint wireless transmission. Sounds impressive when you put it that way, doesn't it? Yet telephones and radio have been so intertwined since the beginning of broadcasting that it's hard to think of talk radio as revolutionary. Re-evaluating it in today's new media context shows just how marvelous a communications model it is.

Broadcasters' recent moves toward digital telephony generally don't enter the picture here. Most talk-radio equipment still revolves around POTS (Plain Old Telephone Service). Traditional as the form may be, however, there is much that is new about its technology behind the scenes.

Most talk-radio equipment still revolves around POTS (Plain Old Telephone Service).

Hybrids

The first technical element required in any talk-radio environment is the telephone audio interface, often called the hybrid. This device interconnects the bidirectional, 2-wire world of the telephone to the unidirectional, 4-wire world of the audio studio.

There are several different ways of accomplishing this deceptively difficult task, and no area of talk radio has seen more recent (nor more welcome) progress.

The basic function of a hybrid is twofold: It must feed audio from the radio studio (typically the talk-show host's and/or guests' voices) down the phone line to the caller, and simultaneously present the caller's voice to a line input of the studio's mixing console. The trickiest part of the process involves the hybrid's ability to send the studio voice into the 2-wire domain of the caller without having that studio voice come back out of the hybrid along with the caller's voice. How well the hybrid accomplishes this feat – referred to as *trans-hybrid loss* (THL) or *sidetone suppression* – is the measure of its quality. Overall audio quality of the hybrid's output is not the issue, really. The phone network has already taken care of that by band-limiting, distorting and adding noise to the caller's voice. All the hybrid has to do in this respect is not make things any worse. THL is therefore the major parameter that distinguishes a hybrid from its competitors.

Recently, digital signal processing (DSP) has allowed excellent THL characteristics to

be offered in reasonably priced hybrids. THL performances of 40dB or more are now common. This was unheard of in the analog hybrid days of a few short years ago, where 10dB was considered a "good" THL. More important, digital hybrids are adaptive, meaning that they optimize THL for every call, allowing excellent performance to be consistently delivered. This is also in marked contrast to the past when most analog hybrids' balancing networks were fixed. THL could change dramatically from one call to the next using a fixed hybrid, because each phone call presents a different complex impedance to the balancing network.

Mix-minus

To avoid feedback and echo problems, the audio that is sent from the studio down the phone line to the caller should not include the caller's own voice. This is referred to as *mix-minus*. It is usually accomplished by establishing a dedicated mix bus on the studio console into which all inputs except the hybrid are delegated. This allows the caller to hear all elements of the program except his/her own voice. (See Figure 1.)

If multiple callers are involved, each must have a separate mix-minus feed, which includes the other callers' voices, but not their own.

There are some alternatives to using auxiliary mixing buses on the studio console for telephone mix-minus, most of which involve compromises. The first is to simply use a speakerphone instead of a hybrid, placing the speakerphone's microphone in the studio. This keeps the caller send completely independent of the studio audio, and the output of the speakerphone is fed at line level to the console. (Plenty of talk shows used this approach in the old days, before telephone hybrids were available off-the-shelf.) More recently, an outboard mix-minus box can take the main console's program output and mix it in reverse polarity with the phone hybrid output to create a pseudo-mix-minus signal for the caller feed. Finally, some new digital hybrids can perform a similar trick internally – just feed a full program mix to the hybrid, and the caller voice is extracted from the mix before it is sent down the line.

> You never know when a caller might spew invective that makes Howard Stern sound like the Pope.

Profanity delay

Putting a caller live on the air can be a bit risky, as many radio stations have learned the hard way. You never know when a caller might spew invective that makes Howard Stern sound like the Pope. To protect themselves, many stations employ a delay system that takes the program output of the talk studio and stores it (typically as a digital audio signal in a RAM buffer) for several seconds before sending it to the transmitter. This gives the control room operator a few seconds to react to what the caller is saying before the rest of the world hears it.

If the talk show's producers feel that something just said is inappropriate for air, a control room operator hits the "DUMP" button, which does just that to the contents of the delay system's buffer. The audio stored in RAM is instantly deleted, and the live output of the studio is switched to air. Meanwhile, the caller is cut off, and the host moves on to the next caller.

Naturally, this never sounds elegant on the air. It comes across like a bad edit, in which several seconds of tape were arbitrarily removed from a recording. But it probably sounds better to the station's licensee than what the caller said.

After a "dump," returning to delayed broadcasting can be tricky. Several seconds of time must be added back into the live feed. In fact, this same process has to occur at the beginning of the talk-radio show, or whenever the station com-

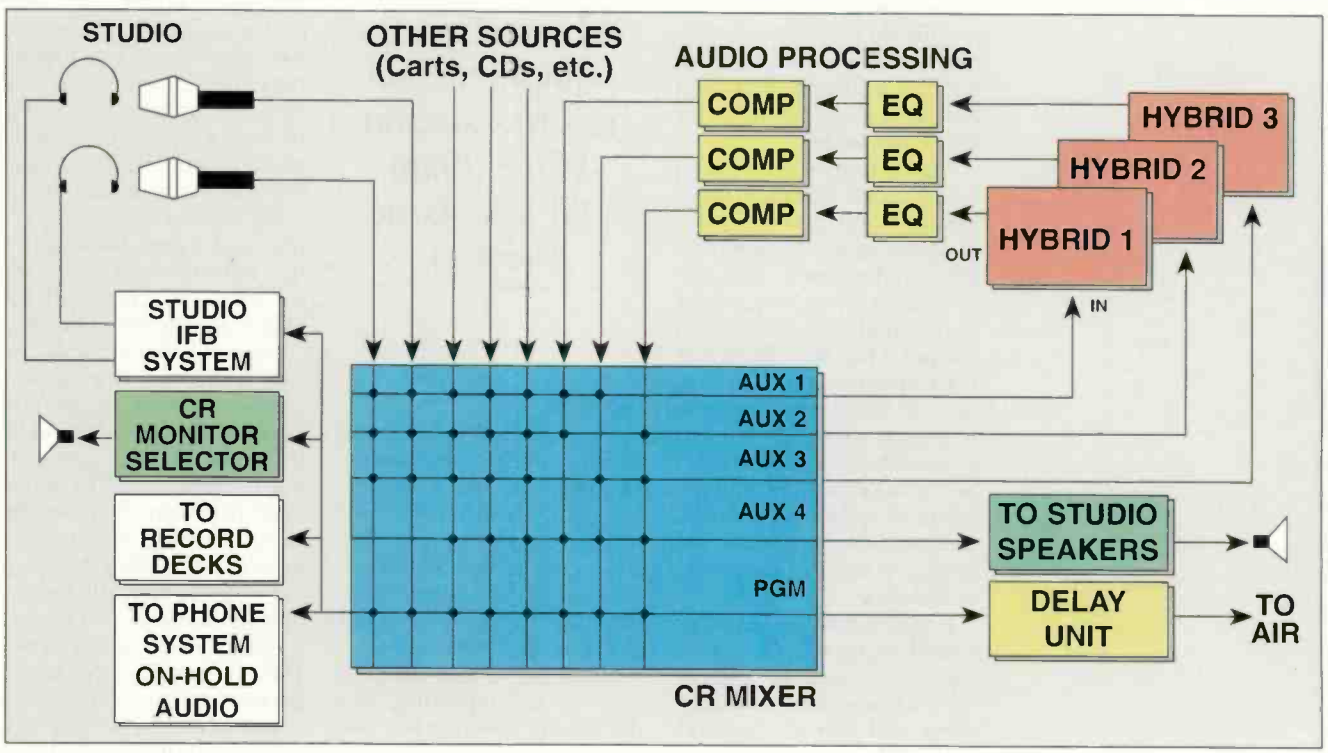

Figure 1. Audio signal flow for a typical talk-radio facility. (CR = Control Room)

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mences delayed operations. (Some full-time talk-radio stations keep their delay system in the air chain permanently.)

In earlier times you had to be pretty clever to do this without experiencing a few seconds of dead air. This was generally done by running an undelayed cart (containing a short announcement of the same length as the delay) while cuing the (delayed) announcer to start talking. Modern delay units use programmable digital delays, and these can be set to "grow" a delay on the fly. Typically, the delay is set to the "grow mode" during the talk-show host's opening monologue or setup segment, so by the time the first caller is put on the air, several seconds of delay are in the line. After a "dump," the delay unit automatically begins to re-grow a delay immediately.

The rate of delay growth on such units can often be set by the user. If a fast growth rate is selected, more obvious artifacts of the process will be audible, such as excessive pauses in the host's speech pattern, or an odd form of "perforating" distortion, as tiny dropouts appear within the host's speech. The latest delay units use more sophisticated delay-growth algorithms, however, and are less prone to these artifacts than earlier digital broadcast delays.

Obviously, when using a delay system, everyone participating (including the callers), must monitor program audio ahead of the delay unit. It is also helpful to have this undelayed signal feed the callers on hold who are waiting to come on-air, rather than feeding them the air monitor feed that is commonly used for on-hold audio in a station's phone system. Some multiline phone hybrid systems offer a provision for separate on-hold audio input.

Audio processing

Most audio professionals know that the telephone passband only ranges from about 300Hz to 3,000Hz, but that's only half the story. The actual response *within* this band can also be quite variable, resulting in poor intelligibility. These frequency-response anomalies can be caused by electronic variations in the phone network or by acoustic transducer problems at the caller's end – the handset's mouthpiece microphone. With the increasing use of digital technology by telephone companies, acoustical problems are often the culprit.

In normal telephone use, the frequency response of a telephone handset's earpiece speaker often compensates for poor intelligibility caused by the mouthpiece microphone at the other end of the call. The earpiece also rolls off most hiss or hum that may have been picked up along the line by the call. But when using a telephone hybrid in the studio, the acoustical coupling of the handset is replaced by direct electrical connections, and the corrective response functions of the earpiece speaker do not occur.

To replace this intelligibility enhancement and filtering, audio processing (equalization) of the phone hybrid's output audio is often employed. Although each phone call's response will differ, a basic equalization curve can be set for the talk-radio environment. When adjusting an equalizer for this purpose, it is best to let *subtractive* equalization predominate. This means that it is preferable to reduce the energy in the frequency bands that are too high, rather than boosting the areas with too little energy. This minimizes the addition of noise and reduces the risk of distortion in the equalizer or in downstream devices.

Start with shelving rolloff at about 200Hz and 4,000Hz (to eliminate out-of-band hum and hiss), with dips at 400-500Hz and 800-1,000Hz (where "boominess" and "honkiness" often hurt intelligibility). You'll want to play with the width and depth of the band-reject settings on the dips, but they should typically be of moderate-to-narrow width, and -3dB to -6dB in depth. Let your ears be the final arbiter. For final touch-up, you may want to add some small, narrow boosts at the edges of the passband,

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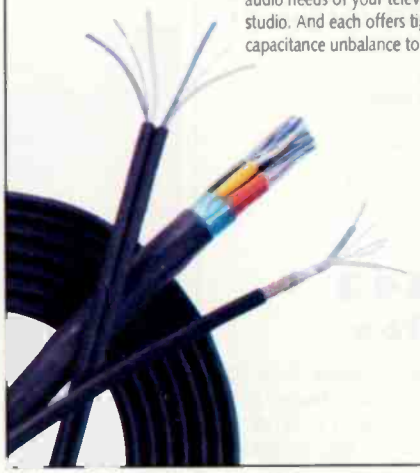

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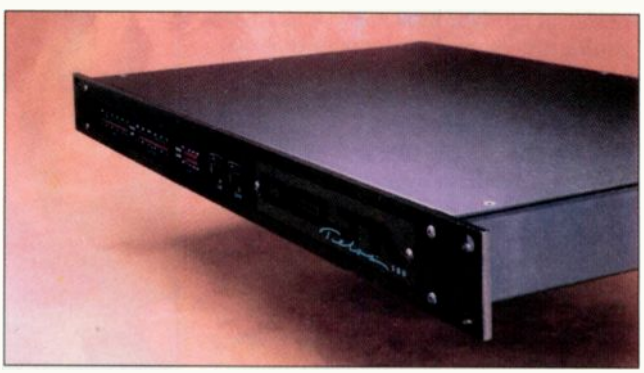
centered on 2501Hz and 3,5001Hz. Doing this will boost the line noise somewhat, but a bit of added noise in the upper end may be worth the trade-off in increased brightness of the caller voice. Remember that listeners of talk-radio programs are often in cars or other noisy environments where slight increases in background noise will rarely be noticed, but improved intelligibility will always help.

There is one other way that audio processing can help a talk-radio program. Consider that talk radio constantly puts a full-fidelity studio host voice up against a severely band-limited caller's voice. These radically differing responses can cause substantial discrepancies in subjective loudness between the voices. If both the caller and studio host voices are set to peak at "0VU" on the control room's mixing console, the host will usually sound significantly louder than the caller. (Don't expect the station's on-air processor to fully compensate for these unmatched levels, especially if it is set for relatively unaggressive action.)

The Gentner G2700DCT Superhybrid is a digital hybrid that creates its own mix-minus from a full mix backfeed.

To solve this problem, insert a simple compressor in line between the hybrid output and the console input, set to increase the subjective loudness of the phone voice so that it better matches the studio voice. The compressor will also serve to minimize the level variation between calls, although some manual level adjustment may still be required. If the filtering and equalization described earlier is also used, place the compressor "post-EQ" (downstream of the equalizer).

The compressor for this application can be a fairly unsophisticated unit. Because it will be acting upon such a narrowband signal, a single-band mono compressor without a lot of bells and whistles is all that's required. Don't set the unit for too much compression, however, because it will bring up the subjective level of the phone line background noise.



The Telos Delta is a digital hybrid that includes adaptive audio processing to optimize caller intelligibility.

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Tom Cusic, TM Century, Dallas, TX

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More important, it will also raise the loudness of the studio voice signal that leaks through the hybrid, thereby reducing the effective THL of the phone interface. For the same reason, it is generally not advisable to compress the mix-minus caller backfeed. (However, it is helpful to have a meter dedicated to monitoring this signal's level.)

Some telephone interface hybrids incorporate audio processing internally, controlled either by front-panel adjustments or via adaptive automatic sensing.

Facility layout

The ideal setup for talk radio requires a slightly different facility design from the standard radio studio suite. First, a separate control room and studio are recommended. Talk radio is generally not suited for full combo operation. Second, a relatively large studio is helpful. It should be big enough to comfortably accommodate a host and several guests. Arrange seating so that the guests have their backs to the control room, with the host facing the control room window. Be sure the host has good sight lines to control room personnel, clocks, timers, tally lights and guest positions.

The ideal setup for talk radio requires a slightly different facility design from the standard suite.

