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ABC's John Lyons reports on the Sony MiniDisc performance. See page 9.

Radio World

Vol 20, No 8

Radio's Best Read Newspaper

April 17, 1996

Congress Orders Ruling on RFR Standard

by Lynn Meadows

WASHINGTON It took an act of Congress but the Federal Communications Commission (FCC) will decide on a new Radio Frequency Radiation (RFR) standard by summer's end.

An innocuous little clause in the Telecommunications Act of 1996 gives the FCC 180 days to complete action on Docket 93-62 and prescribe rules regarding the environmental effects of radio frequency emissions.

How the industry will be affected by new standard, however, depends on what the FCC does now.

While the FCC must act by mid-August, the rules will not necessarily take effect

by then, said Robert Cleveland, physical scientist in the Office of Engineering and Technology (OET). The OET will release a plan explaining how to comply with the 1991 standard at the same time or before.

Thwarted efforts

It is not like the FCC has not tried to adopt a new RFR standard. The current standard, ANSI C95.1-1982, is 14 years old. The IEEE has since revised that standard and released IEEE C95.1-1991 in the spring of 1992. That revision was subsequently adopted by ANSI (ANSI C95.1-1992).

In 1993, the FCC opened a Notice of Proposed Rulemaking to get industry comment on adopting the newer stan-

dard. Cleveland said nearly 3,000 pages of comments from industry groups and federal safety agencies poured in.

The Environmental Protection Agency recommended that the FCC use certain exposure criteria laid out in the 1986 National Council on Radiation Protection (NCRP) standard. That "hybrid" model is opposed by the National Association of Broadcasters (NAB).

In a three page statement, the NAB outlined all the reasons why the FCC should use the ANSI/IEEE standard exclusively over the NCRP: One, the ANSI/IEEE standard is more recent. Two, the ANSI committee was comprised of 120 members versus a total of six NCRP members.

Three, compared to the "controlled" and "uncontrolled" exposure environments explained in the IEEE standard, the NCRP "employs the vague, discretionary criterion of 'worker' and 'general public.'" Four, ANSI is a continuing body which meets at six-month intervals while a new NCRP committee will take three to five years to revise the standard and then dismantle itself. Five, according to the

NAB, the ANSI standard is generally more protective than that of the NCRP.

The NAB was not alone. In his comments, acting Director of Technical Support at the Occupational Safety and Health Administration (OSHA) Steve Mallinger wrote "An important factor in our recommendation to adopt the ANSI limits is the scheduled, on-going review and update of this standard." Mallinger added that if the NCRP were commissioned to update its 1986 criteria, OSHA's concerns for the future viability of NCRP guidelines could be resolved.

Ironically, a committee of the IEEE is just now beginning its scheduled five-year review of the 1991 standard. Revisions are expected to be finished around 1998 according to committee chairman John Osepchuk.

The permissible RFR levels between the 1982 and 1991 standards are not appreciably different according to

continued on page 11 ▶



Classic Soul KXBT (AM) Jams on Expanded Band

by Alan Peterson

SAN FRANCISCO A new voice arrived on the expanded AM band Tuesday, March 19, at 7 a.m., PST.

KXBT(AM) in Vallejo, Calif., became only the second radio station to inaugurate regular broadcasts in the new expanded band, and did so with a star-studded celebrity on-air party.

"We like to call ourselves 'The first expanded-band station west of New Jersey,'" said KXBT engineer Alan McCarthy. The station simulcasts a soul oldies format on both 1190 kHz and 1640 kHz, but will soon move down to 1630 kHz.

The talent lineup at the kickoff celebration was every bit as exciting as the event itself: Appearances by James Brown, Barry White, Martha Reeves and Johnny "Guitar" Watson helped welcome KXBT to the air. Brown put his personal stamp of approval on the new signal with a rousing "It feels good!"

Andy Santamaria is the general manager of KXBT, and one of the partners. He has owned the station for about three years.

"We knew that the expanded band was coming," said Santamaria. "We knew the FCC would do all it could to make KXBT a full-time station." Santamaria credited FCC engineer Bill Ball with assistance in getting up and running in the expanded band.

"He was very helpful in getting through

the maze," said Santamaria. "It was my first time having to get something complicated through the commission and I was pleasantly surprised. I got the impression that the FCC is trying hard to honor the congressional mandate of the four AM daytimers that have priority."

The congressional mandate directed any

continued on page 3 ▶

Stations Delaying EAS

by Christopher Nicholson

WASHINGTON Jan. 1, 1997, is coming.

On that date, broadcasters must have their Emergency Alert System (EAS) equipment in place. With EAS implementation eight months away, many broadcasters are holding out to see what the marketplace brings.

Jerry Davis, assistant chief engineer for Viacom's Washington properties, said that he has not bought any EAS equipment yet because he is waiting for more models to hit the market. Davis hopes that more models will produce more competition and push prices down.

Cost factor

Price is certainly a factor when it comes buying new EAS equipment. A complete Emergency Broadcast System (EBS) package could be purchased for \$1,000 to \$1,500. Broadcasters can expect to pay anywhere between \$3,000 to \$3,500 for EAS equipment. Only two companies — TFT and Sage — actually had type-approved products on the market as of mid-March.

continued on page 10 ▶

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NEWSWATCH

Steering Committee Meets

WASHINGTON Members of the National Association of Broadcasters (NAB) 1996 Radio Show Steering Committee are already planning for the fall show.

David Gingold, president and COO of Barnstable Broadcasting Inc., is chairman of the entire committee. Rick Buckley, president of Buckley Broadcasting is chair of the Management Subcommittee; John Gehron, co-COO of American Radio Systems is chair of the Programming Subcommittee. Dean Sorenson, president/CEO of Sorenson Broadcasting is chairman of the Sales and Marketing Subcommittee.

The NAB Radio Show is scheduled for Oct. 9-12, 1996, in Los Angeles at the Los Angeles Convention Center. Registration to the Radio Show also includes admission to World Media Expo (WME).

FCC Budget for 1997

WASHINGTON President Clinton proposed a \$222.5 million dollar budget for the Federal Communications Commission (FCC) for fiscal year 1997.

The proposal is a \$46.8 million dollar increase over fiscal year 1996. The increase includes \$4.3 million for increases in fixed costs, \$12.5 million to fund extra employees needed to implement the

Telecommunications Act within the mandatory time frames, and \$30 million for initial costs associated with moving the FCC Headquarters. The president also proposed increasing the staffing level by 110 full-time equivalents to a total of 2,255.

The President's budget also includes a provision for additional funds to be made available to the FCC in fiscal year 1996 to provide support for the Telecommunication Act implementation.

Congress has acknowledged that the FCC has a lot of work to do to implement the new Act. Congressional oversight hearings on the FCC indicate that the agency's role will diminish once the new law is implemented (see page 6).

Station Sales over the Top

CHANTILLY, Va. An aggregate estimated \$4.5 billion in the first quarter of 1996 was spent or proposed to be spent on over 360 radio stations according to BIA Publications.

BIA revealed that group owners with total station revenues of over \$25 million swept up 172 stations in group deals totaling more than \$3.5 billion. Over 280 of the stations sold in the first quarter are ranked in the top 100 markets.

Barrett to Leave FCC

WASHINGTON Federal Communications Commissioner Andrew Barrett announced last month that he would be leaving the FCC within 45 days. The commissioner was appointed in 1989 to complete an unexpired term and then reappointed in 1990. His term technically expired last June, but until the Senate confirms a replacement, he could stay at the FCC. ☺

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Allotment Plan Released

The Federal Communications Commission released what it hopes will be the final AM Allotment plan barring any petitions for reconsideration. Eighty-seven AM radio stations will move to spectrum between 1605 and 1705 kHz. Here is the list.

CALL	City	State	old Freq.	new Freq.
1610 kHz				
KALT	Atlanta	TX	900	
1620 kHz				
WJRZ	Toms River	NJ	1550	
WGYJ	Atmore	AL	1590	
WAMJ	South Bend	IN	1580	
KRIZ	Renton	WA	1420	
WTAW	College Station	TX	1150	
KQKE	Soledad	CA	700	
KHRT	Minot	ND	1320	
KJCK	Junction City	KS	1420	
WKZQ	Myrtle Beach	SC	1520	
KECN	Blackfoot	ID	690	
WRRR	Frederiksted	VI	1290	
1630 kHz				
KXBT	Vallejo	CA	1190	
WRDW	Augusta	GA	1480	
KSVE	El Paso	TX	1150	
KCFI	Cedar Falls	IA	1250	
KTKK	Sandy	UT	630	
KKLS	Rapid City	SD	920	
1660 kHz				
WJDM	Elizabeth	NJ	1530	
KRCX	Roseville	CA	1110	
WGIV	Charlotte	NC	1600	
WCHQ	Camuy	PR	1360	
WKRG	Mobile	AL	710	
WQSN	Kalamazoo	MI	1470	
KZOK	Seattle	WA	1590	
KRZI	Waco	TX	1580	
WMIB	Marco Island	FL	1480	
WREN	Topeka	KS	1250	
KRKS	Denver	CO	990	
KQWB	Fargo	ND	1550	
KBLU	Yuma	AZ	560	
1670 kHz				
KHPY	Moreno Valley	CA	1530	
WRCC	Warner Robins	GA	1600	
WLWV	Salisbury	MD	960	
KBTN	Neosho	MO	1420	
WTDY	Madison	WI	1480	
KHTE	Redding	CA	600	
KKEL	Hobbs	NM	1480	
KSOS	Brigham City	UT	800	
1680 kHz				
KLOQ	Merced	CA	1580	
WHWH	Princeton	NJ	1350	
KCJJ	Iowa City	IA	1560	
KHVN	Fort Worth	TX	970	
KSHY	Fox Farm	WY	1530	
1640 kHz				
KOQO	Clovis	CA	790	
WSYD	Mount Airy	NC	1300	
WTRY	Troy	NY	980	
WVMI	Biloxi	MS	570	
KPHP	Lake Oswego	OR	1290	
WKSH	Sussex	WI	1370	
KURV	Edinburg	TX	710	
KCRC	Enid	OK	1390	
WWHL	Cocoa	FL	1350	
KLXX	Bismark	ND	1270	
KWFM	Tuscon	AZ	940	
WGOD	St. Thomas	VI	1090	
1650 kHz				
KOJY	Costa Mesa	CA	540	
WAOK	Atlanta	GA	1380	
WPMH	Portsmouth	VA	1010	
KWHN	Fort Smith	AR	1320	
KSVP	Artesia	NM	990	
KTMT	Phoenix	OR	880	