Many talk-radio shows give the host some measure of control over the phones. For example, the host may select which call to go to, and physically engage and disengage the line to air. For this to work smoothly, the control panel for these functions must be properly incorporated into the host's environment in the studio. It is also becoming common for a computer screen to display caller information for the host. Placement of this screen must also be appropriate, considering both visual and acoustical needs.

The ultimate talk-radio facility includes a third room (or at least a dedicated area in the control room) for call screening. This is where phones are answered and callers are placed in a queue for air. Call screeners usually conduct a brief pre-interview with callers to determine things like their name, location and topic of question/comment. This data is entered into the screener's computer, and it can be displayed on video monitors in the studio and control room. Simple text displays can be used on word processing or database templates, or specialized call-screening software can be used. Some of the latter can be directly interfaced to telephone hybrids to integrate their control to the computer. (See "Software Solutions for Talk Radio," *BE Radio*, January 1994.)

Many talk-radio shows give the host some measure of control over the phones.

Off-site variations

For maximum flexibility and variety, some talk-radio programs often incorporate remote elements. Usually this involves an off-site guest who is brought into the show via either POTS or a higher-quality connection such as ISDN or satellite feed. In either case, the remote guest usually requires a separate mix-minus backfeed, which must be maintained throughout the show. This is a good reason to have at least two (and preferably three) hybrids in a talk-radio control room, so that both a remote guest and caller(s) can be accommodated simultaneously. For Switched-56 or ISDN connections to remote guests, appropriate terminal hardware and codecs are needed instead of a hybrid, and mix-minus backfeed may not be required (depending on the amount of delay accrued through the line and the codecs).

Sometimes a talk-show host will want to go on-location, and do the show from a commercial venue like a sports bar or a theater with a live audience. This can be a bit more complicated, but is generally handled by running ISDN, microwave RPU or analog program circuits to carry high-quality host/guest audio from the remote site back to the studio. Incoming calls are still handled back at the studio, with a program backfeed to the remote site. (Depending on the situation, this backfeed may be full-mix or mix-minus the remote site microphones.) Voice communications from the studio producer/engineer are also fed back to the remote site (generally via a separate line), and a modem intercon-

A PC network running specialized call-screening software helps many talk-radio shows run smoothly. (Photo by Gary Wachter.)

One other critical element is the facility's communications system. This can involve a dedicated intercom/IFB (interruptible foldback) unit or the communications system included in the studio mixer. Production staff (engineer, producer, screener) should have independent access to the host's headphones, to each phone hybrid's backfeed and to the communications return channel(s) to any remote site, plus an "all call" capability to talk to all these locations at the touch of a single button.

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nection can even be run on a separate POTS line for call-screening computer display/control at the remote location.

If a live audience at the remote site is involved, they must hear the program backfeed over a sound-reinforcement (SR) system. A potential feedback and/or echo loop exists if the talent and audience microphones at the remote site pick up a sufficient amount of the caller's voice coming from the SR speakers. (Remember that these mics must be assigned to the caller's mix-minus backfeed. This problem also may occur in a studio situation where a large number of guests are assembled, and you don't want them all to have wear headphones to hear the callers.)

To counteract this, a number of techniques may be applied. The first – always advisable – is to run the SR system at as low a volume as possible. Next, keep the host and guests as close to their microphones as possible using directional microphones oriented away from the SR speakers. If problems still remain, find out which microphones are picking up the most SR leakage and manually reduce their level when the caller talks. Last (and perhaps most effective), use one of the more up-to-date adaptive digital hybrids, particularly those that do not require mix-minus backfeeds. You may even want to seek out one that adapts to reverberant "trails" behind the caller's voice to accommodate room reflections that may be added to caller pickup from the SR system.

> Even if you don't like what they're saying, it's hard to turn off a good talk show.

Talk is (kind of) cheap

Talk radio is a labor- and facility-intensive product, which does not fit today's vogue of downsizing and automation-heavy programming. (Most talk- radio shows require a host, an engineer, a producer/director and a screener, although some of these jobs can be doubled up. A typical local talk-radio show's staff size is three.) Otherwise, the acquisition and broadcast rights cost for such programming is minimal, and its growing popularity is unquestioned. Political topics are particularly big listener draws right now, and there's certainly no shortage of willing guests from that area. Even if you don't like what they're saying, it's hard to turn off a good talk show.

As a full-time or daypart-only format, talk radio makes good sense in today's broadcast marketplace. Unlike earlier times, the hardware and knowledge required to produce successful talk-radio programs is no longer arcane. Putting together the right equipment and following a few simple rules makes it easy to be a behind-the-scenes talk-radio hero.

For more information on talk-radio hardware, circle (100) on Reply Card. See also "Telephone Hybrids," "Dynamics Processors," "Effects Processors" and "Equalizers," pp. 53-54 of the *BE* Buyers Guide.

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and TV HALL BOOTH #16001

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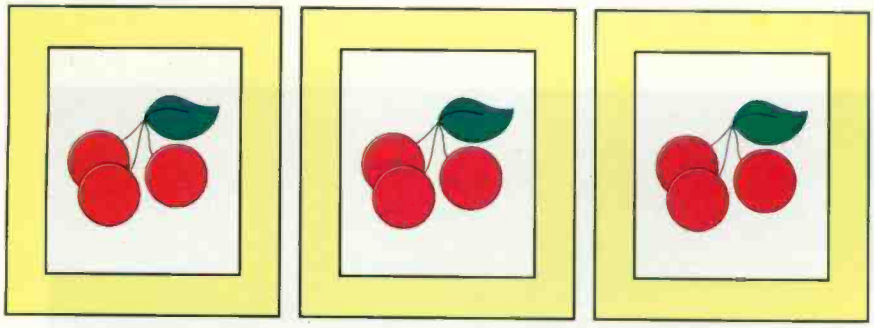


NAB '95 conference preview

A summary of the technical sessions and other highlights at NAB '95.

Once again, broadcast technologists will meet in Las Vegas for their annual conclave. More than 70,000 attendees are expected this year, as NAB'95 convenes at the Las Vegas Convention Center, April 8-13, 1995.

As in previous years, NAB '95 will include several separate conferences, some containing multiple tracks. The conferences of interest to radio broadcasters include the Radio Management Conference (4/9--4/13), the RAB Sales and Marketing Conference (4/11 -- 4/12), the Broadcasters Law and Regulation Conference (4/10 -- 4/12) and the Radio track of the Broadcast Engineering conference (4/9 - 4/13), jointly organized by the NAB and SBE - see table below for a summary of the sessions in this conference track). Some attendees may have interest in the Broadcast Education Association Convention (4/7 -- 4/10).

New this year in the Broadcast Engineering Conference are special Saturday (4/8) technical seminars. For the radio track, a half-day seminar about digital radio broadcast transmission is scheduled.

Highlights at the Radio Management Conference include a radio production workshop and sessions on newsroom technologies, digital broadcasting and making satellite programming sound local. Radio station tours are also featured in this conference, along with a joint Radio/TV/Law & Regulation session on station acquisitions.

For the third year, a parallel conference and exhibition, NAB MultiMedia World (4/9 - 4/13), will take place in the adjacent Las Vegas Hilton Pavilion. This separate multitrack conference and exhibition floor will cover the rapidly growing multimedia marketplace. Registrants to NAB'95 will be granted corresponding access (i.e., exhibits only or full access) at NAB Multimedia World.

Contact the NAB for more information about any of these programs at 800-342-2460, or use the NAB Fax-on-Demand line at 301-216-1847. You can also request information via e-mail to *register@nab.org* on the Internet.

In one other highlight for radio broadcasters, several in-band DAB systems will be demonstrated on the air at this year's conference. USA Digital Radio plans to broadcast its in-band/on-channel digital radio formats on both the AM and FM bands. Specially equipped buses will be provided for listeners to audition the DAB reception while traveling around Las Vegas. Meanwhile, digital radio developers at AT&T plan a similar demonstration of one of their DAB formats (on the FM band only).

Broadcast Engineering Conference

Las Vegas Convention Center, Las Vegas, Nevada

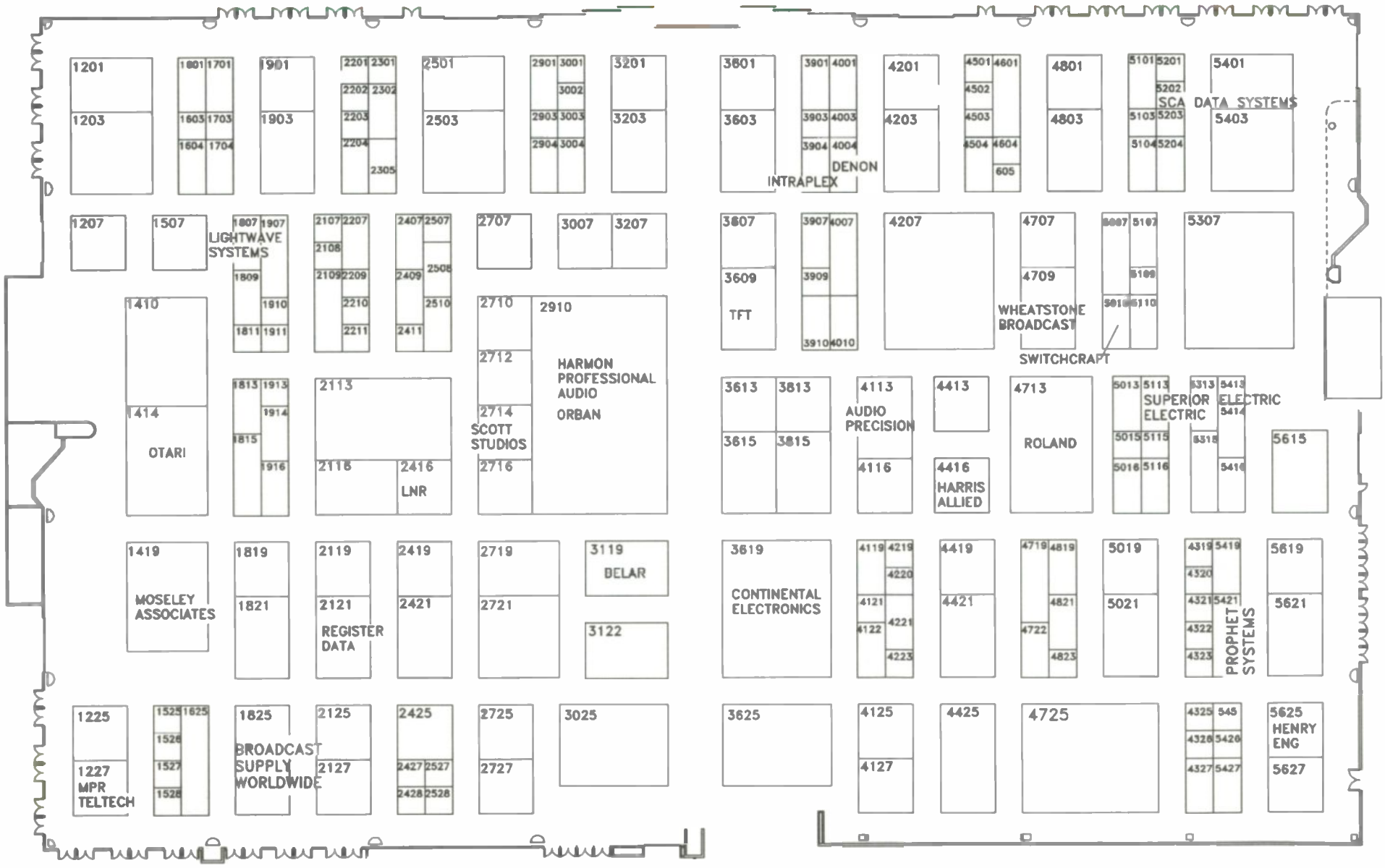
Saturday, April 8 - Thursday, April 13

Gain an insider's perspective on the newest technologies, systems and products for radio in the most comprehensive broadcast engineering conference in the world. You'll explore advances in digital technology, data broadcasting, satellite and auxiliary systems, post-production and more.

	Sat. 4/8	Sun. 4/9	Mon. 4/10	Tues. 4/11	Wed. 4/12	Thurs. 4/13
AM		9:00 am Keynote: FCC Commissioner James H. Quello 9:30 am The All-Digital Radio Station I: Digital Audio Broadcasting	---------- NAB '95 Exhibits Open ---------- 10:30 am Radio Data Broadcasting: Present and Future Technologies	9:30 am Digital Audio Encoding: Concepts and Realities	9:00 am Audio and Video Testing: New Technologies Technical Regulatory Issues: Radio & TV -- Part I	9:00 am Radio RF Workshop: Maintaining the Signal
PM	Special Technical Seminars 1:00 pm Digital Radio Broadcast Transmission	1:00 pm The All-Digital Radio Station II: Digital Audio Production	1:00 pm Computer Technology for Broadcast Support: BBSs, LANs, WANs and the Internet	1:00 pm Radio Remote Broadcasting: The Latest Digital Technologies	12:30 pm Engineering Awards Luncheon 2:00 pm Technical Regulatory Issues: Radio & TV -- Part II 6:00 pm Ham Operators Reception	

BE Radio

NAB '95 Audio Hall Map



BE Radio

NAB 95 Audio Hall Exhibitors:

ABC Digital/Australian B'cast	5627
Adams-Smith	3613
AEQ	5307
AEV Snc di Vaccari GEC	2716
AKAI Digital	5021
AKG Acoustics/Harman Pro Audio	2910
Algo Rhythmic Technology	1916-7
Aphex Systems	2125
Apogee Electronics	1601-2
Arrakis Systems	4725
Audi-Cord	4416
Audio Developments	3910-11
Audio Intervisual Design	2203
Audio Precision	4113
Audio Processing Technology	4007-9
Audio Services Corporation	3607
Audioarts Engineering	2211
Audiomation Systems/Sellmark	4327-8
Audion Laboratories	1603
audiopak	4219
Audiotronics	2721
Augan Instruments	3613
Autogram Corporation	4719-21
Axcess Global Communications	5115
Belar Electronics Lab	3119
BEXT	3815
Bird Electronic Corporation	2901-2
Boonton Electronics Corporation	2107
Bradley Broadcast Sales	1903
Broadcast Electronics	3625
Broadcast Supply Worldwide/BSW	1825
Broadcasters General Store	3007
Bryston	3907-8
Burk Technology	3207
CBSI Custom Business Systems	2113
CCA Electronics	4421
CCS Audio Products	3813
Cellcast	5109
Central Tower	2411
Circuit Research Labs	2719
Coaxial Dynamics	5013-14
Communication Graphics	5016-7
Communications Data Services	1811
Computer Concepts	2503
ComStream Corporation	5615
Continental Electronics	3619
Cortana Corporation	3909
Crouse-Kimzey Company	1914-15
Crown International	3203
CTE International	3201
Cutting Edge Technologies	4203
Dalet Digital Media System	5007-9
Dataworld	2419
DB Elettronica	4201
dbx/Harman Pro Audio	2910
Delco Wire & Cable	2204-5
Delta Electronics	4125
DENON	4004-5
DG Systems	1809-10
DGS Pro Audio	4605
Digidesign	1203, 1515
Digital Broadcast Associates	1701-2
Digital Courier/MPR Teltech	1227
Doremi Labs	2302-3
Doug Vernier B'cast Tech.	2301
Econco Broadcast Service	4823
Electro-Voice	15717
Elenos SRL	1225
ENCO Systems	5619
Energy-Onix	4707
Euphonix	3603
Eventide	2707
E-Z UP International	4821-2
Fidelipac	3122
Flash Technology	1819
Gefen Systems	2304-5
Gentner Communications	5621
Gorman-Redlich Mfg Co	1913
Hafler Professional	3903
Hallikainen & Friends	4223
Harris Allied Broadcast Div	4416
Henry Engineering	5625
HHB Communications Ltd	1604-5
Hughey & Phillips Inc	4722-3
Illbruck	2904-5
Inovonics	1625-8
International Datacasting	4122-23
International Tapetronics/ITC	1410
Intertec Publishing	4322
Intraplex	3904-5
JNS Electronics Pty	1627-8
Kay Industries	2507
KD Kanopy	5204-5
Kintronic Laboratories	2119
Lightwave Systems	1807-8
LNR Communications	2416
Logitek	2725
Loral Microwave-Narda	5425
LPB	2727
Magnum Tower	4010-11
Marantz/Superscope Tech.	5426
Marti Electronics	4119-20
Moseley Associates	1419
Murry Rosenblum Sound Assoc	2428
National Supervisory Network	5101-2
Nautel	2421
Neotek	1907-9
Neutrik Instrumentation	2127
Neutrik USA	2127
Norsat Int'l/NII	1704-5
NPR Satellite Services	4221-2
OMB America	3601
Orban/Harman Pro Audio	2910
Otari	1414
Pacific Recorders & Eng.	3025
Penny & Giles	3004-5
Penta Laboratories	1525
Phasetek Inc	5427-8
Potomac Instruments	2510-11
Posthorn Recordings	1526
Professional Sound Corp	5116-7
Prophet Systems	5421-3
QEI	4418
Radio Computing Services	5403
Radio Design Labs	2407-8
Radio Systems	3615
Radiomation	4504-5
Register Data Systems	2121
Roland Corporation	4713
Rules Service Company	1528
SADIE	1207
SCA Data Systems	5203
Schafer World Communications	4116
Schmid Telecommunication	1815-17
Scott Studios	2714
Seem Audio A/S	4604
Selco Products	4121
Shively Labs	4425
Sierra Automated Systems	2710
Smarts Broadcast Systems	5416-7
Solidyne	5107-8
Sonex	2904-5
Spectral Synthesis	4801
Sprague Magnetics	5015
Staco Energy Products	2427
Studio Technologies	3003
Superior Electric	5113-4
Svetlana Electron Devices	5313-4
Switchcraft	5010-11
Symetrix	1911
Synclavier	3901-2
Tactile Technology	2207-8
Telos Systems	4203
TEM/Tecnologie Elettr. Milano	1813-4
TFT Inc	3609
The Management	2109-11
360 Systems	2116
TimeLine	1821
TM Century	4127
Trident Audio USA	1507
TWR Lighting	4323
U S Tape & Label	2508-9
Utility Tower	2528
Videoquip Research	5315-17
Wheatstone Broadcast Group	4709
Yamaha Music	2425

Main Hall exhibitors of interest to radio broadcasters:

Acoustic Systems	13417
Acoustical Solutions	13419
ADC Telecommunications	19935
ADM Systems	17836
AF Associates	16338
Alesis	18372
AMCO Engineering	12510
AMEK Consoles	19348
Anchor Audio/ROH	11504-6
Andrew Corporation	19914
Antenna Concepts	19375
Anvil Cases	13126
ASACA ShibaSoku	17406
AT&T	15740
ATI Audio Technologies	16602-702
Audio Accessories	13642-742
Audio Technica US	11206
AVID Technology	19539
Barco-EMT	11450
Belden Wire and Cable	19223
Benchmark Media Systems	10052
beyerdynamic	11214
Calzone Case	16758
Canare Cable	11118-22
Clear-Com Intercom Systems	18936-19336
Columbine Systems	15731
Comrex	12105
Connectronics	13627
Control Concepts/Leibert	16014-5
Countryman Associates	11607
Dan Dugan Sound Design	13619
DIC Digital	18385
Dielectric Communications	15720
Dorrough Electronics	16443-4
Dolby Labs	16567
Electronics Research - ERI	16604
ESE	13606-8
Fairlight ESP Pty Ltd	19920
FM Systems	19051
Fostex	10952
GEC-Marconi Comm. Systems	17101
GEPCO International	13251
Harris Allied Broadcast Div	16001
Harrison by GLW	12110
Hewlett-Packard	19656
Holaday Industries	12908
Industrial Acoustic/IAC	14039
Intertec Publishing	15659-60
ITELCO spa	18514
Jampro Antennas	16617
Jensen Tools	16609
Kline Towers	16367
Larcan-ITC	12500
Leader Instruments	12803-6
Lectrosonics	11232
Leitch Inc	15748
LEMO USA	11222
Lightning Eliminators & Cons.	12900
Mark IV Audio Group	15717
Maxell Corporation of America	18136
McCurdy Radio Industries	13110
Micro Communications	19401
Micron Audio Products	16448-51
Modulation Sciences	11113-5
Mohawk/CDT Broadcast Cables	13404
MYAT	15714
Nady Systems	11226
Nagra Kudelski SA	11805
Nemal Electronics Int'l.	13636
NVISION	15884
OpAmp Labs	16674
Pacific Radio Electronics	12946-8
Panasonic/Ramsa Audio	18101
Professional Label Inc	15728
RCI Systems Inc	10361
Samson Technologies	12829
Sanken/Developing Technologies	12802
Scala Electronic	15707
ScheduALL by VizuAll Inc	16340-41
Scientific Atlanta	13828
Sennheiser Electric	12035
Shure Brothers	11800
Siemens Audio Inc	13813
Sira Sistemi Radio srl	19359
Solid State Logic	16621
Sonic Solutions	12046
Sony	11514
Stainless	16608-908
Stanton	12832
Storeel	18114
SWR Inc	14845, 15745
Systems Wireless	13634-5
TASCAM	17167
Techni-Tool	11547-8
Tektronix	16528
Telex Communications	18827
Tentel	13407-408
Tennaplex Systems	15707
Thomson Tubes Electroniques	12505
3M Pro A/V Products	16312
Vega/Mark IV Audio	15717
Ward-Beck Systems	15704
West Penn Wire/CDT	19570
Whirlwind/US Audio	12507
Will-Burt	16114-5
Winsted Corporation	11827
Wireworks	13602-3
Wohler Technologies	18369-569

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"The DSP 6000 allowed us to run both our FMs from one studio over one STL. We got cost savings *and* digital fidelity."

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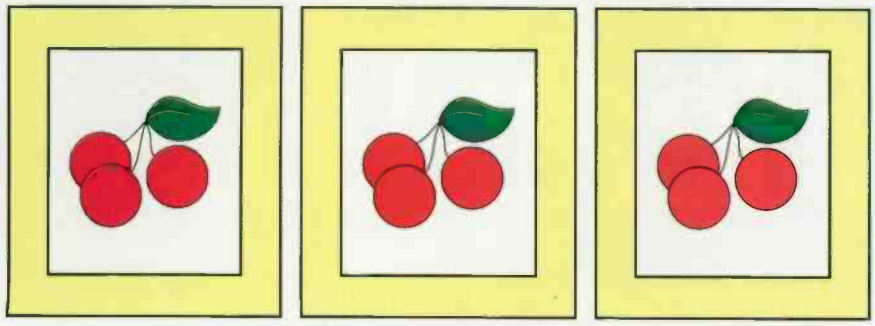


NAB '95 Exhibitor Highlights

A comprehensive listing of companies and their products at NAB '95.

The 1995 NAB exhibition promises more exhibitors and more new products than ever. Even a full four days on the show floor isn't nearly enough to see everything, so good planning is essential. To help you in this monumental task, the *BE Radio* listings are specially selected to include all the companies exhibiting audio, RF and miscellaneous products of interest to radio broadcasters.

Four-digit booth numbers indicate that the exhibitor is located in the North (Audio) Hall, while 5-digit numbers mean the booth is in the East or West (Main) Halls. Selected exhibitor listings for both of these halls are combined in the *BE Radio* Exhibitor Highlights, with companies listed alphabetically. This year, demand for booth space has required expansion to a third hall at the Las Vegas Convention Center, called S-6. Companies exhibiting in this hall are listed separately on p. 48 (using booth numbers with an S- prefix), along with any last-minute additions to the other halls available at press time.

To carry with you during the show, you'll find an exclusive *BE Radio* pull-out map of the Audio Hall on p. 35. A legend for the map appears on the reverse, along with booth numbers for Main Hall exhibitors who are of interest to radio broadcasters. For complete, up-to-the-minute data for the entire broadcast exhibition floor (all halls), pick up a copy of the exclusive *BE* full-show map in the publication bin area at NAB '95. And wear comfortable shoes.

A

ABC Digital/Australian Broadcasting 5627
Digital audio recording and automation products; D-CART news audio+text editing workstation; D-RADIO digital program assembly system.
Circle (310) on Reply Card

Acoustic Systems 13417
Announcer facilities, voice-over booth.
Circle (301) on Reply Card

Acoustical Solutions 13419
Acoustic treatments including AlphaSorb wall panels and hanging baffles; Audio Seal sound barrier; modular recording booth.
Circle (302) on Reply Card

Adams-Smith 3613
Augan digital audio workstations.
Circle (473) on Reply Card

ADC Telecommunications 19935
Signal distribution products, LightSwitch fiber/coax digital routers and video converters; "true 750Ω BNC connector family; S-8 RS-422 patchbay.
Circle (303) on Reply Card

ADM Systems 17836
Audio mixing consoles.
Circle (472) on Reply Card

AEQ 5307
Introducing ACD 3001 audio codec; MAD hard disk automation system; BC series mixing consoles; SYSTEL muticonfer system; MP, TLE series portable mixers; TH-2EX digital hybrid, line extender; telephone terminal equipment.
Circle (304) on Reply Card

AEV Snc di Vaccari GEC 2716
Introducing Mirage FM 3-band audio processor with digital stereo encoder, adjustable bass, presence, brilliance, density and SCA, RDS inputs; Luxor stereo enhancer; StarLight digital stereo encoder.
Circle (305) on Reply Card

AF Associates 16338
Tapeless digital technology; turnkey systems design, engineering and fabrication; consulting engineering services; digital computer & disk-based solutions for broadcast production.
Circle (306) on Reply Card

AKAI Digital 5021
Digital recorders, including the DR8 hard disk recorder; MT8 Mix tab, DD1500 digital audio workstation.
Circle (315) on Reply Card

AKG Acoustics/Harman Pro Audio 2910
Microphones, wired and wireless; headphones.
Circle (469) on Reply Card

Alesis 18372
Digital audio products, ADAT multitrack recorder, remote-control equipment.
Circle (307) on Reply Card

Algo Rhythmic Technology 1916-7
Digital audio conversion and wired-transmission products.
Circle (470) on Reply Card

AMCO Engineering 12510
Equipment enclosures; introducing an extended line of enclosures for monitoring applications.
Circle (308) on Reply Card

AMEK Consoles 19348
Introducing new console with 2-input paths, 4-band EQ per input module, routing to 24 buses, 16 aux sends, Supertrue fader/mute automation, Recall, Virtual Dynamics; 9080 console, designed by Rupert Neve; Big by Langley console; 501 and Recall by Langley.
Circle (309) on Reply Card

Anchor Audio/ROH 11504-6
Introducing 2-channel wired PORTACOM intercom; intercom systems; sound systems, including Voyager PB-3000.
Circle (311) on Reply Card

Andrew Corporation 19914
Introducing vertically polarized Shadowmaster antenna; 6-foot STL grid antennas; 3 1/8" HRLine rigid line; EW20 elliptical waveguide wideband connectors; top-mount ALP antennas; Digital ValuLink; 4.5M dual-reflector earth station antenna; MT 050 low-volume automatic membrane, MRS 052 Slim Line manual regenerative dehydrators.
Circle (312) on Reply Card

Antenna Concepts 19375
UHF and VHF antennas from low to high power, in slot, panel and corner reflector designs; introducing CP FM panel transmit antennas covering the entire FM band; transportable omnidirectional VHF antennas.
Circle (313) on Reply Card

Anvil Cases 13126
Transport cases for delicate equipment, A.I.R. isolated rack types.
Circle (314) on Reply Card

Aphex Systems 2125
Model 107 Tubessence tube type 2-channel mic pre-amp; model 722 Dominator, including defeatable pre-, de-emphasis.
Circle (471) on Reply Card

Apogee Electronics 1601-2
Model AD-1000 digital conversion system; Wyde-Eye digital audio cable; Master Digital audiotape; UV1000 super CD encoder; Master Tools mastering software for Digidesign
Circle (474) on Reply Card

Arrakis Systems 4725
Audio mixers, Systems 6, 12, 18; studio furniture.
Circle (315) on Reply Card

ASACA ShibaSoku 17406
Audio analyzers; audio routers; erasable rewritable MO disk audio files; test signal, sync generators.
Circle (316) on Reply Card

AT&T 15740
Telephone, program transmission services.
Circle (318) on Reply Card

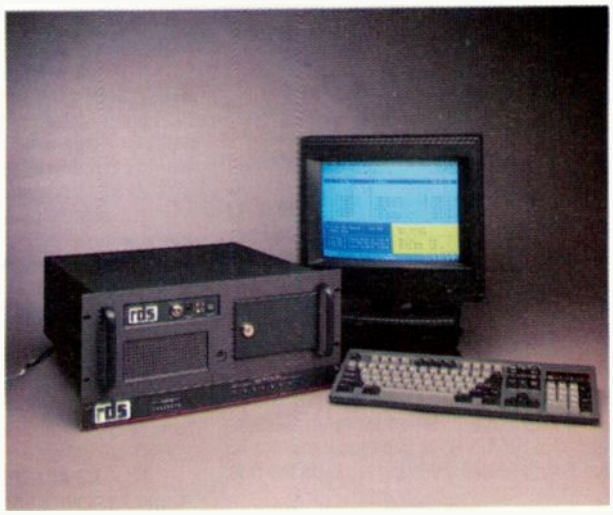
ATI Audio Technologies 16602-702
Small-format audio mixers; mic, headphone, line, monitor, turntable, interface, utility amps, audio DAs; metering systems.
Circle (319) on Reply Card

Audi-Cord 4416
Audio cart recorders/players, DL series and S series.
Circle (475) on Reply Card

Audio Accessories 13642-742
Introducing Project Patch reconfigurable interface system for easy, fast studio wiring through pre-terminated patchbays and cables.
Circle (320) on Reply Card

When looking for a digital audio system for automation of satellite programing or live assist, there would appear to be many choices. But if you're looking for a system which is flexible enough to give you total control without sacrificing your sanity, there is only one choice. The Phantom by RDS.