WJDM	Elizabeth	NJ	1530	WBNA	El Pas	TX	920
KRCX	Roseville	CA	1110	KCOL	Ft. Collins	CO	1410
WGIV	Charlotte	NC	1600	KBRF	Fergus Falls	MN	1250
WCHQ	Camuy	PR	1360	1690 kHz			
WKRG	Mobile	AL	710	WBIT	Adel	GA	1470
WQSN	Kalamazoo	MI	1470	WDDD	Johnson City	IL	810
KZOK	Seattle	WA	1590	WPTX	Lexington Park	MD	920
KRZI	Waco	TX	1580	KRGI	Grand Island	NE	1430
WMIB	Marco Island	FL	1480	KFVR	Crescent City	CA	1310
WREN	Topeka	KS	1250	KAPR	Douglas	AZ	930
KRKS	Denver	CO	990	KSTR	Grand Junction	CO	620
KQWB	Fargo	ND	1550	1700 kHz			
KBLU	Yuma	AZ	560	KAHI	Auburn	CA	950

KHPY	Moreno Valley	CA	1530	WSVA	Harrisonburg	VA	550
WRCC	Warner Robins	GA	1600	WZNN	Rochester	NH	930
WLWV	Salisbury	MD	960	WCMQ	Miami Springs	FL	1210
KBTN	Neosho	MO	1420	WEUP	Huntsville	AL	1600
WTDY	Madison	WI	1480	KAST	Astoria	OR	1370
KHTE	Redding	CA	600	WONX	Evanston	IL	1590
KKEL	Hobbs	NM	1480	KIDR	Phoenix	AZ	740
KSOS	Brigham City	UT	800	KNRB	Fort Worth	TX	1360
1680 kHz				KDDR	Oakes	ND	1220
KLOQ	Merced	CA	1580	Visit http://www.fcc.gov for more information			
WHWH	Princeton	NJ	1350				

New Expanded Band Tenant

► continued from page 1

AM daytimer that is the only station serving a community of over 100,000 to have priority in moving to the expanded band.

Frequency advantages

Santamaria noted the advantages of KXBT's new frequency.

"We were very lucky. A lot of analog radios can get 1640 kHz. We noticed that in our testing, I would say a very high percentage of the radios out there can receive 1640 kHz so we don't have quite the uphill battle that we originally thought we were going to have."

Indeed, the station's new frequency allows listeners from San Jose to Sacramento to Santa Rosa to hear the classic soul format.

Getting the station on the air posed a considerable technical challenge to McCarthy, the engineer who oversaw KXBT's new position on the dial. The project required a lot of planning. 10-hour-plus days, a considerable amount of home-brew fabrication and some good old-fashioned guesswork. McCarthy also credits consulting engineer W. Richard Green and Associates of Sacramento with much of the project's success.

"We're diplexing three-wire folded unipoles through home-brew networks," said McCarthy. "We're running an L net on one frequency and a T net on another. The folded unipoles worked out nice. We had the 1190 (kHz station) up there, and we dropped three more wires for the 1640 ... it took about three weeks to play around to get tuning to where we could tune both and keep spurious emissions down."

Constructing the diplexer and filters required stout components. McCarthy and his team burned out a number of parts during the design and test phases due to high RF voltages.

"Folded unipoles are highly reactive. Everybody underestimated the size of the

components needed. Essentially, the bigger, the better. I've ended up with 40 or 50A coils in there, even though I'm running only 13 or 14A of base current."

Inductive reactance was so high, voltages near the antenna tuning unit (ATU) were incredibly excessive. McCarthy was getting arc-over meltdown even on 20A coils.

Modifications to the existing transmitter and the diplexer were made by a lot of calculations and a lot more trial and error. McCarthy and his crew would plug in some theoretical values and then fine-tune them. They discovered values as small as in the picofarad range would make a significant difference.

It took two months to work out the modifications and tune the network, but KXBT 1640 was ready to go on the air. To hear McCarthy tell the story, they had only minutes to spare before the official station kickoff.

"We literally made the timetable by seven minutes," said McCarthy. "There was a little problem, and we worked all night. It was fixed seven minutes before sign-on."

Home for now

When the FCC announced the list of stations that will move into the expanded (see above), KXBT was told it will have to move to 1630 kHz.

Santamaria said, "As a prerequisite to giving us this signal, the FCC told us that if they have to move us, we will move. We will go to 1630 kHz just as soon as the crystals come in."

McCarthy noted the possibility of interference with first or second adjacent channels or a second harmonic of another station might necessitate a move.

"KGO(AM) is at 810 kHz, so its second harmonic would be at 1620. Preliminary reports are pretty good, though."

When diplexing, there could be interference due to the interaction of the two frequencies being transmitted.

KXBT's second harmonic interacting

with its original 1190 kHz signal and the IF frequency would have dropped the station right into the ham bands. McCarthy's team plotted spurious and harmonic emissions up to five miles on different radials and noted everything

came out -80 dB or better.

KXBT will continue broadcasting on 1190 kHz for five years, after which the allocation will be dropped for that market, making the expanded band the new permanent home for KXBT. ☺

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BIA Study Assesses Radio's Shape to Come

Industry Consolidation Will Continue, Ushering In an Era of Triopoly, Quadropoly and Pentopoly

WASHINGTON By the time you read this column, baseball season will be well under way, the NAB will be in full swing and maybe, just maybe, spring finally will have arrived and started warming up our neck of the world.

I now am more convinced than ever that NAB '96 will prove to be a landmark show for radio. We will be featuring extensive NAB coverage (as always); news coverage first in the May 15, issue and product coverage plus our annual Cool Stuff Awards in the May 29, issue. Stay tuned.

★ ★ ★

Many of you in radio ownership and management have already heard of Tom Buono. For you engineers and tech-types, Tom is the president and founder of BIA (short for Broadcast Investment Analysts) and active in the radio industry since 1981. He has worked extensively in appraisals (radio, TV and cable), and owned, through a venture capital firm, 10 radio stations in medium-sized markets.

He has just authored "State of the Radio Industry 1996," a look at where radio is as a business, and where it looks like the industry is headed, based on the analysis of current trends and regulation.

The report is very thorough and well-supported with figures, charts and analysis. Way too much information to tackle in one column, but I did want to highlight some of the very interesting "speculations" he indulges in throughout the study.

A careful look at what data is available (extrapolation from historical data, publicly traded groups and BIA's consulting experience) indicates that the cost structure of the radio business is essentially fixed. As revenues increase, the potential for much higher margins increase. He notes, however, that AM success is dependent to a large degree on news. Talk and news programming can draw a large audience share to an AM, but conversely can also be costly to produce. The advent of satellite distribution of these programs has helped quite

a bit, he notes, but as long as "AM viability is dependent on such programming, AM margins will be significantly lower than the music-based FMs."

Tom speculates that the profitability of radio has "bounced back from the recession lows. Margins in the 30 percent-plus range are more common. We speculate that 40 percent-plus margins will be common for radio groups in the latter half of the decade."

News like that bodes well for the equipment manufacturers among you.

One item that really piqued my interest was his analysis of the growth of duopolies. Tom speculates that the number of in-market combinations will climb to well-above the 50-percent mark by the end of the decade. These will take the form of triopolies, quadropolies and pentopolies — duopolies will be a thing of the past.

To date, duopolies stations have generally outpaced their markets in terms of listening and revenues. According to Tom's report, the "greatest revenue gains were experienced in the largest markets where management teams may have been able to better influence national and regional advertising budgets."

Interestingly enough, however, BIA speculates that:

- 1) The marginal utility (audience, revenue and cash flow gains) of triopoly, quadropoly, etc.) will diminish.
- 2) With the expansion of the in-market ownership rules, much of the future combinations will be horizontal across formats.
- 3) There will be more programming diversity in certain markets as in-market MSOs (multiple station operators) experiment with different formats.

The last chapter I want to draw to your attention analyzes the current radio ownership structure and the shape of things to come. BIA reports that consolidation is causing the radio business to look a lot like the television business — larger markets are primarily served by eight to 10 companies and medium markets have four to seven primary owners. Tom writes that "their economics are becoming more like that of television operators, with the exception of the high programming costs associated with television."

Furthermore, Tom predicts: "In an environment without ownership caps, consolidation will be rapid and there will be more large company mergers as the titans jockey for control."

In fact, Tom speculates that more than 70 percent of listening in most of the top 50 markets will be to publicly-owned radio stations.

The danger signs in this chapter point loudly to the small operator. Tom speculates: "The gap between the 'haves' and the 'have-nots' is large and widening. It will be difficult for many of the private operators to compete, so many will sell to the publicly traded firms, causing even more of a disadvantage for the remaining private firms."

If you are contemplating radio ownership, or simply a long career in the business, Tom's "State of the Radio Industry 1996" is a must read. I can't really do it justice in the space available for my column, but it is worth a read.

Call BIA at 703-818-2425 for information on ordering the report.

Teddy Bear Patrol



KLSY-FM Seattle's Janet Magleby (l), Gray Line of Seattle's Herb Rollins and Amy Longstreth, Bruno, the KLSY-FM Teddy Bear, and the 'Random Acts of Kindness Man' John Curley (r) of KING-TV, participated in the filming of a segment for "Evening Magazine" on March 20. The segment featured the KLSY-FM Teddy Bear Patrol, a program devoted to providing teddy bears to children in traumatic situations. Gray Line of Seattle donated teddy bears to the patrol and transported the bears in one of its deluxe motorcoaches to the Bellevue, Wash., Fire Station.

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GUEST COMMENTARY

Broadcasters Should Exploit SCA Advantage

by David Maxson
Vice President, WCRB(FM)
Charles River Broadcasting Co.

BOSTON FM broadcasters, you are throwing dollars down the drain. There is a lot more horsepower in your FM signal than you are using. A few subcarrier businesses exploit your unused bandwidth. Meanwhile you look in other places for a fountain of youth to protect you from new digital broadcast services. It's time to milk the most out of the transmitter and license you already have.

Subcarriers are inefficient. Merely 29 percent of FM stations earn pocket money leasing subcarrier bandwidth — a paltry \$30 million a year by NAB estimates.

Our core business is FM broadcasting, which generates some \$8 billion a year nationally. FM stations would make hundreds of millions more by tuning under-used bandwidth into a real broadcast medium.

This will not happen by complacently waiting for a silver bullet to rescue FM broadcasting from digital competition. Will it be IBOC technology? Will it be a free FCC license for a slice of some new digital radio service? In the unlikely event that one of these happens, it still seems intended to replace FM, not enhance it.