You will see the difference as soon as you see the Phantom in action. The display provides you with all of the information you need to see in a clean, concise manner, without the crowed look that you'll find in other systems. If you are familiar with the most popular software on the PC, then you may already know how to use the Phantom. The Phantom's pull-down menus guide you through all of the steps involved in setup and daily operation, from creating and scheduling clocks to creating and editing logs.



The PHANTOM

Digital Audio Automation

The Phantom ends the confusion of automation by keeping everything organized. The Phantom simplifies your daily operations by keeping information such as input changes, voice changes, and clock changes in their own individual schedules rather than in the log. You can leave those liners and other voice drops out of the log because the Phantom will do them for you. The Phantom allows you to date new schedules to begin weeks, months, or even years in advance. When your satellite network informs you that there will be a voice substitution on Thursday, two weeks from today, you can prepare for it *today*.

The Phantom can retime spots to fit them cleanly into a satellite break without inserting silence, overlapping, or running late. The Phantom can create reports to keep you informed on a number of topics, from a list of expired spots to an analysis of potential mistakes in your log. The Phantom also maintains a history of system activity.

The Phantom has the features that others would want you to believe are theirs exclusively. The Phantom remains *completely* functional during recording, sensing relay closures and starting breaks as easily as it does when it is not recording. The Phantom can fill incomplete breaks with spots from a list you specify without ruining product separation.

While other systems tie your hands and limit your flexibility by only offering 3 or 4 inputs, the Phantom gives you 6 stereo inputs, using its AMX-84 solid state switcher, with the option of increasing the number of inputs to 14 or more. If your station is News/Talk, you know how important this can be.

The Phantom allows you to change the sampling rate, digital format, and stereo/mono settings at will to meet your needs for an individual spot. The Phantom offers a number of digital formats, including the new Dolby AC-2 format, as an option.

Call us today to find out how your station can benefit from the advanced technology of the Phantom and the experience of RDS.

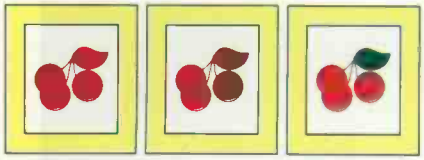
1-800-521-5222

912-987-2501 • FAX: 912-987-7595

P. O. Box 980, Perry, GA 30169

rds REGISTER DATA SYSTEMS

Circle (25) on Reply Card



Audio Developments 3910-11
Portable mixers; audio processors AD151, AD152; AD153 audio DAs.
Circle (476) on Reply Card

Audio Intervisual Design 2203
Microphones.
Circle (477) on Reply Card

Audio Precision 4113
Introducing System Two audio analyzer; APWIN Windows-based audio test software for Systems One and Two; GAT-1 GPIB interface translator for System One; PCMCIA interface for Systems One, Two.
Circle (322) on Reply Card

Audio Processing Technology Ltd. 4007-9
Digital audio processing units using data compression, apt-X 100 system.
Circle (478) on Reply Card

Audio Services Corporation 3607
Distributor: audio mixers, speakers; wireless boompole; Stellavox, Fostex DAT recorders; Microtech Gefell microphones.
Circle (479) on Reply Card

Audio Technica US 11206
AT4050/CM5 capacitor mic for studio; MX341a SmartMixer automatic mic mixer; ATH-M40, ATH-D40 precision headphones; ATM75 headworn condenser, AT873R hand-held condenser, ATM10a condenser, MT858 gooseneck mics; AT851b, AT835b line cardioid shotgun mics; COM1, COM2 headsets.
Circle (323) on Reply Card

Audioarts Engineering 2211
Audio mixing consoles.
Circle (324) on Reply Card

Audiomation Systems/Sellmark 4327-8
Distributor of audio products.
Circle (325) on Reply Card

Audion Laboratories 1603
VoxPro digital sound workstation.
Circle (326) on Reply Card

audiopak 4219
Tape cartridges A-2, AA-3, AA-4; lubricated audio tape formulas 605, 613, 614.
Circle (480) on Reply Card

Auditronics 2721
Audio mixers, 210 series radio on-air, 900 series TV news/production; 1900 series IFB/mix-minus system; Destiny 2000 program management systems with control console, control software and 200MB computer.
Circle (327) on Reply Card

Augan Instruments 3613
Digital audio workstations.
Circle (481) on Reply Card

Autogram Corporation 4719-21
Introducing Autogram CYA-3; featuring the AC-8, R/TV-20, Pacemaker and Minimix audio consoles; Autoclock time and temperature device, Autocount counter.
Circle (328) on Reply Card

AVID Technology 19539
AudioVision digital audio workstation; AvidNet ATM; MediaServer production server/library solutions.
Circle (361) on Reply Card

Axcess Global Communications 5115
Communications products using subcarriers; RBDS paging.
Circle (482) on Reply Card

B

Barco-EMT 11450
Digital cartridge recorders, players EMT-460, -461; EMT-710 audio router.
Circle (329) on Reply Card

Belar Electronics Lab 3119
Modulation monitors; FMMA-1 The Wizard digital FM analyzer; RFA-4 agile FM amp; digital FM stereo monitor/analyzer.
Circle (372) on Reply Card

Belden Wire and Cable 19223
Introducing #1694A serial digital video cable; #1696 high-flex AES/EBU digital audio interconnect cable; #1800 series NEC-rated single-, double-pair digital audio interconnect cable; NEC CM-rated digital audio snakes.
Circle (330) on Reply Card

Benchmark Media Systems 10052
Audio equipment including card-based DAs, mic-pre DA, remote gain cards; router/switcher; MicroFrame Series 1RU chassis for 16 amp modules, two power supplies; program meter systems; interface amplifiers.
Circle (331) on Reply Card

BEXT 3815
Introducing the SF series high-power solid-state MOSFET FM amplifiers to 5kW; featuring 27 models of FM amplifiers from 100W to 30kW; STL systems; exciters.
Circle (332) on Reply Card

beyerdynamic 11214
Wireless equipment, microphones, headsets; S170H hand-held and S170P pocket microphones and NE170 diversity receivers; headphones.
Circle (333) on Reply Card

SCA Data Systems, Inc.
The Leading Manufacturer of SCA Products

Standard Products

- Music 4® plus 9600 high speed data and audio system
- RD-57 RDS Generator
- PG 57-3 phase-locked paging generator
- 9600 bps subcarrier data system

Introducing

- NT series of high-speed high-performance data systems

SCA questions... We have answers

See us at booth 5203

2912 Colorado Avenue, Suite 200, Santa Monica, CA 90404 · 310/315·9930 · FAX 310/315·9530

Circle (26) on Reply Card

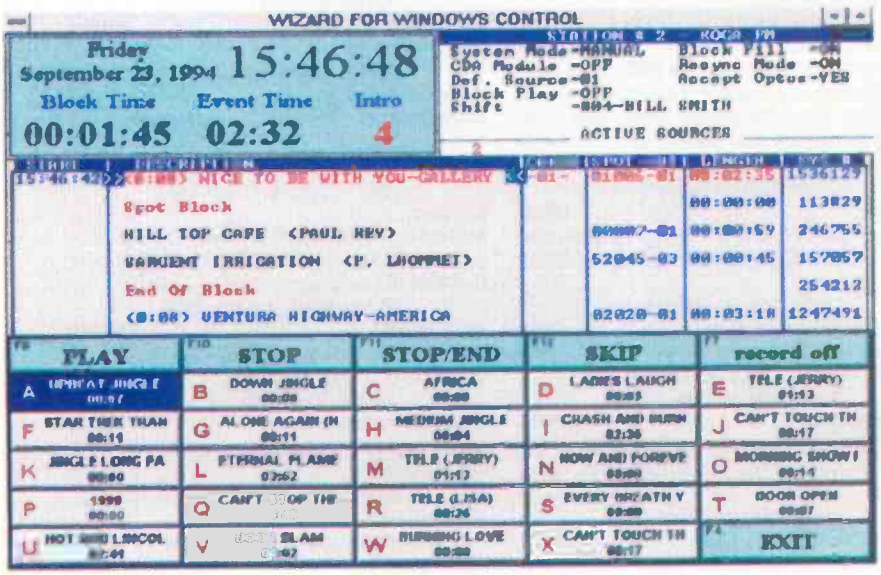
The Digital System Everyone's Chasing...

the industry-leading **Wizard For Windows™** by Prophet Systems.

The competition is trying to catch up to our innovative features

- Exclusive Automated Time AND Temperature Announce!
- VoiceTRAC System, pre-record "live" shows weeks in advance!
- Backtime System, fills out each hour!
- Unsurpassed FLEXIBILITY, runs any program log!
- Button Bar with Quick Record Capabilities!
- On-Line Copy Entry System, integrate your stations!
- Automatically record and play network feeds!
- The leading Hard Drive Automation System in the industry!
- The ONLY true multi-user system on the market!
- Automatic Block Stretch/Squeeze for perfect timing!
- Full Equipment Redundancy!

FEATURING:
COMPAQ -The #1 Computer...Now with a 3 year Warranty!
Windows -The #1 Operating System!
NOVELL -The #1 Network



Control Room with Button Bar Overlay

- Runs 4 or more stations!
- Live, satellite and automated modes!
- Expandable to 20 or more users!
- Multi-track Wizard Editor!
- Instant audio access..NO transfer delay!

For information about radio's premier digital automation system, call Prophet Systems, Inc.

1-800-658-4403

In Australia, New Zealand, and Pacific Rim, contact Broadcast Solutions Pty Ltd. at (02) 439-6662.

Wizard For Windows™

The Flexible Digital Automation System featuring Windows and Novell Technology

Windows is a Registered Trademark of Microsoft Corporation. Novell is a Registered Trademark of Novell, Inc. Compaq is a Registered Trademark of Compaq Computer Corporation.

Circle (27) on Reply Card

Bird Electronic Corporation 2901-2
RF measurement instruments, accessories.
Circle (483) on Reply Card

Boonton Electronics Corporation 2107
RF test, measurement equipment.
Circle (484) on Reply Card

Bradley Broadcast Sales 1903
Introducing Panascheme studio furniture, racks; Audioarts R-60 audio mixer; Telos 1x6 phone talk system; Tascam portable DAT; Gentner TS-612 phone talk system.
Circle (485) on Reply Card

Broadcast Electronics 3625
Featuring FM-5C 5kW, FM-250C 250W solid-state FM transmitters; AM-500 500W solid-state AM transmitter.
Circle (334) on Reply Card

Broadcast Supply Worldwide/BSW 1825
Distributors of professional audio, RF/radio products, including Telos Zephyr, Arrakis Digilink, Audion Labs' VoxPro digital editor and Roland DM-800.
Circle (486) on Reply Card

Broadcasters General Store 3007
Distributor for IQS SAW digital audio editing software; Sine Systems RFC-1/Bj Thermal Sentry, Message Board Controller; American Recorder Technology recorder cleaning products.
Circle (487) on Reply Card

Bryston 3907-8
Introducing audio monitor amplifier, model 7B-PRO.
Circle (488) on Reply Card

Burk Technology 3207
Introducing audio test equipment; ARC-16 transmitter control packages; walkaway packages with ARC-16 and AutoPilot software; LX-1 stereo selector switch.
Circle (335) on Reply Card

C

Calzone Case 16758
EZ-Haul transport case; ESCORT mobile computer cases; floating/shock-mount rack case; NEC-MT transport case; LD-ATA DVR-20, Convoy Lightweight, LD cases; Ultima LCD panel transport case; Executive lap-top attache case.
Circle (336) on Reply Card

Canare Cable 11118-22
Cable & connectors, including IMPX AES/EBU digital audio adapters.
Circle (337) on Reply Card

CBSI Custom Business Systems 2113
Station automation software for broadcasters; Classic traffic & billing software, DOS or Windows; lower-cost Elite system; InterAcct complete interactive accounting system; Digital Universe digital audio storage and management system using Windows NT.
Circle (489) on Reply Card

CCA Electronics 4421
Solid-state FM transmitters; high-performance FM exciters; AM, SW transmitters to 50kW; FM transmitters to 45kW.
Circle (338) on Reply Card

CCS Audio Products/Corporate Computer Systems 3813
Audio transmission codecs, including PRIMA, CDQ-1000, CDQ-2000, Micro 56+ and Micro 66i; PACE news audio workstation.
Circle (490) on Reply Card

Cellcast Communication Products 5109
Remote production and transmission equipment.
Circle (491) on Reply Card

Central Tower 2411
Towers and monopoles for all broadcast applications; structural engineering analysis; complete construction services, antenna and line installation; turnkey projects; new line of self-supporting towers.
Circle (492) on Reply Card

Circuit Research Labs 2719
Audio processing equipment, Audio Signature 4-band stereo, MBL-100 news/talk AM processing systems; FM generators; event sequencing systems.
Circle (339) on Reply Card

Clear-Com Intercom Systems 18936-19336
PL-Pro party-line intercoms, 2- to 12-channel stations with Linking feature for communication flexibility; ICS-92 9-key programmable intercom station, dedicated answer-back key for Matrix Plus II system; XPL-12, -22 expansion panels with electronic LED labels add 60 keys to Matrix Plus II system; AB-100 On-Air Announcer's Console.
Circle (340) on Reply Card

Columbine Systems 15731
Master Control Automation with multistation, multiregional capabilities; video server automation control; Program Scheduler; Asset Management; software for traffic, sales analysis, accounting, finance; Oasis cable advertising sales management.
Circle (341) on Reply Card

Coaxial Dynamics 5013-14
Introducing model 81070 Wattchman series; transmitter protection products, RF wattmeters, loads.
Circle (493) on Reply Card

Communication Graphics 5016-7
Promotional products and professional logo design.
Circle (494) on Reply Card