Let's get our heads out of the sand and think about how FM broadcasting can be more effective, more creative, more profitable. Realize that the subcarrier businesses are our tenants, not our partners. We ought to be able to direct the development of our services. For heaven's sake, why are we leaving the discussions about so-called high speed subcarriers primarily to our tenants? Why did we let RBDS

become a voluntary standard when we were so reluctant to buy encoders?

It is time to sit in the driver's seat and steer the development of overlooked bandwidth. Using your entire signal, your analog stereo could ride side by side with an extra-high-speed data subcarrier fast enough to carry digital stereo. If you prefer, divide that data stream into multiple audio or data channels, offering each free or by subscription as you choose.

Drop the stereo part of your analog signal and you can add a second digital stereo service. The technology is simple. It makes consumer receivers affordable giving this new flexible medium a jump on the competition.

You could grow new broadcast services or rent out data capacity or both. With a consumer based digital FM service, you and your tenants benefit from lower delivery costs and higher market penetration.

Cost of entry is low; you have the license and the transmitter. Turn-around time would be quick — no regulatory hurdles block subcarrier use. The technology is common not exotic; FM receivers, subcarriers, digital audio coders, and modem technologies are proven building blocks.

Rule Wisely on RFR

The Federal Communications Commission has 180 days from the day the Telecommunications Act of 1996 was enacted to decide on a new Radio Frequency Radiation (RFR) standard. It's been a long time coming, and RW would like to urge the commission to base its decision on sound scientific thinking with reasonable and periodic revision.

By summer's end, the commission must complete action on Docket 93-62 and prescribe rules regarding the environmental effects of radio frequency emissions, even if the rules will not necessarily take effect by then.

The FCC has struggled with the adoption of a new standard for years. The current standard, ANSI C95.1-1982, is 14 years old. The IEEE has since revised that standard and released IEEE C95.1-1991 in the spring of 1992. That revision was subsequently adopted by ANSI (ANSI C95.1-1992).

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The NAB's reasons are sound:

- The ANSI/IEEE standard is more recent.
- The ANSI committee was comprised of 120 members vs. a total of six NCRP members.
- Compared to the "controlled" and "uncontrolled" exposure environments explained in the IEEE standard, the NCRP "employs the vague, discretionary criterion of 'worker' and 'general public.'"
- ANSI is a continuing body that meets at six-month intervals while a new NCRP committee will take three to five years to revise the standard and then dismantle itself.
- According to the NAB, the ANSI standard is generally more protective than that of the NCRP.

In making its decision, the commission should consider too the level of professionalism prevalent in the broadcast engineering community and that most areas with high RFR are only accessible to those professionals. In making its decision, the FCC needs navigate between consideration of the health of radio personnel, and not placing undue burdens on the radio stations' bottom line — thus ensuring that broadcasters can continue to employ professional engineers for upkeep and repair of their plants.

How do we make FM broadcasting worth millions more? Take back the initiative. Turn our under-utilized bandwidth into a new broadcast medium. Speak up for an industry effort to plan real improvements to FM broadcasting. Make digital FM broadcasting a priority for NAB and

the Electronic Industries Association.

□ □ □

WCRB is working in conjunction with Sanders, a Lockheed Martin Company, to develop an extra high-speed subcarrier for DAB. Maxson can be reached by e-mail at maxson@wcrb.com or call 617-893-7080.

Punish pirates

Dear RW,

Regarding the article "FCC Goes Easy on New York Pirate" (RW, Feb. 7), I do not support FCC field engineer Jud Mansbach's lenient approach toward pirate radio stations. Shutting down these frenzy stations does nothing to discourage them from reappearing. The whole concept of rule enforcement is to discourage future violations.

Mr. Mansbach's philosophy says only legal stations that have money are fined. The pirate station in New York should have been taken to task by the FCC. They had equipment, and they had time, let them spend some of the time in jail. In addition, the landlord should share the responsibility as an accomplice. What the hell is going on with the FCC? Mr. Mansbach should get his job and responsibilities in line or consider career change into the field of social work.

Jim Juneau
Pollock, LA

Community broadcasters

Dear RW,

Yet another article in RW (Feb. 7) about the FCC busting a "pirate" broadcaster prompts this letter. While I do not condone anyone, licensed or not, broadcasting obscene or offensive programming, it's about time the FCC realized that there is nothing inherently

wrong with average citizens having the ability to communicate via radio with their community. This is not possible under current licensing requirements.

Other letters to RW (Frank Vela, "Leave Illegals Alone," Jan. 11, 1995; and Bob Bittner, "AM for the Micros," Jan. 25, 1995) voice similar support for community broadcasting. As they and others have pointed out, only those with extremely deep pockets need apply for a new station CP or attempt to buy an existing station.

Commercial (and even non-commercial) broadcasting is just another commodity, with the bottom line usually the only thing in clear view of station management. There's nothing wrong with being profitable, except that (non-revenue-producing) community service usually gets the short end of the stick.

Why can't broadcasting, occasionally, serve the community rather than the advertiser? It can. It just takes a few radioaholics and a localized broadcast facility. There are thousands of radioaholics out there. They have radio in their blood. There only fix is to operate a broadcast station solely for their love of broadcasting. Not for the money, but to actually do something creative and serve the public.

Sound familiar? Public service has always been the FCC's justification for granting private entities the right to use billions of dollars worth of spectrum space, which belongs to the public, for free. It's about time the folks in Washington created a means for

citizens and radioaholics to put their energy to work for the public good: Legalize community broadcasting. Not some crackpot playing obscene music. No drugged-out DJs.

And not a useless flea-power 100 mW signal. Create a "Community Service Broadcast License" for those individuals who are willing to accept the responsibility of operating a community broadcast facility in a professional and respectable manner.

I'd propose the following guidelines for a community service broadcast facility:

1. FM, 10 to 50 W ERP
2. Non-commercial, non-profit, public service oriented
3. Programming must comply with all existing FCC rules (no obscenity, etc.)
4. Engineering must comply with all existing FCC tech rules (annual proof, etc.)
5. Limited operating hours; channel shared with other community service stations.

It would take a dedicated effort to meet such requirements: quality programming, a quality signal, nothing that wouldn't stand up to an FCC inspection. That's good; it eliminates the flakes and wanna-bees ... but leaves dedicated citizens with a real vehicle for doing something positive for their community.

A little far-fetched? Maybe not ... when you think about it, that's how radio started.

Hank Landsberg
Pasadena, CA



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Political Pirates Proliferating

by Lee Harris

NEW YORK They have been out there since the beginning of broadcasting: unlicensed operators who take to the airwaves to broadcast their political viewpoints. Now there are more of them than ever, driven by polarization in the political climate and the consolidation of the broadcasting industry.

Their existence may not shock licensed broadcasters, but their sheer numbers may come as a surprise. The programming on some of these stations might also serve as an eye-opener for those who consider Rush Limbaugh to be the epitome of right-wing outrageousness.

Army of 10,000

According to a micro-power broadcast fact sheet on the World Wide Web, there are now as many as 10,000 unlicensed FM transmitters pouring politically incorrect thought onto the airwaves all over the country. Many are operated by pirates who call themselves patriots.

The mass media has another name for them ... right-wing extremists. These rogue radio operators feel disenfranchised by the state of the nation in general and the mass media in particular. We are talking about people who do not like Pat Buchanan because he is a little too liberal.

They are especially annoyed and motivated by the new broadcast ownership rules, which they charge allow only big money interests (i.e., "international bankers") access to the "public" airwaves.

Many of these political pirates contend the entire federal government is operating in violation of the constitution and that goes double for the FCC, which they say, prohibits them from exercising their constitutional right to free speech.

This is definitely the viewpoint of A.L. Kobres of Lutz, Fla. For the past year, he has operated Lutz Community Radio at

96.7 MHz, 24 hours a day, seven days a week. Kobres said his station provides information on a potpourri of topics of interest to patriotic Americans, people who, according to Kobres, are "tired of being played for fools by an elitist dominated media that refuses to provide the information needed to cast a meaningful vote."

A Kobres press release invites listeners to "learn a lot from the many talk shows produced by ordinary, patriotic Americans. These men and women have a plan to foil the absolute takeover of America by the New World Order Elitists."

Kobres is not giving away any tickets to see Hootie and the Blowfish, but Lutz Community Radio is the place to be if your interests run toward home schooling, natural medicine, organic gardening, POW/MIA issues and the finer points of constitutional law.

Most of LCR's programming comes in by satellite from such right-wing talk networks as USA Patriot and Eagle Radio. Kobres built an automation system that switches satellite channels at the appropriate times. About 15 percent of the programming is locally produced by a small volunteer staff.

Station power ranges from 6 to 46 W, depending on available equipment and its state of repair. Kobres is currently operating toward the lower end of the power

range in the wake of a raid on his home. Kobres told RW that the FCC first came to him in November 1995, and asked him to cease and desist because a local commercial station was complaining that it was losing listeners to Lutz Community Radio.

Kobres says he refused on any number of constitutional and legal grounds, but the visit was otherwise pleasant. Kobres, who deals in marine electronics for a living, was on good terms with the Tampa FCC office. He installed most of its antennas and computer equipment.

Off again, on again

The goodwill apparently ran out on March 7, when the engineer in charge of the FCC's Tampa office stopped by for another visit, this time in the company of federal marshals. They carted off most of the transmitting and studio equipment, "as much as would fit in their car," according to Kobres. Among the items they left behind was the transmitting antenna. Kobres says the marshals were not up to climbing his 75-foot tower to retrieve it.

That was lucky for Kobres, who was also spared the trouble of climbing the stick. Immediately after the FCC departed, he hooked up another exciter to his transmission line and resumed broadcasting at his current, lower power.

Among the chief programming suppliers

for Lutz Community Radio is the Northfield Falls, Vt.-based Eagle Network. Chief executive Richard Eutsler claims to have more than 800 micro-broadcaster affiliates all over the United States, plus a small number of licensed broadcasters that take his satellite feed.

Many of the micro-broadcasters are wired into local or regional networks. The micro-broadcasting FAQ on the World Wide Web gives detailed instructions on how to do this using regular dial-up phone lines in a pyramid broadcasting scheme: Your station feeds three stations, which feed three more stations, etc.

Eutsler also knows of at least one Citizens Band operator with a 500 W linear amplifier who rebroadcasts the network. In "the movement," the frequency is not as important as the message.

And what is the message? Eagle Network programs decry the state of the federal government and the "New World Order," of course, but there are lines that cannot be crossed. Eutsler says racism and anti-Semitism are prohibited, as are calls for the violent overthrow of the government.

Combine the FCC's limited manpower with the political climate in the country and it seems likely we will be seeing more operations like Lutz Community Radio. Like many on the far right, Eutsler and Kobres believe a war is being waged for the soul of the nation, and radio is a very effective means of marshaling the troops. ☹

REGULATORY UPDATE

WASHINGTON The role of the Federal Communications Commission (FCC) should shrink dramatically once the Telecommunications Act is implemented according to speakers at the Senate hearing on FCC oversight last month.

"The very forces of competition introduced by the Telecommunications Act fundamentally erode the *raison d'être*

for many of the commission's traditional regulatory activities," said Albert Halprin, communications attorney and former FCC Common Carrier Bureau Chief.

Even former FCC Chairman Dennis Patrick felt that the commission should be downsized.

"Upon implementing the Act, the FCC should be a much smaller agency with substantially reduced regulatory responsibilities," said Patrick. He said many of the FCC's current responsibilities should be transferred to the marketplace, the states or other federal agencies.

Kenneth Robinson, communications attorney and former FCC and NTIA official, suggested the FCC make the spectrum equivalent of block grants to states. The states would issue the thousands of police, fire safety and other licenses that are currently granted at the federal level.

Robinson also proposed that each commissioner be responsible for particular dockets and speedy disposition of his or her particular docket matters. Robinson added that the FCC should meet formally more than once a month and routinely open those meetings for public arguments and presentations.

Harry "Chip" Shooshan, former chief counsel and staff director of the subcommittee on Telecommunications and Finance in the House, disagreed. He suggested that the FCC be headed by a single administrator.

"Under a single administrator, there would be no need for formal meetings which today serve largely as nothing more than public stagings of privately

choreographed decisions," Shooshan said.

Within five months, there will be two commissioner slots for which the terms have expired, he said, "so this may be an especially good time to make this change."

"By successfully and faithfully implementing the new law, the FCC should be putting itself out of business," Shooshan said.

Shooshan also said that the FCC should shorten its comment periods, limit the length of submissions and restrict the window for ex parte contacts. Several witnesses said they favored auctions.

"The substantial sums raised for the Treasury are only the tip of the benefit iceberg," said Kenneth Gordon, former chairman of the Massachusetts and Maine Public Utility Commissions. "The real gains to the public come from getting this valuable resource into the hands of those who will use it to deliver important services quickly."

Patrick said the FCC should leave the decision of spectrum use up to the licensees who could better decide how to employ it.

"The FCC has already done that in some cases, notably personal communications services (PCS)," Robinson noted. "It needs to go farther."

Some of the witnesses said that once a spectrum license is auctioned, it should belong to the purchaser forever.

Senator Ted Stevens (R-Alaska) said that would prevent future Congresses from making prevent off the natural resource. He did say he might consider a lengthy license period like 55 years or so. ☹



Chip Shooshan favors downsizing.

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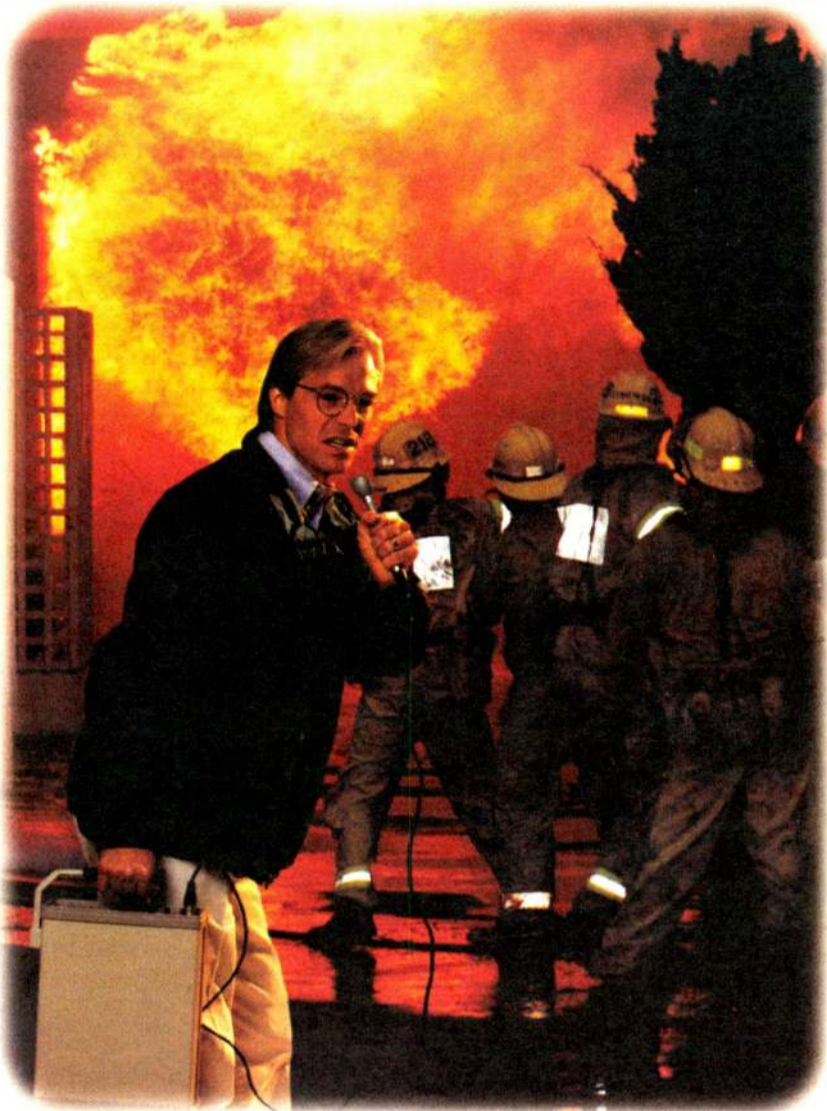
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FIELD IMPRESSION

MiniDisc Recorder a Hit with ABC

by Frank Beacham

NEW YORK After recording nearly 20 hours of interviews, location sounds and music on a grueling six-week tour of 37 cities in 30 states, ABC Radio News correspondent John Lyons is now a believer.

"From now on I will use MiniDisc," said Lyons. "I had a DAT machine that I kept in my bag and it stayed at the bottom of the bag for the entire trip. It will stay there."

The trip was Lyons' "Rolling Across America" election year tour for ABC News. It featured reports from diners, donut shops, truck stops and other locations throughout the United States. Working seven days a week — often 15 hours a day — Lyons logged over 4,300 driving and 3,700 air miles in 36 days.

This radio reporting marathon also put the MiniDisc recording format on trial. It was the ultimate field torture test.

The results may help debunk some widely held opinions concerning the suitability of the MD format for the brutal demands of location radio broadcasting.

Dueling algorithms

First, there was the issue of dueling algorithms. Lyons put MiniDisc audio through layer after layer of compression and then sent it over a broadcast network that added several more compression layers. The MD recordings were squeezed even harder to go on ABC's Internet Web site as RealAudio files for transmission over 14.4 kbps modems.

"Was I satisfied with the sonic quality of MiniDisc? Absolutely," Lyons said without hesitation. "Did I hear anything that degraded the sound? Not at all. And I recorded all kinds of things — voice, music, raw sounds, even some music recordings. It sounded terrific over the air."

After evaluating several models, Lyons settled on Sony's new MZ-B3 portable as the best MiniDisc recorder for field news reporting. He coupled it with an NEC 4000 laptop computer equipped with a shareware audio editing application called Cool Edit 95 from Syntrillium Software Corp. of Phoenix, Ariz.

"I went into the computer from the MiniDisc at 22 kHz sampling, 16-bit and then saved the files as ADPCM," he said. "That came down to about a quarter of the size of a regular WAVE file. The reason I did that is I sent the files back to ABC in New York as attachments to e-mail."

By employing ADPCM, an adaptive differential PCM compression scheme used by Microsoft in the Windows 95 operating system, Lyons said he had edited audio with a frequency response of about 50 Hz to 10 kHz coming out of his laptop.

When live feeds were required, Lyons sent the audio to ABC or affiliate stations via a single standard dial-up voice grade phone line using a new CODEC called the Scoop Reporter by AETA of Mesa, Ariz. The Scoop Reporter uses a 10-to-1 compression algorithm called CELP voice modelization to achieve up to 7.7 kHz without the need of an ISDN circuit.

Two Scoop Reporters are tied together

through a typical V.34 modem connection. Depending on telephone line conditions, the CODECs negotiate a data rate between 21 and 26 kbps. The higher the speed of the connection, the higher the bandwidth of the audio.

The CELP algorithm used by the Scoop Reporter comes from CNET, the research lab of France Telecom. It is optimized for speech and is said to produce no objectionable artifacts when used for that pur-



John Lyons at the beginning of his trip.

pose. Lyons said it worked well with MiniDisc.

Operationally, Lyons said his only problems — which were minor — related to his acclimating to the differences between taped-based and random access recording media.

"I had to overcome the sensibility of using tape," he said. "Things like getting used to hitting the end search button before each new recording so I don't record over something on the disc."

However, Lyons said, once he got used to using random access media he became hooked.

"I did an awful lot of recording on that trip," he said. "Being able to use those indexes, or track marks, is amazing. I wrote down the index marks of good cuts as I went along."

"The last day of the trip I needed a history cut," he continued. "If I had been using tape I'd have had to search using those stupid reference numbers on tape machines. Here I just went to the index number and boom, the cut was right there. The machine saved me time and I'm not used to machines that save me time anymore."

Lyons had only one significant design criticism of the Sony MZ-B3 recorder.

"These mini connectors will eventually kill this thing for heavy users," he said. "Mini connectors were never designed for professional use and they are going to wear out. Radio stations that use this recorder will come up with some sort of system where they attach something permanently to those mini connectors and come out through a pigtail."

Lyons took two other MiniDisc recorders on his trip but used neither. One, Sony's MZ-R3 portable music MiniDisc recorder, worked well only with Sony brand mini connectors. Lyons said, and would not work reliably with his standard connector cables. The other recorder, Denon's DN-80R, was simply too large and complex for such a trip, Lyons said.

"The Denon machine would not be something any working reporter would ever use," Lyons said. "It's more for

serious production. It's just not practical for this kind of trip."

Rave review

The Denon DN-80R did get a rave review for another application from Bill Holder, manager of technical operations at ABC Radio Networks. Holder said he used the Denon recorder on a recent 12-hour live folk music marathon broadcast in New York City on WFUV(FM), Fordham University's public radio station.