Communications Data Services 1811
RFCAD; International terrain data; Fryers Site Guide/CDS on-line services; North American Terrain Data (US, Mexico, Canada).
Circle (495) on Reply Card

Computer Concepts 2503
Radio automation featuring the DCS digital commercial system, v 2, capable of dealing with 16,000 audio files; expanded display shows data when loading carts, peak level meters; can play files of varying sample rates, and more.
Circle (342) on Reply Card

Comrex 12105
Introducing DX200 ISO/MPEG Layer II digital audio codec; DXR.1 and DXP.1 G.722 codecs capable up to 15kHz.
Circle (343) on Reply Card

ComStream Corporation 5615
Introducing ABR700 digital audio receiver (for NPR system); RCA DSS1 satellite receiver.
Circle (496) on Reply Card

Connectronics 13627
Introducing Big Ears parabolic reflector with accessories, shoulder straps, transport cases, sport handles, wind muff.
Circle (344) on Reply Card

Continental Electronics 3619
Complete line of AM, FM, SW/MW radio transmitters and associated equipment; demos of high-power FM transmitter.
Circle (345) on Reply Card

Control Concepts/Leibert 16014-5
Introducing Isolatron Plus, AccuVar power line protection for broadcast and communications; featuring patented Islatrol, Islatran active Tracking Filters.
Circle (346) on Reply Card

Cortana Corporation 3909
Featuring Stati-Cal lightning prevention systems for tower protection through charge dissipation.
Circle (497) on Reply Card

Crouse-Kimzey Company 1914-15
Audio distributors; Otari Prodisk 464 digital workstation; Denon DN970FA CD player.
Circle (498) on Reply Card

Crown International 3203
CM-312 head-worn mic; full line of microphones, amplifier products.
Circle (499) on Reply Card

Countryman Associates 11607
Microphone products, the EMW series.
Circle (347) on Reply Card

CTE International 3201
FM broadcast transmitter products, exciters, power amplifiers.
Circle (500) on Reply Card

Cutting Edge Technologies 4203
Audio processing systems, including UNITY 2000i FM processor; UNITY AM processor; UNITY Remote software; Dividend composite filter.
Circle (348) on Reply Card

D

Dalet Digital Media System 5007-9
Digital audio workstations and automation system. Uses networked PCs for editing, production and on-air operations.
Circle (349) on Reply Card

Dan Dugan Sound Design 13619
Featuring Model D automatic mic mixing system.
Circle (350) on Reply Card

Dataworld 2419
Broadcast industry database, introducing detailed ethnic, demographic reporting in tabular and graphical map formats; large on-line database with instant access; Internet capability; ethnic/demographic shading overlays.
Circle (501) on Reply Card

DB Elettronica 4201
FM, TV transmitters, translators.
Circle (351) on Reply Card

dbx/Harman Pro Audio 2910
Audio processing equipment.
Circle (502) on Reply Card

Delco Wire & Cable 2204-5
Wire, cable products
Circle (503) on Reply Card

Delta Electronics 4125
Broadcast transmission monitoring products, SM-1 splatter monitor, OIB-3 operating impedance bridge.
Circle (352) on Reply Card

DENON 4004-5
Introducing DN995R MiniDisc cart recorder; DN80R portable MD cart recorder; DN790R cassette deck; DN1400F CD jukebox.
Circle (507) on Reply Card

DG Systems 1809-10
File-based digital audio distribution of radio spots using dial-up telephone lines.
Circle (508) on Reply Card

DGS Pro Audio 4605
Connectors, cables, including universal XLR, MIDI; 1/4" phone plugs, 1/4"-to-1/4" cable leads; digital multipair, speaker, GAC-2 low-noise cables; adapters, attenuators.
Circle (509) on Reply Card

DIC Digital 18385
Magnetic recording media, MQ digital audiotape, Microfinity 8mm videotape, 4mm width data-grade cartridge tape, rewritable magneto-optical disks; HQ series professional DAT cassettes.
Circle (353) on Reply Card

Dielectric Communications 15720
RF transmission equipment.
Circle (354) on Reply Card

Digidesign 1203, 1515
Digital audio workstation systems.
Circle (355) on Reply Card

Move Up from Carts to Touchscreen Digital Audio

Play Any Audio at a Touch

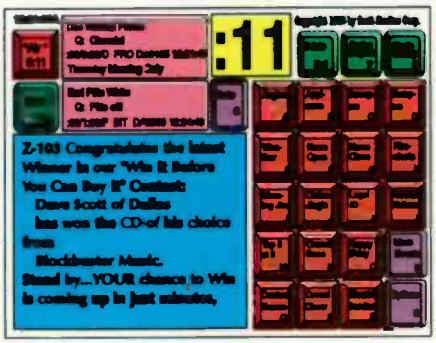
Nothing else makes radio as fast or easy as having all your spots, sounders and sweepers start with your fingertip–***always on-line and ready*** to play from hard disk. And ***nothing else*** makes your station sound as good or as exciting as touchscreen digital and creative talent with the ***new Scott Studio System!***

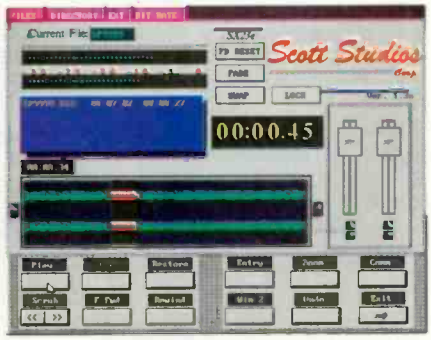
Here's how it works: Six buttons on the left of the 17" computer touchscreen play what's on your program log. Scheduled spots, promos, PSAs and live copy come in automatically from your Scott System Production Bank and your traffic and copy computers. You see legible labels for everything, showing full names, intro times, lengths, endings, announcer initials, outcues, posts, years, tempos and trivia. Your jocks can rearrange anything easily by touching arrows (at mid-screen), or opening windows with the entire day's log and lists of all your recordings.

On the right, 18 "hot keys" start ***unscheduled*** jingles, sounders, effects, comedy or promos ***on the spur of the moment***. You get 26 sets of 18 user-defined instant "hot keys" for your jocks' different needs.

Large digital timers automatically count down intro times, and flash at 60-, 45-, and 30-seconds before endings. You also get count-downs the last 15 seconds of each event.

The Scott Studio System is your ***best*** way to make the move to digital audio and eliminate troublesome carts. Each button on the touchscreen plays whatever you want instantly. All scheduled spots, jingles, promos and scripts come in from your traffic and copy computers.





The World's Fastest Playback!

Touch either of the two buttons at the top right of the main screen to see our "Wall of Carts" with all your audio ***on-line!*** Touch the sound, spot, jingle, promo, PSA or comedy you want and it plays ***instantly***. Or, you can put it anywhere you want in the day's schedule. Audio is displayed any five ways you like.

The Scott System also gives you a "Make Good" button so it's quick and easy to reschedule missed spots or promos.

Instant Requests from Hard Drive

Our most popular option is 9 gigabyte disks with ***1,000 songs*** pre-dubbed for ***free!*** The audio quality of digital music from the Scott System hard drive meets or beats the best CDs.

And nothing could be faster than song requests from the Scott System! You also get five "Wall of Carts" with music that plays at a touch! Songs are displayed by title, artist, year, length, category, or any ways you like.

Live Copy On Screen

Live tags, weather, promo copy, music trivia, contest copy and winners' lists automatically pop up on your Scott System's screen.

The *Best* Digital Audio

When spots, promos, PSAs, or any other digital audio events are recorded, they're immediately playable in ***all*** your Scott System air studios. Nobody wastes time carrying carts down the hall or redubbing spots for additional stations.

One question you ***don't*** have to worry about with the Scott System is "What if it breaks?" The Scott Cart Replacement System comes complete with ***every*** spot and jingle stored ***redundantly*** on ***two*** hard disks with a ***split-second*** switch to the "hot standby" computer and its own backup audio outputs! You get touchscreen convenience, digital quality, and backup redundancy for no more money than cart machines and commercial carts.

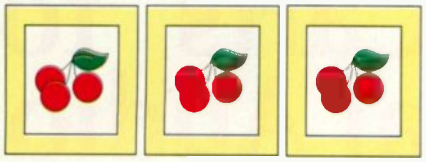
Sound Better With Digital Editing

Scott Systems' graphic waveform editors work wonders with phone calls in the air studio and creative spots and promos in production.

Your Best Investment

The Scott System ***leads the industry*** with the biggest broadcast groups like Shamrock, Alliance, Salem, Saga, Liggett, Regent, Tichenor, Heftel, Waterman, Max, Atlantic, and Rawlco in Canada. Our major markets include Detroit, D.C., Dallas, Miami-Ft. Lauderdale, San Diego, Denver, Oklahoma City, San Antonio, Greensboro, and others large and small from Bangor to Bakersfield.

Scott Studios Corp.
13375 Stemmons Freeway, Suite 300
Dallas, Texas 75234 USA
8 0 0 7 2 6 - 8 8 7 7
(800) SCOTT-77



Digital Broadcast Associates 1701-2
Digital cart recorders using magneto-optical disks.
Circle (510) on Reply Card

Digital Courier/MPR Teltech 1227
Digital audio file-transfer network; ISO/MPEG Layer II audio codecs.
Circle (511) on Reply Card

Dolby Labs 16567
Dolby Fax; enhancements to DSTL digital studio-to-transmitter link.
Circle (356) on Reply Card

Doremi Labs 2302-3
Digital audio workstations.
Circle (512) on Reply Card

Dorrough Electronics 16443-4
Signal measurement products including #280-D AES/EBU digital audio level meter; #40-N video level meters; standard line of analog audio meters.
Circle (357) on Reply Card

Doug Vernier Broadcast Technologies 2301
Broadcast consultants; introducing FM Frequency Search for Windows; RF Hazard Prediction for Windows; upgrades for INTERDLG contour mapping and FMCONT contour-to-contour FM channel search.
Circle (358) on Reply Card

E

Econco Broadcast Service 4823
Rebuilt power transmitting tubes.
Circle (513) on Reply Card

EDX Engineering 4325
Engineering software, MCS v1.2, SIGNAL v2.0/v2.5 International; MSITE v2.0/v2.5 International; SHDMAP v6.0/v6.5 International; TPATH V2.0/V2.5 International; RPATH v7.0/v7.5 International; US, international terrain data; US land use/land cover data.
Circle (514) on Reply Card

Electro-Voice 15717
Introducing RE-2000 large-diaphragm condenser mic; new power amps; N/D mic line; monitor speakers.
Circle (583) on Reply Card

Electronics Research - ERI 16604
FM transmission antennas; introducing ARS-1003 auto transmitter recycler; RFSS-3125 Safety Switch for worker protection; SKIP Site Keeper Integrated Pager monitors and reports status of 16 site conditions.
Circle (360) on Reply Card

Elenos SRL 1225
Transmission system components, radio transmitters.
Circle (361) on Reply Card

ENCO Systems 5619
Hard-disk audio storage; delivery/automation systems.
Circle (362) on Reply Card

Energy-Onix 4707
Introducing two frequency-agile composite STL systems, ITS 100W FM solid-state exciter & transmitter, RPU transmitters & receivers, FM relay receiver, AM transmitter; featuring ECO and MK series grounded grid, triode FM transmitter; SST and Legend series solid-state FM transmitters.
Circle (363) on Reply Card

Euphonix 3603
Introducing World Premiere, digitally controlled audio mixer for on-air or audio-post with instant reset of every control, optional surround sound; CS2000B broadcast mixer.
Circle (515) on Reply Card

Eventide 2707
Featuring DSP400B, H3500B, H3000B+ Ultra-Harmonizer effects processors with broadcast, post production software; obscenity delays; VR, VP series digital audio loggers.
Circle (516) on Reply Card

ESE 13606-8
Introducing ES-181 modem-based master clock, time-code generator; ES-126/-127 time/date displays with .55," 1" display heights; ES-996 2," 6-digit time or date display; ES-217 1x4 audio DA, XLR connectors; ES-150 auto switchover for primary and secondary master clock systems.
Circle (364) on Reply Card

E-Z UP International 4821-2
Quick setup shelters, requires minimal time, tools.
Circle (519) on Reply Card

F

Fairlight ESP Pty Ltd 19920
Digital audio workstation.
Circle (365) on Reply Card

Fidelipac 3122
Featuring Dynamax DCR 1000MO digital recorder, reproducer using magneto-optical drive; Dynamax MXE series audio console modules, studio talkback monitor, telephone interface, 5-band EQ and panpot.
Circle (517) on Reply Card

Flash Technology 1819
Introducing ElectroFlash FTB 312 medium-intensity dual beacon, ElectroFlash FTB 224, FTB 225 high-intensity dual beacons, ElectroFlash AOL 302D dual antenna obstruction light; SMART obstruction-lighting hardware; EAGLE obstruction-lighting software.
Circle (518) on Reply Card

FM Systems 19051
Audio level controllers; ATIS Eater ID-signal filter.
Circle (366) on Reply Card

Fostex 10952
Audio recorders, analog, R-DAT, multitrack; audio mixing systems.
Circle (367) on Reply Card

G

GEC-Marconi Communications Systems 17101
Test, measurement equipment; radio transmitters.
Circle (368) on Reply Card

Gefen Systems 2304-5
M&E Pro SFX locator and control for Mac and large-capacity CD changers; M&E Windows SFX locator; #100AGC auto gain control, #100CF crossfader, #100DS digital switcher, #TSE100 keyboard & monitor extender; CD changers from NSM, Denon, Sony, Pioneer.
Circle (520) on Reply Card

Gentner Communications 5621
Introducing enhancements for TS612 multiline telephone talk show system, enhanced ET100 portable teleconferencer; digital hybrids; teleconference interfaces; acoustic echo cancelers; VRC-2000 transmitter remote control.
Circle (521) on Reply Card

GEPCO International 13251
Introducing VA-$^1/_3$ video/audio composite cable; multipair digital audio cable; packaged cable assemblies.
Circle (369) on Reply Card

Gorman-Redlich Mfg. Company 1913
EBS and weather service equipment; model CEB EBS encoder and decoder; model CRW weather radio.
Circle (522) on Reply Card

H

Hafler Professional 3903
Audio power amplifiers.
Circle (523) on Reply Card

Hallikainen & Friends 4223
Audio mixers, TVA series, programmable transmitter control systems, DRC190.
Circle (524) on Reply Card

Harris Allied Broadcast Div. 4416/16001
Introducing DX series EPAC high-power digital solid-state medium-wave transmitters; DSE 1400 digital satellite exciter, DSR 1400 studio grade receiver; Audio-Metric CD-10E CD cartridge machine; OKTAVA microphones with Russian heritage.
Circle (370) on Reply Card