"We used it to record interviews of artists and highlights of the performances," Holder said. "We then marked the cuts and did rudimentary editing to

create instant highlights which were broadcast during breaks of the live performances.

"The Denon is a wonderful production machine and worked beautifully in that application," Holder said. "But it doesn't fit in a news application."

Lyons said ABC's MiniDisc experience was so positive that the network is going to order B3 portables for its field reporters. Holder, the man in charge of such matters, would not confirm or deny such an order but said they were considering it.

For information on the AETA Scoop Reporter call (602) 464-0085 or e-mail: cosma@gespac.com. For Cool Edit 95 info contact Syntrillium Software Corp. at (602) 941-4327 or e-mail at syntrill@aol.com

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BBG Starts Asian Network

WASHINGTON The Asia Pacific Network (APN) is being created in response to the Radio Free Asia section of the U.S. International Broadcasting Act of 1994.

According to the Act, APN is being established to service China and other Asian countries "which lack adequate sources of free information and ideas" and is intended to "enhance the promotion of information and ideas while advancing the goals of United States foreign policy."

APN will provide news and commentary about regional events, transmitting in the Chinese, Tibetan, Burmese, Cambodian, Lao, Vietnamese and Korean languages.

The Board of Directors of the newly-established APN named Richard Richter

as the organization's first president. Richter has had a long career in broadcasting serving most recently as chairman of the board of Pact, a private nonprofit international development organization.

"We'll be starting from scratch. The only things that won't be new are the transmission relay facilities out in Asia," said Richter. He predicted APN will go on the air sometime this summer.

"What I hope to do ideally would be to reach all of the Mandarin-speaking portions of China and hopefully Cantonese plus Tibetan pretty soon after we start," he said. After that, they will expand to other services in the remaining countries-

possibly by September.

The new network will be funded as a private, nonprofit U.S. corporation by a grant from the Broadcasting Board of Governors (BBG). Richter is optimistic the APN will survive upcoming budget battles.

"When the legislation was passed, it had wide bipartisan support. The basic sponsor was Senator Biden (D-Del.) but he had many co-sponsors and it was supported on a bipartisan basis. We had very strong support from the White House as well," said Richter. "We do think we are in a pretty good position in terms of the mood of the legislature."

BBG is responsible for directing and supervising all non-military U.S. international broadcasting activities including the Voice of America. Radio and TV Marti, WORLDNET television and Radio Free Europe/Radio Liberty Inc. ☎

Shopping for EAS

► continued from page 1

Vern Killion, director of engineering at KRVN-AM-FM Lexington, Neb., is investigating the possibilities of setting up a group purchase to drive down the cost of the equipment. Killion would like members of the Nebraska Broadcasters Association to buy the equipment as a group in order to reduce the cost for member stations.

Gary Hardwick, a sales coordinator for Harris which exclusively distributes the Sage system, said not to expect any noticeable reductions in cost for the EAS equipment even if more boxes come on the market. Because this will be a one-time purchase for broadcasters, a low margin is already in place because of the one-time surge in sales.

Hardwick agreed that many broadcasters are still waiting to see what else appears in the marketplace before making their purchases. He has demonstrated EAS equipment at a number of SBE meetings and said he has received a mixed reception from engineers. According to Hardwick, the perceived attitude has been, "with the deadline still so far away, why worry now?"

Most of the calls Harris receives regarding EAS equipment come from people checking on availability and price. So far, Harris has received 40 or 50 orders, said Hardwick.

Tim Schwiager, vice president of marketing for Broadcast Supply Worldwide, has noticed the "wait until the last minute" approach of broadcasters.

"Broadcasters seem to be passively interested in EAS," Schwiager said. He expressed some concern that there will be a tight window between the time when broadcasters ultimately place their orders and the Jan. 1 deadline.

Another reason broadcasters are waiting to make their purchases is that many state EAS committees have not finalized their plans yet. Cris Alexander, director of engineering for Crawford Broadcasting Company, said he is taking a "wait and see approach" until the state plans are made. Alexander said he expects to purchase the boxes for Crawford by mid-summer.

Mark Krieger, Chief Engineer of WGAR-FM Cleveland, said the state EAS plan for Ohio is still being drafted but is roughly three-fourths complete. Krieger said he expects to purchase the Sage system because of its out-of-the-box availability of inputs.

Sales of EAS equipment are expected to pick up in the third and fourth quarters of this year. With trade show season in full swing, more new products should be appearing on the market. As the year winds down, count on the rush for EAS equipment to be winding up. ☎

Worried that this is all you'll see at this year's NAB?

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New RFR Rules Expected

► continued from page 1

appreciably different according to Richard Strickland, Director of Business Development for Instrument Products at Loral Microwave-Narda.

Strickland, who has served on the NAB's RFR panels, said that if anything, the 1991 standard is more lenient for broadcasters at lower frequencies.

In the 1982 standard, below 3 MHz, broadcasters were allowed 100 mW/cm² for both electric and magnetic fields. In 1991, the permissible levels for electric fields did not change, but at 1 MHz, the permissible level for magnetic fields was set at 10,000 mW/cm².

Many broadcasters are worried about what did change in the 1991 standard: The IEEE established two sets of levels — one for "controlled" environments and the other for "uncontrolled" environments. The levels for uncontrolled environments are roughly five times more restrictive than those for controlled environments.

Now, Strickland said, the IEEE committee is trying to come up with a reinterpretation of controlled versus uncontrolled. They suggest a controlled environment is

"It is extremely rare like a small fraction of one percent of the time," agreed Strickland, "where you could ever be above these standards outside an occupational setting." The exceptions he offered were cases where someone had built a high rise before checking out a nearby tower.

Induced current

The 1991 standard also added limits on induced and contact currents.

"In my estimation, that's where most of the impact would come," said Cleveland. He said there are only a few ways to certify compliance with induced current limits and the instrumentation used for measuring is expensive.

Dealing with induced currents has raised a lot of questions inside and outside the FCC, Cleveland said. He even suggested that the issue may have to be deferred past the August deadline.

Induced currents occur at low frequencies below 100 MHz when without touching anything, a person becomes an antenna and has current flowing through his or her body. They are related to the electric field.

The levels for uncontrolled environments are roughly five times more restrictive than those for controlled environments.

one where someone with an RF background who is aware of the dangers works while an uncontrolled environment might be where a secretary unfamiliar with RF works.

Unacceptable

"The possible implication that employees may be subjected to a higher level of risk because they 'are aware of the potential for exposure as a concomitant of employment' is unacceptable to OSHA," wrote Mallinger. He suggested that the FCC adopt the uncontrolled environment criteria as an "action limit" that determines when an RF protection program is required.

That matches what Canada and several companies stateside are doing, said Strickland. In Canada, the government has two sets of signs for RFR. One is the of the "danger-keep out" variety and the other is a warning that the worker is approaching an area of high RF radiation and should take protective measures.

At other companies, Strickland said he sees programs that use red, green and yellow: red boundaries mark the areas where nobody goes unless the power is turned down, green is where levels are safe, and yellow represents the area in between where it is safe to work, but there should be appropriate signs and a safety program in place providing education.

Cleveland said he does not think the levels in uncontrolled areas is the biggest issue for broadcasters even though they are five times stricter. He said most towers he has seen already meet those levels. Even on infamous Mt. Wilson, home to hundreds of towers in Los Angeles area, Cleveland said most of the areas are open only to industry personnel and would come under controlled environment standards.

"If you are no higher than 15 percent of the electric field limits for the controlled environment, the physics say you'll never have to worry about exceeding induced current limits," Strickland said. Under certain conditions, however, even in areas under the electric field limits, the induced current limits could be exceeded. Broadcasters are not certain how the FCC will handle that.

The 1991 standard for induced current limits applies up to 100 MHz — smack in the middle of the FM band.

That means small public stations operating below 100 MHz would have to comply while a powerhouse at 100.1 would not.

Like induced currents, contact currents are another puzzle for the FCC. They also come up at lower frequencies and occur when there is a conductive object in the vicinity of an antenna sometimes even when the levels are far below the standard.

"I know one broadcaster that had a problem. He did all the right things. The electric and magnetic field levels were far below what you needed to be at the fence line, but every time his neighbor across the street went to get mail from his mailbox, he burnt his hand," said Strickland.

The problem for the FCC is that contact currents "are impossible to predict from any other measurement without getting into the physics," explained Strickland.

Cleveland said an item on RFR rules was on the eighth floor of the commission already. He expected it to be circulated among the commissioners rather than discussed at a public hearing. Whatever is in that item, Cleveland said any rumor that the new ruling would be disastrous for the industry was "not an accurate representation."

BIA's Top Ten Station Groups

CHANTILLY, Va. The passage of the telecommunications bill has radio owners jockeying for a foothold in the rapidly consolidating world.

BIA Consulting Inc. agreed to provide *RW* with a quarterly list of the top-10 station groups. Here from one to 10 are the top radio groups in terms of revenue from BIA. The station counts and owner revenues include sales agreements for new stations acquired in the first quarter of 1996:

Owner	AM	FM	Total	Estimated 1995 Revenue (\$000)
CBS Radio Station Group	18	21	39	495,750
Infinity Broadcasting Corp.	14	31	45	466,950
Evergreen Media Corp.	11	23	34	283,800
Walt Disney Co.	11	10	21	269,800
Jacor Communications Inc.	18	32	50	262,850
Clear Channel Communications	22	34	56	188,000
American Radio Systems	18	30	48	172,000
Chancellor Broadcasting	12	21	32	169,150
SFX Broadcasting Inc.	16	35	51	151,700
Cox Enterprises	5	13	18	138,300

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Review in *Line Up - The Journal of the Institute of Broadcast Sound*
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Creative Financing from Fresh Air

by D.C. Culbertson

PHILADELPHIA No matter who wins the elections this year, it seems certain that public radio stations face decreases — possibly drastic ones — in the funding they receive from the federal government.

As a result, both individual stations and the Corporation for Public Broadcasting (CPB) are looking for ways to increase revenue so they do not have to worry about how generous the government is feeling in any given year.

Serious consideration

According to David Othman, vice president and station manager of WHYY-FM in Philadelphia, stations are beginning to think seriously about the assets they have and how to use them to generate revenue.

WHYY-FM is more fortunate than some other public radio stations because it has not had any sharp decrease in funding in recent years.

"The budget has been pretty steady over the last few years," said Art Ellis, director of public information. Ellis said he is aware, however, of impending legislation in Congress to decrease federal funding and feels it is better to be prepared.

Biggest asset

WHYY-FM's biggest asset is its weekly program "Fresh Air with Terry Gross." Distributed by National Public Radio (NPR), Fresh Air is heard regularly by over two million listeners on more than 160 stations across the country. Next to "Morning Edition" and "All Things Considered," it is NPR's most listened-to program.

Although it was originally funded with a large grant, Fresh Air has received no federal money for three years and is doing well on its own.

WHYY has been studying ways to make money with its asset. One proposition was to create a Fresh Air Book Club which would give listeners the opportunity to purchase books discussed on the show

and provide the station a percentage of the profits.

The program has a "strong identity with books," explained Ellis because host Terry Gross regularly features interviews with authors.

Bookish idea

The idea for the Book Club was sent to the newly formed Future Fund project at the CPB whose aim is to create projects that will generate more revenue for member stations both in radio and television.

Out of 21 applications originally submitted, the Book Club was one of only four projects CPB selected for strategic business development consultation and the only one that involved radio.

After doing some investigating, WHYY-FM found that the idea of a book club was not economically feasible due to prohibitively high start-up costs. After additional brainstorming, they came up with not one, but six other possible projects.

The project which seems most feasible and is presently being pursued most aggressively involves setting up an 800 number through which listeners could order books discussed on the show with WHYY-FM getting a percentage of the sales. The setup would be similar to that of the Public Radio Music Source, a national toll-free number which allows listeners to purchase many of the CDs they hear on public radio programs.

Dotting the Ts

Othman admitted that there are "a huge number of Is to dot and Ts to cross" before the line can be set up. It will probably be tried locally first.

Some other projects involve having Gross act as a guest editor for an existing book club like the Book-of-the-Month



Fresh Air host Terry Gross

Club or having her do about ten interviews per year that would be open to the public for an admission charge.

Othman said the station hopes to begin doing some interviews later this fall. WHYY-FM has actually done this a few times before but not on a regular basis.

Unlike many other public radio stations, WHYY-FM

has no problem finding a location for these interviews: the station is located in a former museum for the U.S. Bicentennial which contains a 500-seat theater.

The station is also considering selling transcripts of complete programs or interview segments, aggressively packaging and selling interviews from WHYY-FM's

archives which presently number between 4,000 and 5,000, and packaging archival material to be used in college or adult education courses.


Specifically aimed

The latter would probably initially be aimed at specific courses in contemporary literature or music offered by local schools, but again, Othman said, "there's a lot of research to be done there."

While Othman and Robert Altman, vice president of marketing and development, are the two main workers on the Fresh Air projects, the proposed projects are a result of brainstorming among all interested station personnel.

Othman said that Terry Gross is "very much involved with the discussions, very much a part of it" although her actual time to help with the project is limited because she has her hands full putting the show together.

At present, Ellis said none of the six proposed projects has progressed beyond "the thinking/research stage just now. We're trying to think ahead and see what might work."

Othman said that everyone at the station is "excited" and "thrilled" about the possibilities of the success of any of the projects. 

DXers: Tales from Here, There and Everywhere

by Alan Haber

WASHINGTON Invisible to the naked ear, signals of radio stations from far and away inhabit the air above, swirling around us. In the blink of an eye, as quickly as they've appeared, suddenly they're gone.

DXing veterans know the feeling of capturing a distant station however faint. They know how being able to listen to programs broadcast from cities hundreds or even thousands of miles away can lift your spirits and make you feel more alive than you've ever felt before.

Stories of sweethearts cuddling in the still of the night to the sounds of their favorite disc jockeys are legendary: the jocks weren't always close by, however. Sometimes, they were coming out of New York on WABC(AM) or out of Windsor, Ontario from CKLW(AM). Sometimes, they were unidentifiable but just as exhilarating to hear.

Ionosphere phenomenon

Although it is possible to DX FM stations, DXing is more common with AM and shortwave. The phenomenon revolves around the ionosphere.

Dave Wilson, staff engineer at the National Association of Broadcasters, said that the characteristics of the ionosphere change dramatically at night. At night, the ionosphere shifts and radio signals bounce off it and come back down to Earth to distant locations.

DXing is "almost like you're eavesdropping," said Wilson. It's "just kind of fascinating," he said, "to be able to do that, to be able to sort of transport yourself almost to this far-off city and listen to what's going on there, even though it's basically the same kind of stuff you could hear on a local station."

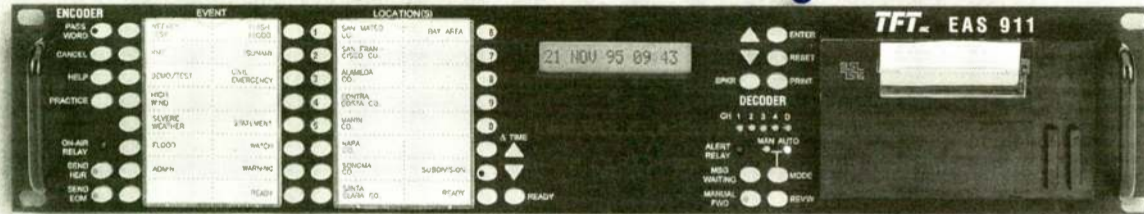
People with the urge to listen are always DXing. Take the people who responded to a poll posted on the Internet newsgroup rec.radio.broadcasting.

Mark James was driving to Appleton, Wis., when, all of a sudden, the FM band was jam packed with country music stations. Each station came in strong for about five minutes — enough time for James to determine that the origination point of Roswell, N.M., was "taking over Wisconsin airwaves."

Andrew Randle, a Ph.D. student researching radio systems at the University of York in England, lives in a town called Filey, located on the North

continued on page 15 ►

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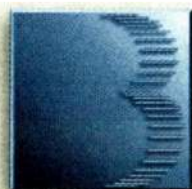
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World Radio History

INTERNATIONAL UPDATE

Lynxx Beams Reports from Bosnia

by Leo del Aguila

SARAJEVO, Bosnia and Hercegovina The final borderlines for Bosnia and Hercegovina agreed to in the Dayton Peace Agreement were visualized using sophisticated mapping software.

This program, called "Powerscene," allowed negotiators to mark territorial divisions in an artificial, three-dimensional world in surprising detail and clarity.

I mention this point as a reminder of how large a role "Information Age" technology plays in world events, as well as in our daily professional and personal lives.

The information age

State-of-the-art digital technology plays a major role in National Public Radio (NPR) coverage of the NATO Implementation Force deployment into war-torn Bosnia and Hercegovina. The sonic quality of NPR correspondents' reports transports our listeners to this military theater with vivid detail.

The equipment combination that makes this coverage possible is a California Microwave Mobile Satellite Products LYNXX Transportable Inmarsat-B Earth Station (MES) used in tandem with a MUSICAM USA CDQ-1000 MUSICAM codec.

The LYNXX provides high-quality voice telephone, Group 3 fax service and, if outfitted with a High Speed Data (HSD) port, full-duplex data calls at 56 and 64 kbps. The CDQ-1000, which the NPR audio engineering department uses daily, provides digital encoding and decoding of real-time 50 Hz to 10.1 kHz mono audio.

Over the past few years, broadcasters have become acquainted with the International Maritime Satellite Organization (Inmarsat). Inmarsat has provided worldwide telephone, fax, and data communication services via its four satellites — Atlantic East, Pacific, Indian and Atlantic West — since 1982.

The Inmarsat-B service, successor to the original Inmarsat-A service, is based on digital technology, allowing it to more efficiently manage satellite power and bandwidth resources. It is this service that permits the delivery of data-reduced high-quality two-way audio from almost anywhere in the world.

The process is a little bit tricky. Inmarsat satellites hover over the Earth in geostationary orbits above the equator and which one you use depends on where you are.

Bosnia is located at 45 degrees north longitude and 18 degrees east latitude, making the Atlantic Ocean Region East (AOR-E) satellite stationed at 15.5 degrees west longitude the best satellite to use.

From Bosnia and Hercegovina, the Indian Ocean Region (IOR) satellite at 64.5 degrees east longitude can also be accessed, but AOR-E is the more convenient satellite for our purposes.

The next step is to align the antenna with the satellite. For this, you must feed the LYNXX computer the map-coordinate data and it automatically computes the azimuth (compass location) and elevation (angle to horizon). For Bosnia the azimuth is 220 degrees and the elevation is 38 degrees.

With this information, you point toward that location in the sky, power the MES up and, if your aim is good, you are on-air.



The author out in the field — on a pontoon bridge — gathering information for his reports.

Nudge is needed

Often it is necessary to nudge the antenna or MES from side to side or up and down to secure the strongest signal. The LYNXX hand unit, which doubles as the computer controller, displays a signal strength bar to facilitate this task.

Before the connection is made, you have to tell the LYNXX computer the Land Earth Station (LES) you want to



California Microwave's LYNXX Satphone deployed for transmission of NPR stories via high-speed data/ISDN in an apartment in Sarajevo.

downlink to Southbury, Conn. — in this case — and the Inmarsat satellite to which you are pointing.

For voice communications, the next step is similar to using a cellular phone, just dial the country code, area code and number.

For HSD calls, dialing the prefix *3 followed by the ISDN number links, including country and area codes, connects you to the HSD network. Faxes are sent using the prefix *1 followed by country code, area code and number.

If fortune and the atmospheric conditions are with you, the procedure for filing a story is straightforward.

Using the MES phone, a call is placed to Master Control (MC) to alert them to the upcoming feed and to find out which ISDN unit is available.

You then dial the ISDN unit and within a couple of minutes, the units should lock. Once this happens, a digital duplex communication with the studio can proceed, allowing you to feed and receive audio.

I cannot stress the importance of being prepared, at both ends, when using the HSD mode. Unlike the voice service, which costs \$5.00 per minute, HSD charges are \$16.50 per minute. When you consider that the average feed time for a five-minute report is 20 minutes, costs add up quickly.

The LYNXX continues to perform well, as the reports from Bosnia confirm. Its technical features, size and ruggedness make it a flexible and reliable tool.

Ultimate remote

When covering the news where conventional communications are limited or non-existent, this unit, together with an ISDN codec, is the ultimate remote broadcast package.

The only technical stumbling block I faced during my stay in Bosnia and Hercegovina was in early January, while on deadline for the NPR news program "All Things Considered." On that occasion, the CDQ-1000 codec in Bosnia could not lock with any of the ISDN units in Washington, D.C.

At both locations the equipment tested okay. With the help of NPR colleagues Norb Gallery, Dennis Coll and Jane Holmes, we got the LES in Southbury technical support personnel involved with the troubleshooting.

We spent close to six hours testing every possible technical scenario to no avail.