Harrison by GLW 12110
Featuring Series Twelve, K-Series, AP-100, Pro-790, MPC audio mixing consoles.
Circle (371) on Reply Card

Henry Engineering 5625
TELESTOR digital actuality recorder for automatic recording of news stories, weather updates and other material via dial-up phone line; Fast Trac II voice-over audio workstation; Stereoswitch audio switcher.
Circle (372) on Reply Card

Hewlett-Packard 19656
Test and measurement products.
Circle (373) on Reply Card

HHB Communications Ltd. 1604-5
Accessories for PORTADAT portable DAT recorders; MCA 1000 AC/DC powered 4-bay fast charger; DH1 DeHisser from Cedar Audio.
Circle (525) on Reply Card

Holaday Industries 12908
Magnetic field, RF radiation hazard instruments; HI-3702-induced current meter; EMF instrumentation.
Circle (374) on Reply Card

Hughey & Phillips Inc. 4722-3
FAA-approved obstruction lighting, controllers and remote monitoring for tall towers.
Circle (526) on Reply Card

I

Illbruck 2904-5
Acoustical material, treatments; Sonex I Classic, Sonex Techwedges.
Circle (527) on Reply Card

Industrial Acoustic/IAC 14039
Acoustic, sound control products.
Circle (375) on Reply Card

Inovonics 1625-8
Featuring #716 David-II 2nd-generation FM processor/generator; #708 digital synthesis FM-stereo generator; #540 AM modulation monitor; RBDS encoder, decoder with full computer interface.
Circle (528) on Reply Card

International Datacasting Corp. 4122-23
Reception equipment for satellite data transmission, SR250 and IDC FM/FM receivers.
Circle (505) on Reply Card

International Tapetronics/ITC 1410
DigiCenter digital audio management system with audio database management tool box, .WAV file support; multitasking operations; multivolume HDD backup with DAT cartridges; expanded integrated mixer with virtual console, event-driven input switching; enhanced traffic, music interfaces; Virtual Scheduler; Audio Routing Switchers.
Circle (527) on Reply Card

Intertec Publishing 4322, 15659-60
BE Radio, *Broadcast Engineering*, *World Broadcast News* and *Video Systems* magazines.
Circle (529) on Reply Card

Intraplex 3904-5
Introducing Series 4400 portable audio codec integrating ISO/MPEG Layer II and G.722 encoding/decoding, ISDN terminal adapter, multiconfiguration storage memory.
Circle (376) on Reply Card

ITELCO spa 18514
1kW, 5kW fully solid-state FM transmitters.
Circle (377) on Reply Card

J

Jampro Antennas 16617
Rigid coaxial transmission line and components; JIDC low-power FM combiner; hybrids, harmonic filters; channel combiners, rigid transmission line, patch panels; directional couplers.
Circle (378) on Reply Card

Jensen Tools 16609
Numerous tools and tool kits for audio technicians and broadcast engineers; various metering, signal source products, JTK-5000 computer maintenance kit; Fluke model 87 DMM.
Circle (379) on Reply Card

JNS Electronics Pty 1627-8
RFM 8323 FM broadcast receiver module for 8000 system.
Circle (530) on Reply Card

K

Kay Industries 2507
Power conversion products.
Circle (531) on Reply Card

KD Kanopy 5204-5
Shelter products for outdoor radio productions.
Circle (532) on Reply Card

Kintronic Laboratories 2119
Introducing RFC150-50-1 single-pole, double-throw 150A 60kV RF contactor; RFC250-30-1 single-pole, double-throw 250A 30kV RF contactor.
Circle (533) on Reply Card

Kline Towers 16367
Design, fabrication and erection of guyed, self-supporting, platform and multiarray towers, space frame structures and special type antenna structures for broadcast applications; new tower designs, analyses of existing structures; inspection, maintenance services.
Circle (534) on Reply Card

L

Larcan-TTC 12500
FMS500/s dual 500W FM transmitters.
Circle (380) on Reply Card

Leader Instruments 12803-6
Test equipment, including audio and RF metering, waveform and spectrum display products.
Circle (381) on Reply Card

Lectrosonics 11232
Introducing wireless mic systems, UDR200 UHF synthesized receiver, UM200 synthesized belt-pack transmitter; UMC16 modular UHF multicoupler (8 diversity, 16 non-diversity receivers); 4-channel UHF, VHF receivers with integral RF, power distribution; 187 series VHF narrowband wireless system.
Circle (382) on Reply Card

Leitch Inc. MS204, 15748
Audio routers; distribution amps; digital interfacing products.
Circle (383) on Reply Card

LEMO USA 11222
Audio and video connectors.
Circle (384) on Reply Card

Lightning Eliminators & Consultants 12900
Lightning prevention systems, Spline Ball Ionizer and Dissipation Array systems; Chem-Rod chemically activated grounding electrodes; transient voltage surge suppression devices for power, communications lines.
Circle (385) on Reply Card

Lightwave Systems 1807-8
FBDO-M, FBDO-SL digital audio modules for Fibox fiber-optic audio transmission system. IMS passes AES digital audio through as 20-bit analog audio signal.
Circle (386) on Reply Card

LNR Communications 2416
MVC-10 mobile voice communication package.
Circle (387) on Reply Card

Logitek 2725
Featuring Ultra-VU audio meters with simultaneous VU, PPM, Peak Hold, 64dB range, high-resolution zoom mode, phase display; Mini RateGate low-cost digital audio sample rate converter.
Circle (535) on Reply Card

Loral Microwave-Narda 5425
Microwave products for ENG, STLs.
Circle (536) on Reply Card

LPB 2727
Introducing Salsa for Pentium, Salsa CD-R option; Signature III and Series 7000 stereo linear-fader consoles; low-power AM transmitters meeting Part 73 AM nighttime, Part 90 TIS/HAR and Part 15 unlicensed limited area broadcast; carrier current systems; radiating coaxial cable, limited-area FM systems.
Circle (537) on Reply Card

Studio Overload?

Use *Fast Trac II* to eliminate all those pesky chores from your main production studio!

NEW! *Fast Trac II* is a compact production system that's perfect for routine production tasks. Dub a spot to cart or hard drive, record a liner, add a tag to a spot, make a cassette, copy a CD.

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Circle (29) on Reply Card See us at NAB Booth #5625

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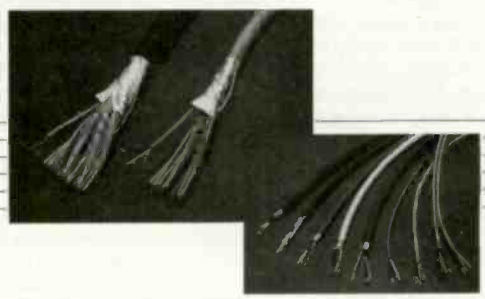
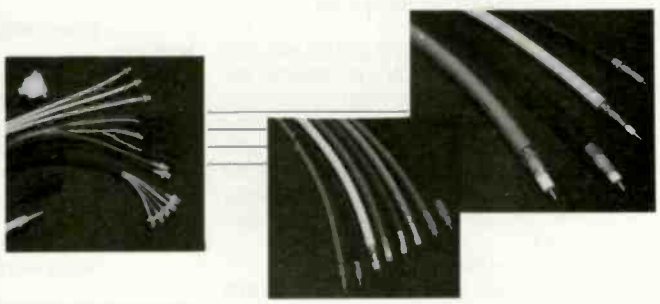




Audio, Video & Broadcast Cable Products

GEPCO INTL INC CHICAGO, IL
2225 W. HUBBARD ST., CHICAGO IL 60612-1613
(312)733-9555 FAX'(312)733-6416 (800)966-0069

Circle (30) on Reply Card See us at NAB Booth #13251

M

Magnum Tower 4010-11
Radio and communications towers.
Circle (538) on Reply Card

Marantz/Superscope Technologies 5426
Audio recording products.
Circle (565) on Reply Card

Mark IV Audio Group 15717
Introducing Klark Teknik DN3600A stereo programmable graphic EQ, DN 782RM remote control for DN 728 delay; Midas XL-200 console; featuring Klark Teknik 300, 400 series equalizers; 500 series compressors, gates; 700 series digital delay, 800 series crossovers; DDA Profile, FMR and Forum MUTE consoles.
Circle (389) on Reply Card

Marti Electronics 4119-20
STL and ENG products, STL-10 studio transmitter link and RPT-30 ENG transmitters.
Circle (390) on Reply Card

Maxell Corporation of America 18136
Analog and digital audio recording media products.
Circle (391) on Reply Card

McCurdy Radio Industries 13110
DCS 3000 serial digital and Microcompact digital intercoms; M/2000 automation system; McCart digital audio storage, multichannel playback; UMD-32 3-color 32-character under-monitor display; ATS-100 audio test set; AT2656 stereo audio monitor; UIO-80 serial/parallel machine control interface; Series 9000 A/V DAs, accessories.
Circle (392) on Reply Card

Micro Communications 19401
Transmission line and broadcast antennas.
Circle (393) on Reply Card

Micron Audio Products 16448-51
Wireless microphone systems, accessories; including model TX-505 hand-held transmitters; SDR range portable diversity receivers; SQN-IIIa portable stereo mixer; Tram lavalier mics.
Circle (394) on Reply Card

Modulation Sciences 11113-5
Audio processors, spatial image enlarger; modulation measurement equipment, digital FM peak deviation monitor; diversity subcarrier receiver for ENG/mobile crew communications; RDS/RBDS generator, analyzer and data receiver.
Circle (396) on Reply Card

Mohawk/CDT Broadcast Cables 13404
Analog and digital audio cable.
Circle (397) on Reply Card

Moseley Associates 1419
PCL 6000 aural STL; DSP 6000 digital STL with ISO/MPEG Layer II codec, AES/EBU rate converter options; MRC 2 (with programmable co-processor module) and MRC 1620 remote-control systems; TASKMASTER 20, MASTERCONTROLLER PC software for transmitter remote control; RPL-4000 remote programming link; StarLink 9000 digital modular simplex/full-duplex system with personality modules.
Circle (398) on Reply Card

Murry Rosenblum Sound Assoc. 2428
Audio Ltd. diversity wireless microphone systems.
Circle (539) on Reply Card

MYAT 15714
Rigid coaxial transmission line components and accessories, $^{7}/_{8}$" to $9^{3}/_{16}$".
Circle (399) on Reply Card

N

Nady Systems 11226
Wireless mic systems using VHF and UHF frequencies.
Circle (400) on Reply Card

Nagra Kudelski SA 11805
Analog, digital audio recorders; introducing NAGRA AREA, solid-state recorder with PCMCIA support; single channel records 40 minutes on 20MB card; editing, G.722 or MUSICAM compression; standard telephone output, ISDN, time-code options.
Circle (401) on Reply Card

National Supervisory Network 5101-2
Transmission-plant monitoring service.
Circle (402) on Reply Card

Nautel 2421
Introducing NB superefficient modular AM transmitters from 6kW to 60kW; solid-state AM, FM radio broadcast transmitters, including high-power NA series AM systems; ND low-power AM systems; superefficient FM series modular transmitters; NE50 50W digital FM exciter.
Circle (403) on Reply Card

NDG Phoenix 13043
OMS v1.5 upgrade to operations management software, increases performance with multiple sessions, work orders; LMS v1.6 upgrade to library management system with laser label option, improved interface, barcode and tape logging.
Circle (404) on Reply Card

Nemal Electronics International 13636
Precision audio, video cable; flexible mic cable; Kings products, Cat wire & cable, Switchcraft, Amphenol, Blonder-Tongue, Belden Alpha, Cablewave.
Circle (567) on Reply Card

Neotek 1907-9
Featuring the •lan Extra, the •lite and Esprit audio mixing consoles; multimedia module; Sytek microphone pre-amp line.
Circle (540) on Reply Card

Neutrik Instrumentation 2127
Portable and programmable audio system measurement products; 3501, 5500 test systems.
Circle (541) on Reply Card

Neutrik USA 2127
A and B series XLR receptacles with optional pin 1 direct-to-ground; MiniCon 12-pin connector for PCB mounting; EASY PATCH series of patchbays and panels.
Circle (542) on Reply Card

Norsat Int'l./Nil 1704-5
C-, Ku-band satellite communications system equipment; introducing new LNBs, Channel-on-Demand and Microsat 150.
Circle (543) on Reply Card

NPR Satellite Services 4221-2
Satellite transmission services for radio broadcasting.
Circle (406) on Reply Card

NVISION 15884
Introducing DAPS II digital audio processing suite with 16x16 I/O matrix; NV9301 router control panels; NV1055 mix/minus router/control panel; NV1050 4-channel sample rate converter; NV1035/1045 20-bit A/D, D/A converters; NV1308A router, RS-232 machine control router; NV1060 40-channel delay compensator; NV3128D digital machine control routing switcher.
Circle (407) on Reply Card

O

OMB America 3601
Radio transmitters.
Circle (408) on Reply Card

OpAmp Labs 16674
Audio, video signal distribution, switching equipment, A-24/2ML audio and VA-16 1x16 video/audio press feed boxes.
Circle (409) on Reply Card

Orban/Harman Professional Audio 2910
Introducing 8208 stereo generator, compact, standalone, all-digital processing for large network application; DSE 7000 digital sound editor with +/-25% time compression/expansion using V4.65 software; PC software for Optimod-FM 8200.
Circle (544) on Reply Card

Otari 1414
Audio mixers and recording equipment; STATUS RP, a digitally controlled console; the BR-10 broadcast console; and CDC-600 CD changer; MR-10 minidisc recorder and RADAR random access digital audio recorder.
Circle (545) on Reply Card

P

Pacific Radio Electronics 12946-8
Racks, panels; precut holes accommodating various manufacturers' connector products.
Circle (410) on Reply Card

Pacific Recorders & Engineering 3025
Audio mixing consoles, including BMX, AMX, STX, RMX and Productionmixer systems; ADX Ensemble and ADX Eight digital audio workstations; custom studio cabinetry.
Circle (546) on Reply Card

Panasonic 18101
See Ramsa Audio/Panasonic.