Needless to say, we blew the deadline and our correspondent was forced to do a live two-way phone call instead of the report.

The next day, Michael Cullen helped me retest the system. After a few tries we locked units, but we were only able to establish one-way transmission capabilities from Bosnia.

Subsequent tests seemed to indicate that the receive stage on my codec was at fault.

Obviously, this complicated our filing and two-way procedures, because we no longer had backfeed capabilities.

From then on, when we had to file a report, NPR headquarters called us on a regular phone to establish the back-feed.

At times this was quite a tedious process as reliable phone service is not a reality in Bosnia.

The problem was eventually solved by replacing the codec with a healthy unit brought by Marty Kurcias who came to replace me.

To this day, we have no idea what caused the malfunction and, to further confuse matters, the unit I returned with checked out okay at the shop in Washington. It is now back in service. ☺

Leo del Aguila is the Los Angeles bureau engineer for National Public Radio. Contact him via e-mail at: ldelaguila@npr.org

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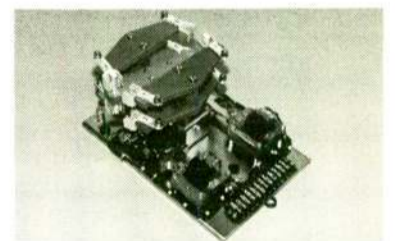
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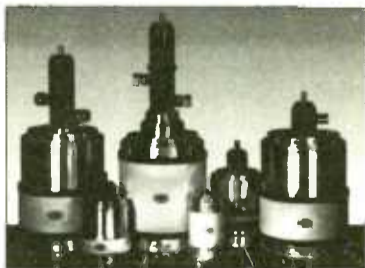
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READER SERVICE NO. 73

DXers Even Like Static

► continued from page 12

Yorkshire coast of the country. He said last summer — one of the hottest ever — gave him the chance to listen to German FM radio.

Fred Cantu remembered hearing voices in the middle of the night from all over the country. Cantu, who spent 18 years in radio and is now morning news anchor at KVUE-TV in Austin, Texas, now carries a Grundig YB400 radio on which he scans the dial.

"After sundown, AM still skips off the ionosphere like you wouldn't believe," he said.

In the same boat

Peter E. Hunn and his wife owned and operated daytimer WZZZ(AM) in the Syracuse, N.Y., area for about seven years.

They ran the station "on a typical mom and pop radio shoestring," said Hunn. He was "in the little cinder block transmitter/studio building from sign-on to sign-off."

One cold, clear February night, Hunn said he conducted a DX test for a club. He promised the club's members he'd stay on the air "for an hour with talk, polkas, Christmas music and code Ids."

"Near the end of the hour, I'm running out of polkas and things to say, so I just gave a monologue about how I loved my tiny piece of American broadcast landscape, but felt trapped in the place 365 days a year."

Four days later, Hunn started to receive reception reports. One person wrote, "I heard your talk and know exactly how you feel." The return address, Hunn said, jumped "off the page." It was from a guy in the Pennsylvania State Prison.

Hunn, an associate professor in communications department at the State University of New York in Oswego, said he enjoys what he's doing now, including the "non-seven-days-per-week schedule."

Still, he said, "I sure miss looking out the studio window and starting folks' day with a smile and the weather."

Peter Baskind, the weekend anchor at WMC-FM in Memphis, says there's "something unique, yet intangible" about radio DXing.

"It's not unlike why a mountain climber

climbs — simply because it is there."

Baskind started DXing with television. He soon discovered that DXing was not confined to the tube.

"As a radio fan, I had always listened to

long-distance AM," he said. "When I discovered one could do the same with FM in more occasional circumstances, I was hooked."

By the time he graduated from high school, he said he "had heard literally hundreds of stations, some from such exotic locations as Bermuda and Jamaica. In these cases, the locations themselves made it romantic."

The DXing bug can be caught nearly anywhere. Patrick Mason, a technical advisor for the Department of Defense now living in Hawaii, had his first introduction to DXing in the first grade when he spied a copy of "Know Your World" magazine.

"They had a map of the United States with 30 transmitters and a list of 30 stations and a game of 'Radio Bingo' —

match up the 30 stations with their cities as they are received," he said.

Still enjoys it

From his home in Illinois, he received 29 of the 30 stations, missing only KEX(AM) in Portland, Ore. He still enjoys AM DXing today.

The next time you're parked in just the right spot, searching the AM or FM band under a starry night hoping to snag just one far away signal you can call your own, remember this story.

Mason drove with a friend in Coal Valley, Ill., to a corn field road where they stopped to listen for FM stations. A policeman approached the pair and asked them what they were doing.

"My friend simply told the officer, 'We're engineers. We do this sort of thing,'" said Mason. You too? ☺

The DXing bug can be caught nearly anywhere.



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INTERNATIONAL UPDATE

Australians Try Digital Delivery

by **Barrie Smith**

GLEBE, Australia Despite the strengths of the Australian radio industry, innovation has not been the industry's strong suit. The last major innovation in radio here was AM stereo, which died like dog.

Operators proclaim that Australia has one of the most advanced and balanced radio broadcasting systems both in terms of content and technology.

But one sector of the industry has consistently lagged behind the others: the handling of the advertisements that bankroll the whole commercial system.

Leader in the field

In the major cities there are audio production studios on par with the best in the world. One Sydney studio which is a leader in its field is Stellar Sound Studios, based in Glebe, New South Wales.

Stellar is managed by radio veteran Rob Lynch, employs 22 people and houses three voice studios. Most of the time these operations run smoothly and

profitably, but a new area of the company kicked off in February caused an unexpected furor.

The new development is DART (Digital



Stellar covers all installation costs

Audio Rapid Transfer), a new way to deliver radio ad spots to stations across the nation digitally via ISDN.

When Lynch began as an on-air announcer in the 1960s, advertisements were played back from 45 rpm vinyl records.

"If you were doing a breakfast show you would have chaos in the studio. You would have three turntables constantly running," he said. "You never turned them off. You just put the next disc on,

cued them up and played ad after ad."

Next came delivery on quarter-inch tape reels which lasted for 23 years. Recently stations have dubbed the supplied tracks onto NAB tape cartridges. This provided a degree of on-air mechanization, but the quality of the commercials always suffered.

FM improved

While FM improved in terms of voice content and CD-quality music, the ads were often aired from cart machines stacked with cartridges that probably had seen 200 to 300 passes.

"Stations had gone digital. But the only thing analog still on air were the commercials, the lifeblood," Lynch said. Then the ad agencies wanted the advertisements to be brighter. Stations tried to equalize them to be brighter, but this was not the solution at all."

It was obvious to Lynch that the agencies were not going to do anything about it, "and the radio stations, although it was their lifeblood, were not going to do anything about it. They had no influence on it."

Stations were accepting advertisements no matter how they sounded. Production studios were still profiting from sending out dubs and they were not going to help end that monopoly.

We can have a 30-second commercial anywhere in the country in 45 seconds. All the hardware and management software is run from here.

— Linda Christian
Adfile Pty. Ltd.

"I decided to make it my problem. Otherwise, it would probably have taken a while longer for somebody to come up with a solution," Lynch said.

The Stellar DART system is operated by Adfile Pty Ltd., a subsidiary of Stellar in Sydney.

Computers and software were installed in every commercial radio station in Australia allowing Adfile to send commercials via ISDN.

"We can have a 30-second commercial anywhere in the country in 45 seconds," said Adfile General Manager Linda Christian. "All the hardware and management software is run from here."

First, a DAT, quarter-inch tape or ISDN feed is taken from a studio or ad agency. Next, traffic instructions are added and the track is copied to a DAT machine in the main control room. The DAT machine is controlled by a bank of PCs.

Financed by advertisers

The DART setup operates at no cost to the stations. It is financed by advertisers with a \$31 fee per transmission and one transmission may contain a number of spots.

"The radio stations just think it is marvelous," Christian said. The advertisers also benefit from the rapid delivery and the ability to quickly alter the playback schedule. A spot can be written, recorded and transmitted by DART to any station in the country within half a working day.

The setup operates all days and all hours so an advertiser can instruct that a commercial be transmitted at any time or even withheld until a specified release date.

Currently 123 of Australia's 161 com-

mmercial stations use the system. Each connected station has a PC linked to Adfile by ISDN. The spots are received and downloaded to whatever machine is attached — DAT, cart, hard disk or whatever — along with scheduling instructions. In some cases, commercial spots arrive and are integrated directly into the station's computerized traffic/scheduling software.

If an out-of-Sydney advertiser wants to distribute material nationally, the tapes are given to a DART distribution point in each state capital to relay to Sydney for dissemination.

The quality of the ads is comparable to CDs. Transmission takes place after processing, via rack mounted file servers, linked directly into the Telstra ISDN system.

The output to ISDN is 18-bit, 64-times oversampled audio at user-variable sampling rates of 32, 44.1 or 48 kHz. At both ends a 486DX4/100 MHz PC is used, each outfitted with 8MB RAM and a 540MB hard drive. The entire cost of installation at the station end is born by DART.

In the start-up phase there were two schools of thought as to who would bear the cost of the installation, said Lynch.

"I went for what people do in their houses: The phone is put in for nothing, then they are charged to use it. I knew radio stations would not even pay a connection fee, but they wanted it and they were excited about it," he said.

"The tenet of the whole idea is that it costs the radio stations nothing. So we stuck with that. I had a few heavy fights because that is where a lot of money went," Lynch said.


About \$1.09 million has gone into just the radio station installations. From mid-February to March, the software was phased in and bugs were isolated and corrected.

Obviously, the Australian telecom authority Telstra gains from the ISDN revenue. Stellar and other production studios, however, will lose all their revenue from dubbing tapes.

Some studios have revolted against DART claiming it is a restrictive trade practice. Surprisingly, the least opposition has come from Stellar's main rival in the Sydney market, Audio O'Brien.

From other studios, however, the opposition has been so strong that Lynch has been barred from attending some industry meetings to present the system. One radio station group opposed to DART, 2UE/4BC, already uses a satellite link for live program output across Australia, and it may be planning to use this link to run a similar commercial distribution system.

Lynch says that DART frees studios to maximize their creative input in recording especially smaller studios who use outside dubbing facilities.

People are still free to send dubs by satellite or any other means, said Lynch. "It is not a monopoly." 

Barrie Smith is a free-lance writer based in Sydney, Australia, and a regular contributor to RW's sister publication TV Technology International.