Penny & Giles 3004-5
Signal controls, faders; M3000 linear, MRF 11 rotary motorized series; T-bar controls; precision controllers; Audio Control Module precision faders and control devices.
Circle (547) on Reply Card

Penta Laboratories 1525
Transmission power devices.
Circle (548) on Reply Card

Phasetek Inc. 5427-8
Manufacturers of AM antenna phasing equipment, antenna tuning units, RF components and RF inductors.
Circle (549) on Reply Card

Potomac Instruments 2510-11
RF test/monitoring products; 1900 series directional array antenna monitors; FIM series MF/VHF/UHF field-strength meters; AA-51A automatic audio analyzer, AG-51 generator; QA-100 program audio analyzer; tower-light monitor; remote-control systems.
Circle (550) on Reply Card

Posthorn Recordings 1526
Distributor of Schoeps microphones.
Circle (551) on Reply Card

Professional Label Inc. 15728
Label Producer label printing software for Windows; CD label sheets; packaging products.
Circle (414) on Reply Card

Professional Sound Corporation 5116-7
Production audio equipment distributor; MilliMic lavalier microphones; VDB boompoles; audio distribution amps; battery supplies; mic power supplies; RF antennas; PSC sound carts, custom cables; headset microphones; omniplate microphones; universal shock-mount systems; solar panel/rechargeable power supplies.
Circle (552) on Reply Card

Prophet Systems 5421-3
Radio automation systems.
Circle (415) on Reply Card

Q

QEI 4418
Quantum 10kW solid-state FM transmitter; solid-state 1kW transmitter; model 710 digital stereo generator with AES/EBU facilities; model 50E, 150E, 300E FM exciters; Cat-Link AES/EBU digital audio

transport; Quick-Link spread-spectrum digital RPU system.

Circle (416) on Reply Card

R

Radio Computing Services 5403
Music library software; complete digital audio and data networks; live assist studio or full automation software for radio.

Circle (417) on Reply Card

Radio Design Labs 2407-8
Stick-On line mixer and telephone coupler; Rack-Up audio DAs, pre-amps, IHF-PRO interface, video attenuator; bridging input, adjustable line, line matching transformers; 70-25V input interface.

Circle (418) on Reply Card

Radio Systems 3615
RS series audio mixers; telephone interfaces; digital & analog clocks; audio DAs; DDS digital delivery system.

Circle (419) on Reply Card

Radiomation 4504-5
Radio automation systems.

Circle (553) on Reply Card

RAM Broadcast 4413
Introducing audio mixers, intercom systems, switchers, jackfields and on-air lights.

Circle (553) on Reply Card

Ramsa Audio/Panasonic 18101
Professional audio mixers, monitors; R-DAT systems, SV-3700, SV-3900 with RS-422 control, SV-4100 with instant-start RAM buffer.

Circle (420) on Reply Card

RCI Systems Inc. 10361
AVD series A/V wall plates, panels; BRO active/passive audio mult. boxes; CT-2 cable tester; introducing BMV series video mult. box and custom silk screening services.

Circle (421) on Reply Card

Register Data Systems 2121
Complete business software packages for broadcast with sales, traffic, billing, accounting systems; digital automation systems.

Circle (422) on Reply Card

Roland Corporation 4713
Audio workstations, including the DM-800 and expandable DM-80; AR-2000 audio announcement recorder; AFP-700 antifeedback processor; RSS-10 Roland Sound Space 3-D sound processor.

Circle (554) on Reply Card

Rules Service Company 1528
FCC rules and regulations, published monthly in loose-leaf and computer formats; copyright, patent, trademark rules.

Circle (555) on Reply Card

S

SADIE 1207
Digital audio workstation.

Circle (556) on Reply Card

Samson Technologies 12829
Stage 33, Install wireless mic systems; Behringer Combinator compressor; Soundtracs Solitaire consoles.

Circle (423) on Reply Card

Sanken/Developing Technologies 12802
Lavalier, hand-held and other microphone products.

Circle (424) on Reply Card

SCA Data Systems 5203
Subcarrier transmission products; MUSIC 4 Personal ethnic broadcasting receiver; MUSIC 4 Plus 9600 high-speed data and audio system; RDS, phase-locked paging and super high-speed generators.

Circle (425) on Reply Card

Scala Electronic 15707
Base station antennas for communications; STL, RPU antennas, pre-amps; translator antennas.

Circle (426) on Reply Card

Schafer World Communications 4116
CD automation system.

Circle (427) on Reply Card

ScheduALL by VizuAll Inc. 16340-41
Introducing ScheduALL facility management systems for Windows; ScheduALL library systems, ScheduALL personal manager.

Circle (428) on Reply Card

Schmid Telecommunication 1815-17
Audio test, measurement systems, RESCO network monitoring, control system; SIAT audio test systems.

Circle (557) on Reply Card

Scientific Atlanta 13828
Satellite communications equipment, earth station antennas, antenna controllers.

Circle (429) on Reply Card

Scott Studios 2714
Music, commercials for radio with touchscreen control of hard drive system.

Circle (430) on Reply Card

Seem Audio A/S 4604
Studio and portable audio mixers.

Circle (558) on Reply Card

Selco Products 4121
Equipment replacement components; introducing Locking knobs, Soft Touch slider knobs and 3-shot push-on knobs.

Circle (559) on Reply Card

Sennheiser Electric 12035
Headphone, microphone and wireless RF products; Neumann TLM 193 large-diaphragm cardioid condenser mic.

Circle (431) on Reply Card

Shively Labs 4425
Broadcast antennas and related equipment.

Circle (560) on Reply Card

Sierra Automated Systems 2710
Audio routing switchers.

Circle (561) on Reply Card

SESCOM 13600
Rackem 'n' Stackem Electronics; Audio SIPs and transformers; in-line audio devices.

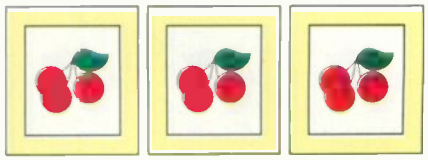
Circle (432) on Reply Card

Shure Brothers 11800
Introducing M367 mixer with 6-input portability for ENG/EFP, using mic or line level signals; the VP3 Wireless System including the VP3 portable receiver and associated T2/58, T1P body-pack/WL93 or L11 body-pack transmitter.

Circle (433) on Reply Card

Siemens Audio Inc. 13813
Neve audio mixing systems; Mitsubishi digital audio recorders; AMS mics, automated mixers, workstations; Siemens analog, digital routers.

Circle (434) on Reply Card



Sira Sistemi Radio srl 19359
FM transmission antennas.

Circle (435) on Reply Card

Smarts Broadcast Systems 5416-7
Radio automation systems.

Circle (436) on Reply Card

Solid State Logic 16621
Audio production equipment, including the Axiom digital production system; SL9000 J series total audio system; DiskTrack hard disk, multitrack recorder/editor; SL8000 GM on-air production console; OmniMix digital surround sound audio/video system.

Circle (437) on Reply Card

Solidyne 5107-8
Distributor of audio products.

Circle (561) on Reply Card

Sonex 2904-5
See Illbruck.

Circle (527) on Reply Card

Sonic Solutions 12046
Digital audio workstations; CD recording equipment, SS-105 premastering system; audio utility NN-100 NoNoise sound restoration system.

Circle (438) on Reply Card

Sony Electronics/Bus. & Prof. Div. 11514
Analog, digital audio products; microphones; digital audio workstation and audio frame converter; audio effects processors; analog and digital audio recorders.

Circle (439) on Reply Card

Sony Recording Media 11514
Full line of professional analog and digital audio tape, cassettes; full line of DataMation products, including data cartridges, MO disks, floppy disks.

Circle (440) on Reply Card

Spectral Synthesis 4801
Digital audio workstations.

Circle (562) on Reply Card

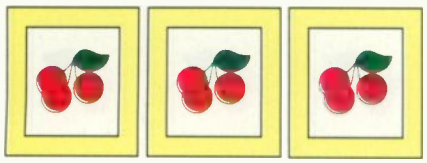
Sprague Magnetics 5015
Tape head, DAT head reconditioning; hard, floppy and optical drive repairs; computer/audio DAT drive repair; computer and audio accessories.

Circle (563) on Reply Card

Staco Energy Products 2427
Power protection products.

Circle (506) on Reply Card

Circle (31) on Reply Card



Stainless **16608-908**
Tower guy materials, towers.
Circle (441) on Reply Card

Stantron **12832**
Modular equipment racks, consoles and cabinets.
Circle (442) on Reply Card

Storeel **18114**
Tape storage systems, including mobile and static designs for all formats.
Circle (443) on Reply Card

Studio Technologies **3003**
StudioComm series model 60 central controller, model 61 control console; Studio Tools model 80 stereo analog audio DA; Studio Tools model 85 AES/EBU digital audio DA.
Circle (564) on Reply Card

Superior Electric **5113-4**
Electronic, electrical control equipment; STABILINE power protection equipment; uninterruptible power supplies, power conditioners, transient suppressors, RFI filters; voltage regulators; AC disturbance monitors.
Circle (444) on Reply Card

Svetlana Electron Devices **5313-4**
RF power devices.
Circle (566) on Reply Card

Switchcraft **5010-11**
Featuring solderless 280DRY plug; black Tini Q-g connector; 188 heavy-duty 1/4" phone plug; 299 heavy duty 1/2" stereo phone plug; 3.5mm single mono jacks.
Circle (568) on Reply Card

SWR Inc. **14845, 15745**
RF feedline products; complete line of FM antennas.
Circle (569) on Reply Card

Symetrix **1911**
528E Voice processor; 488 Dyna-Squeez 8-channel compressor/interface; 602 digital stereo processor.
Circle (570) on Reply Card

Synclavier **3901-2**
Digital audio production equipment.
Circle (571) on Reply Card

Systems Wireless **13634-5**
Wireless mic system with digital code squelch; antenna multicomputers for UHF; 5-, 9-key display stations for cable digital intercom systems; on-air announcer console; wireless video systems.
Circle (445) on Reply Card

T

Tactile Technology **2207-8**
Audio mixing consoles.
Circle (572) on Reply Card

TASCAM **17167**
Audio recording equipment; M-5010/M5-FA, 102/202 MkII; portable DAT, single and dual cassette decks; 32-channel I/O console with automation.
Circle (447) on Reply Card

Techni-Tool **11547-8**
Special purpose tools.
Circle (448) on Reply Card

Tektronix **16528**
Introducing TG2000 multiformat analog, digital signal generation platform; #764 digital audio monitor with measurement, analysis capabilities; numerous signal generators, monitors, oscilloscopes, spectrum analyzers; TDRs, demods.
Circle (449) on Reply Card

Telex Communications **18827**
ADAM intercom system; mono & stereo listen-only keypanels; user stations; line monitor speakers; belt packs; FMR-150, -450 wireless mic systems; log periodic antenna, antenna splitters.
Circle (450) on Reply Card

Telos Systems **4203**
Zephyr ISDN transceiver, Zephyr Net ISDN network hub; Telos 100 Delta and ONE telephone interfaces; Direct interface, ONE-x-Six talk show system; Link intercom-to-phone-line interface.
Circle (573) on Reply Card

TEM/Tecnologie Elettroniche Milano **1813-4**
Radio/TV transmitters, translators.
Circle (574) on Reply Card

Tennaplex Systems **15707**
FM broadcast antenna products, offering omnidirectional and custom patterns.
Circle (575) on Reply Card

Tentel **13407-408**
Tentelometer tension meters; torque, reference plane, head protrusion and drum eccentricity gauges.
Circle (451) on Reply Card

TFT Inc. **3609**
Introducing EAS 911, low-cost emergency alert system and accessories; AM, FM monitors; analog, digital STLs; FM Reciter; Synchronous Booster.
Circle (452) on Reply Card

The Management **2109-11**
Broadcast accounting software; PC-based digital audio automation.
Circle (388) on Reply Card

Thomson Tubes Electroniques **12505**
RF power devices for all broadcast applications.
Circle (454) on Reply Card

360 Systems **2116**
AM16 routing switcher; DigiCart/II digital audio hard disk recorder; Instant-Replay hard disk audio player.
Circle (504) on Reply Card

3M Pro A/V Products **16312**
Digital and analog audio recording media.
Circle (455) on Reply Card

TimeLine **1821**
Time-code products; transport synchronizing systems; digital audio workstations.
Circle (575) on Reply Card

TM Century **4127**
Radio station automation, Digital Commercial System with hard disk storage.
Circle (456) on Reply Card

Trident Audio USA **1507**
Audio mixers for radio production.
Circle (576) on Reply Card

TWR Lighting **4323**
Tower lighting products.
Circle (577) on Reply Card

U

U S Tape & Label **2508-9**
Labels, promotional products.
Circle (578) on Reply CardUtility Tower **2528**
Tower products and services for AM, FM, microwave and other communications.
Circle (579) on Reply Card

V

Vega/Mark IV Audio **15717**
Wireless microphone systems, intercom components.
Circle (460) on Reply Card

Videoquip Research **5315-17**
Signal routing switchers, distribution products.
Circle (580) on Reply Card

W

Ward-Beck Systems **15704**
Renaissance series radio consoles; M405P portable extended range VU meter; D8212 audio DAs.
Circle (461) on Reply Card

West Penn Wire/CDT **19570**
Wire, cable products.
Circle (463) on Reply Card

Wheatstone Broadcast Group **4709**
Audio mixing consoles; A-6000 Air Master audio console; signal processing equipment; modular studio furniture; digital audio hard disk system.
Circle (581) on Reply Card

Whirlwind/US Audio **12507**
Audio mixers, MIX5-SB 4-channel mixer; audio, video cabling, distribution products; transformers.
Circle (464) on Reply Card

Will-Burt **16114-5**
Telescoping masts, TMD-7-42-367 microwave antenna support; 25' Hurry Up; AC Alert live power line detectors for telescoping masts.
Circle (465) on Reply Card

Winsted Corporation **11827, M1718**
Special purpose studio furnishings; Cabinet Design kits; Locking rack shelves; black mini consoles for multimedia use; recessed monitor consoles; WELS software program for designing modular Winsted furniture.
Circle (466) on Reply Card

Wireworks **13602-3**
Introducing TE-3+ combination audio and video cable tester; X series cable assemblies (multiple coax line assemblies with 3 to 5 lines).
Circle (467) on Reply Card

Wohler Technologies **18369-569**
AMP series 1U and 2U high-performance audio monitors; VM 1U monitor; MSM series audible alarms; serial embedded audio/AES-EBU digital interface; analog, AES/EBU digital level-metering and source-select routers.
Circle (468) on Reply Card

Y

Yamaha Music **2425**
Audio mixers; ProMix 01 digital mixer; DMC 1000 digital automated recording console; YPDR 601 compact disc recorder.
Circle (582) on Reply Card

S-6 Hall Exhibitors

Ampex Recording Media ..... **S 714**
Circle (583) on Reply Card

Audio Digital Imaging ..... **S 804**
Circle (584) on Reply Card

Best Power Technology ..... **S 241**
Circle (585) on Reply Card

Entertainment Digital Network **S1009**
Circle (586) on Reply Card

General Microwave Services ..... **S 104**
Circle (587) on Reply Card

Kart-A-Bag **S1043**
Circle (588) on Reply Card

LM Engineering ..... **S 847**
Circle (589) on Reply Card

Northern Telecom ..... **S 614**
Circle (590) on Reply Card

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NEWS

Proposed merger would create fifth-largest group

A deal that will put a new player into the top five of U.S. radio station groups has been proposed by Evergreen Media, which plans to acquire Broadcasting Partners. Pending approvals, the new company will own 22 radio stations in 10 markets. Each company currently owns 11 stations.

The merger would violate FCC duopoly rules in the Chicago market, where four FM stations would be jointly held. (Current duopoly rules allow a licensee to own up to four stations in larger markets under certain conditions, but no more than two stations in each band – AM or FM). The companies have asked the FCC for permission to operate all four FMs in Chicago for 12 to 18 months.

Evergreen's other stations are in Los Angeles, San Francisco, Washington, Houston and Miami, while Broadcasting Partner's others are in New York, Detroit, Dallas and Charlotte, NC.

Under the terms of the proposal, Evergreen has offered $12 plus 0.46 shares of its Class A common stock (approximately $20 total) for each share of Broadcasting Partner's stock. Evergreen also plans to refinance about $81 million of Broadcasting Partner's long-term debt. The overall deal is worth approximately $243 million, according to company sources. The two groups accounted for a combined revenue of about $160 million in 1994.

If the acquisition is approved by the FCC and company shareholders, it could be finalized by mid-1995.

European countries join forces to launch DAB

Ten European nations have established the "EuroDAB Forum" to help create a coordinated launch of DAB on the continent. The 10 countries are Belgium, Denmark, France, Germany, the Netherlands, Poland, Spain, Sweden, Switzerland and the United Kingdom. They have been joined in the effort by the European Community (EC) and several trade associations. Among the latter is the European Association of Consumer Electronics Manufacturers (EACEM), the European equivalent of the EIA.

The forum will hold its first meeting at the European Broadcasting Union (EBU) in Geneva on March 22, 1995. It will consider issues such as marketing, service-launch strategy, coordination of national plans and receiver requirements.

All these countries have already approved the use of Eureka 147 as their DAB format, but they have not fully agreed on common frequency allocations for its deployment. Several of the participating countries (France, Germany, the Netherlands, Sweden and the U.K.) will begin experimental or pre-operational DAB broadcasting during 1995. Test receivers and transmitters are already available in Europe, and consumer DAB receivers are expected there by fall of this year. The first VLSI chips for these receivers are just becoming commercially available.

Membership in the EuroDAB forum is open to all existing and future national and international DAB organizations, along with broadcasters, manufacturers, service organizations and related associations, including those outside the European continent.

For more information, please contact Franc Kozamernik at the EBU, +4122-717-27-32 or via FAX at +4122-717-27-10.

BUSINESS

Harris Allied has announced the use of a Harris DX10, 10kW solid-state medium-wave transmitter to demonstrate **USA Digital Radio's** In Band/On Channel AM Digital Audio Broadcast (USADR IBOC AM DAB) system. The DX10 is being used for over-the-air testing of USADR's IBOC system in Cincinnati, OH.

Meanwhile, the Harris DX 600, the first all-solid state 600kW medium-wave broadcast transmitter, has been operating at Harris Broadcast Division's high-power AM test facility in Quincy, IL, since June 1994.

Also, the broadcast division has been awarded a contract from the **U.S. Information Agency (USIA)** to furnish the world's first 1MW solid-state medium-wave broadcast transmitters. The two transmitters, both Harris DX1000s, will be used by the USIA's Voice of America (VOA) at existing relay stations in Bangkok, Thailand and Poro, Philippines. They are expected to be on the air within the next 19 months.

In support of RDS Smart Radio technology, **Denon Electronics** will kick off the second phase of its campaign this fall, placing 30 more **RE America** RDS encoders on-the-air. The company will target key retail markets, bringing the national total of RDS stations to more than 250.

Gentner Communications has signed on **KBZ Communications** as a representative in the New York and New England states area. KBZ's four offices are located throughout the area for effective dealer communication.

Digital Generation Systems has signed on the one thousandth radio station to the DG Systems multimedia network and celebrated its one hundred thousandth delivery of radio spots via the network.

Teracom Svensk Rundradio AB, Sweden, has furthered its partnership with **Differential Corrections, Inc.** (DCI), Cupertino, CA, through an equity investment in DCI. The financial investment provides funding to continue the development of technology for applications served by DCI's Differential Global Positioning System (DGPS).

Fairlight U.S.A. has announced the purchase of three Fairlight MFX2 24-track digital audio workstations by **Waves Sound Recorders**, Hollywood, CA. The company also announced the installation of 10 new MFX3 systems in facilities throughout Europe, including London and Moscow.

PEOPLE

Kurt Schwenk has joined Dolby Laboratories, Los Angeles, as vice president, film applications. Also, **Larry Poor** has joined the company as director, technology marketing.

Matthew J. McCoy has joined **Electronic Industries Association's Consumer Group**, Arlington, VA, as staff vice president for government and legal affairs.

Dr. **Andrew S. Clark** has been appointed to the newly created position of president for **ComStream Canada Inc.**, Montreal.

John Lancken has been appointed international marketing manager for **Fairlight ESP Pty Ltd**, Sydney, Australia. Also, **Nick Cook** has been appointed director European operations, and **Wayne Freeman** has been appointed as CEO of the newly formed **Fairlight, U.S.A.**

Lance Korthals and **Tom Jorgenson** have left senior executive positions at **Harman International** to become the largest shareholders and top management at **Spectral, Inc.**, formerly **Spectral Synthesis, Inc.** The two share the title of co-chairman, with Korthals holding the additional title of president, and Jorgenson holding the titles of CFO and CEO. The new company will continue the development, manufacturing and sales of AudioEngine and new AudioPrisma products.

New Products

Studio condenser microphone
Electro-Voice

➤ RE2000: a short-D, high-efficiency unit offering the high output of a large diaphragm with the tighter polar pattern and better transient response of a smaller diaphragm; the low-mass diaphragm is ultrathin, gold-sputtered and environmentally stabilized; features true balanced output transformer designed especially for the microphone by Jensen; an external computer-grade power supply ensures steady power to the Constant Environment System; also features a 10dB capsule-attenuator that provides increased usable sound pressure levels to 148dB; an internal, 3-stage pop filter reduces explosive breath blasts and wind noise.

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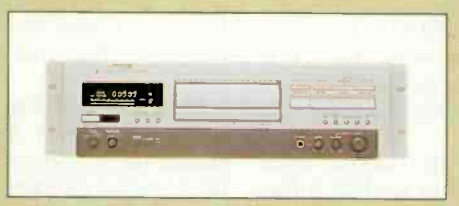
DAT recorder
Fostex



➤ Model D-5: a digital mastering DAT recorder; unit features high-quality 16-bit A/D converters and D/A converters, access to subcode data (start IDs, stop IDs), and a high-speed search function where information on the tape can be read at one hundred times normal speed; available sampling rates include 48kHz, 44.1kHz and 32kHz; other features include 4-motor rugged transport along with AES/EBU and SPDIF I/O professional interfaces (includes GPI trigger).

Circle (121) on Reply Card

3-D sound mastering
Spatializer Audio Laboratories/Desper Products

➤ Digital Spatializer: a real-time, 2-channel processor that provides precise control of expanded stereo imaging and realistic stereo synthesis from mono sources; developed in cooperation with dB Technologies for use in CD mastering facilities and for localization of individual sounds in the stereo sound stage.

Circle (122) on Reply Card

Solderless plug
Switchcraft

➤ 280 Dry plug: 1/4-inch solderless plug that can replace 1/4-inch plugs in unbalanced low-power applications; requires no special tools and minimal wire preparation for easy and quick termination; plugs feature radial insulation-piercing contacts, center pin contact, and one-piece insulator; plugs are field repairable and reusable.

Circle (123) on Reply Card

Three-head cassette recorder
Denon

➤ DN790R professional tape recorder: system features Dolby S noise reduction system; offers easy record optimization for any tape through a bias auto tuning system; a manual bias adjustment allows final control over record optimization; a 3-head transport features a new integral record and playback head assembly that employs an Amorphous Alloy core construction to extend wear resistance by five times over conventional Permalloy designs; system employs Denon's 3-motor, computer-controlled silent mechanism.

Circle (124) on Reply Card

Digital audio recorder and editor
Fostex

➤ Foundation 2000RE: a full-featured 16-channel, 8-output digital audio recorder and editor; the self-contained stand-alone unit features Removable Project Environment (RPE) file format that allows facilities to share data between satellite 2000RE editors and fully configured Foundation 2000 editing and mixing "mother ships;" the compact 4U module contains 8 in/8 out analog I/O and 8 in/8 out digital I/O in the Alesis ADAT optical Light Pipe format; the 2000RE employs an edit controller with a weighted jog/shuttle, touchscreen, and dedicated buttons for transport and editing; the main unit features a docking bay on the front for a removable disk drive while additional drives, magneto optical, or archive devices can be added via the external SCSI port on the rear; master and slave 9-pin remote control can be supported along with LTC, VITC and MIDI; built-in Alesis ADAT sync ports offer sample accurate machine control across 16 2000RE units.

Circle (125) on Reply Card

Cables
Nemal Electronics International

➤ Line of flexible composite broadcast/ENG cables: audio members are 22AWG shielded pairs with drain wire; available with or without color-coded inner jacket; all versions feature a flexible blue outer jacket rated to -40C; all cables available in bulk reels or terminated, tested and labeled to specification.

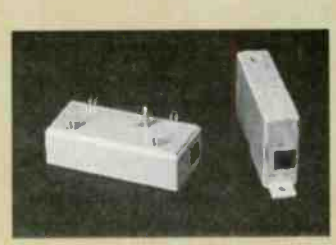
Circle (126) on Reply Card

Multitrack hard disk recorder
Akai Digital

➤ DR8: a multitrack hard disk recorder that permits 8-track simultaneous recording and playback; the DR8 features 8-track recording to a single disk and a built-in 16-channel mixer; the standard 1GB internal hard disk provides up to three hours and 17 minutes of recording time (total track time at 44.1kHz sample rate) and external drives can be connected via the supplied SCSI interface; the digital I/O interface allows data to be backed up to DAT and the TAKE function allows up to five trial recordings; DR8 features 18-bit, 64x oversampling A/D converters and advanced 1-bit dual 20-bit D/A conversion; no host computer is required for operation of the DR8.

Circle (127) on Reply Card

Category 5 surge protection
Atlantic Scientific



➤ UL-tested Category 5 surge protection: surge protectors that can be applied to a 100MHz network without compromising network performance; designed to work with old and new networks; compatible with Token Ring (type 3), 10 Base T and the new 100MHz applications such as 100 Base T; protection module can be configured to protect one to an infinite number of ports; patent-pending protection circuitry diverts up to 8,000A of surge current safely to ground.

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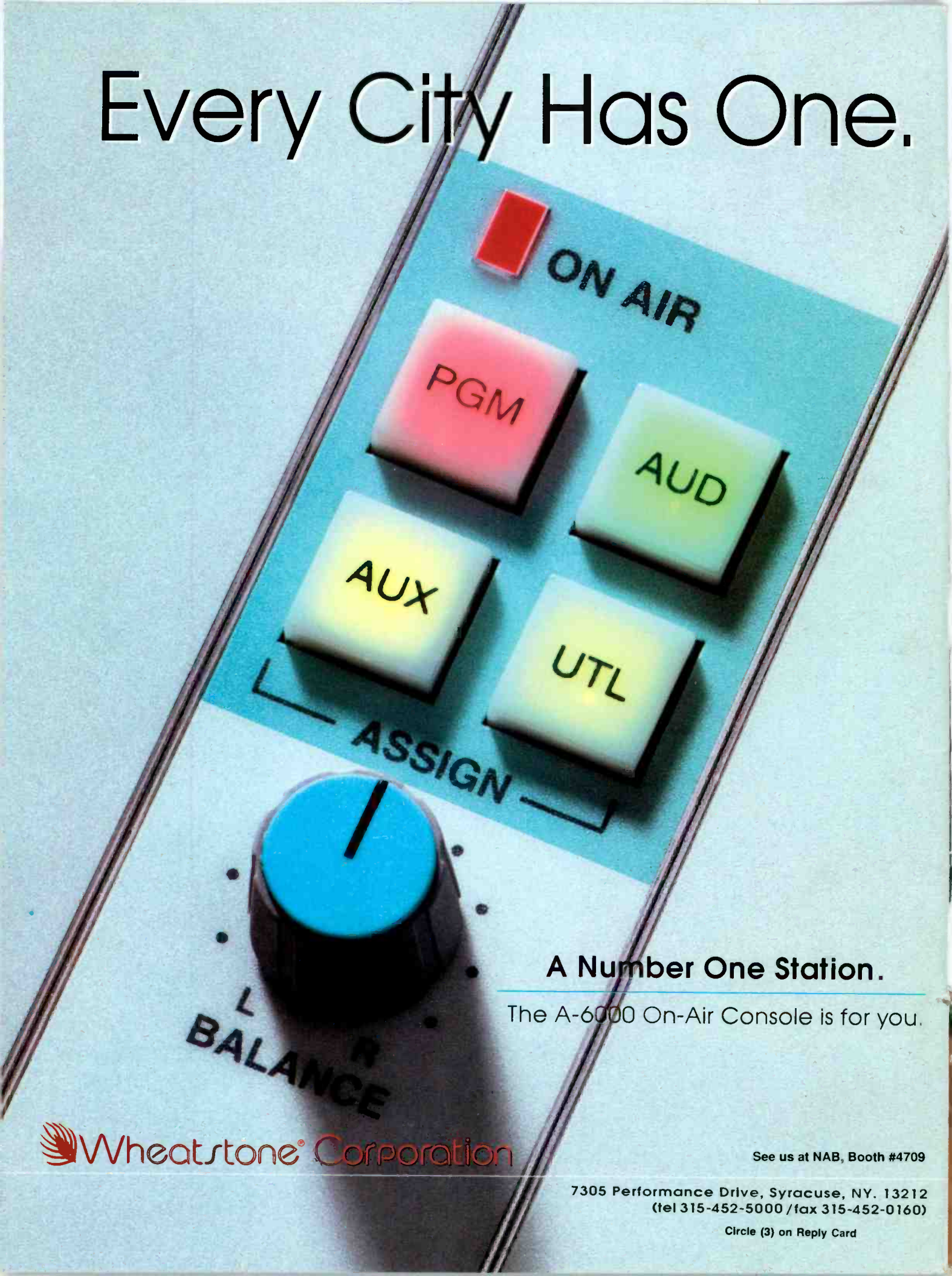

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