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With Gentner's SCREENWAIR software and a PC, the screener uses a keyboard and headset instead of the control surface and preselects calls for on-air and adding names, comments, etc. An additional monitor is placed in the studio

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INTERNATIONAL MARKET WATCH

Latin America

Compiled from reports in the Latin American edition of *Radio World International* by Gabriel Sosa Plata in Mexico City, Gustavo Vásquez in Buenos Aires, Argentina, Henrik Klemetz in Bogotá, Colombia, and Luis Ponce Torres in Tacna, Peru.

Mexican Competition: Terrestrial broadcasters in Mexico face strong competition from satellite-based restricted digital audio (ADR) broadcasts.

Direct satellite audio services have been a reality in Europe for many years, but in

Mexico ADR is a new development. However, it is expected to grow significantly, due to a new legal framework and to the investments of several telecommunication companies over the next few years.

Grupo Zoma is the only corporation in Mexico that provides a continuous satellite music service to businesses, service industries and industries. Other groups, such as Clemente Sema Alvear Medcom Corp., soon will offer television signals and CD-quality audio channels not only to businesses but also to homes.

In Argentina: A forum in Mar del

Plata, Argentina, focused on restructuring frequency allocations and the creation of a new radio broadcasting law.

Alberto Veiga, president of the Association of Private Radio Broadcasters of Argentina (ARPA), and León Guinsburg, supervisor at Radio Broadcasting Federal Committee (COMFER), agreed to the necessity of restructuring the airwaves as quickly as possible.

Currently, the broadcast spectrum in Argentina is overcrowded thanks to the vast amount of low-power FM stations.

According to reports in *La Nación*, Veiga made a pronouncement on the

organization of the radio frequencies. "There must be a frequency plan linked to a political-economic plan," he said. "Otherwise, we will have, we already have, small cities with 30,000 inhabitants that have 20 stations on the air without any possibilities of surviving."

Veiga also said that the future radio broadcasting law has a good chance of being approved.

"The president realizes this is a very old news. It is a shame that democracy has not given us a (broadcasting) law and that we still have to follow military regulations."

Guinsburg said he trusts the situation will stabilize soon.

"That way we will no longer have illegal stations, and everyone who meets the requirements and has the desire and ability will be a radio broadcaster."

Colombian Stations: In a few months 220 new commercial FM stations will go on-air in Colombia.

In addition, approximately 2,000 AM and FM community station and public-interest licenses will be allocated.

But before the new stations can go on air, approximately 300 illegal stations must be closed.

Several legal commercial stations will be reallocated new, currently non-assigned frequencies and some may be able to upgrade their power.

It is believed that more than half of the stations in Bogotá will be penalized for violating at least part of the broadcasting law, including the state broadcaster Radiodifusora Nacional de Colombia.

According to decrees 1445/7 of 1995, the communities and associations can obtain a permit to operate a local 24-hour FM station.

City halls across the country will be able to operate a public-interest AM or FM 250 W station during the day.

"Colombian legislation is the only one in Latin America that pays special attention to community stations," said Alternative Communication Corp. Director Alberto Sierra. "It contains certain errors, but it is a big step — a very big one."

Crackdown in Peru: An illegal FM station detection campaign took place in October 1995 in Tacna, Peru.

Mayor Alex Zegarra requested the campaign in conjunction with Ministry of Transportation and Communications (MTC) representatives and in coordination with the National Police Force of Peru and the Office of the Public Prosecutor for Crime Prevention.

The campaign was initiated by broadcasters complaining about interference in the spectrum. Some of the stations have been broadcasting illegally for more than eight years.

There are 20 FM radio stations in Tacna, five AM and one shortwave. Of all these stations, 17 FM stations were investigated. It was discovered that 13 of these were operating illegally.

MTC Departmental Director Andrés Cornejo said that several stations were visited to assess the situation in Tacna. Cornejo recommends the illegal stations to stop operating immediately as they violate decree 26096 of the Peruvian Broadcasting Law and they must be penalized.

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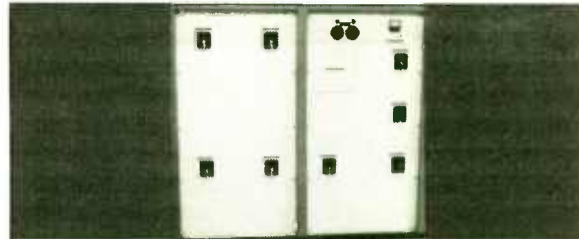
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TECHNOLOGY

A Look at the Anatomy of a Hard Disk

by John Watkinson

LONDON With hard disks taking a greater share of the audio and video storage market, it is important to know how they work. I first studied disk drive technology 20 years ago, and although today's drives are more sophisticated, the basics are still the same.

The disk drive occupies a unique niche in the data storage market. Data storage devices are primarily rated by cost per bit and access time. It is a fact of life that these two goals features are mutually exclusive. The fastest access is obtained from RAM (random access memory), but it costs far too much for universal use. Likewise, tape is cheap but slow.

In between

The disk drive lives in the area between RAM and tape. It is faster than tape and cheaper than RAM. In the right application, like editing, disks give a better price/performance compromise than other storage techniques. However, do not forget that the disk is a niche technology. In the wrong application, it can fail. For example, if the need for rapid access is absent, such as in archiving, using a disk drive just increases the cost.

Today's disk drives are descendants of magnetically coated drums. These were large cylinders coated with the same oxide as was used on tape. Fixed heads, similar to tape heads, accessed signals recorded on circular tracks. The time taken to access any data was no more than one revolution and usually averaged half a revolution. This is called rotational latency.

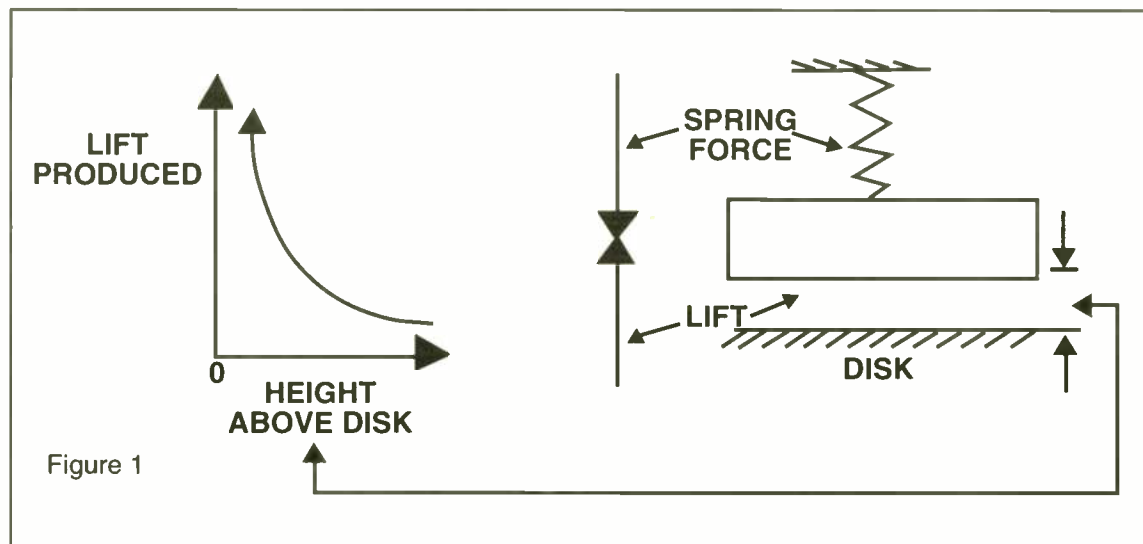
Clearly, faster access would require higher rotational speed. But with conventional magnetic recording, the contact between the head and drum would cause frictional heating and wear. The first breakthrough was to lift the head off the drum surface by feeding compressed air to the interface area. This eliminated friction and allowed a dramatic increase in speed. Soon, it was discovered that a suitably shaped head would produce its own lift and would fly automatically.

Aerodynamic lift

Air is viscous, and a fast spinning drum carries around with it a thin layer of air turning at the same speed. Upon leaving the drum's surface, the air speed falls off. Figure 1 shows that as aerodynamic lift goes as the square of speed, lift will fall as the head goes too high and rise as it goes too low. It is only necessary to apply a downthrust from a spring and the head will reach an equilibrium spacing.

Figure 2 shows the evolution of the disk drive. Greater storage requires greater surface area, and switching from drum to disk allowed a huge increase in area because several disks could be stacked on a common spindle. The large number of tracks now available made it uneconomical to provide a fixed head for every track. The first practical multiplatter disk drive, the IBM RAMAC, had only a single pair of heads. These were mechanically driven from one disk platter to another along a vertical axis, and then driven radially to the selected track. The two heads could access tracks on both sides of the platter.

This soon gave way to a better compro-



mise in which each platter had its own pair of heads. All of the head pairs were mounted on a common positioner that only moved radially. With mechanical positioning like this, the rotational latency has to be added to the positioning latency. It is important to be able to move the heads from one track to another at high speed. Early drives used hydraulics to move the heavy head assemblies. The development of the power transistor allowed the moving coil positioner to take over and this has remained the dominant technology, except in slow, low-cost applications where stepping motors are used.

It is well known that when dirt separates the tape from the heads on an analog audio recorder, the high notes get muffled. This is exactly what happens in a disk drive because of the air film between the heads and the disk. Without the air film, the heads burn up. The loss of high frequencies restricts the recording density in comparison to a system having heads in contact. As I said earlier, rapid

access and cost per bit are mutually exclusive.

Disk drive development is driven by intense competition between manufacturers. The drive with the fastest access will capture certain markets; the drive with the lowest cost will capture others. Driving down the cost per bit requires the recording density to rise, and there are several areas that affect recording density. Advances in media and heads allow the same electrical energy to be induced from a smaller area of the disk. Improvements in precision and cleanliness allow the head closer to the disk without crashing. Improved modulation schemes allow a higher bit rate without increasing the signal bandwidth. More powerful error correction allows the data to be extracted with the same reliability from a noisier signal. More accurate positioning mechanisms keep the heads more closely registered with the tracks.

As all of these effects multiply, it will be clear that a 10 percent improvement in every one has a dramatic effect on the

overall performance. Consequently, the speed and capacity of drives has advanced dramatically, with the density typically doubling every few years.

Although the evolution of the disk drive has generally been incremental, there have been two quantum leaps in development that have allowed performance to rise even faster than usual. The first of these was the development of the servo surface. The positioning accuracy of the drive limits the density. Prior to the servo surface, temperature changes would cause the data tracks to expand and

contract, resulting in tracking errors. The tracks had to be made wide so that they could be read over a reasonable temperature range. With servo surface technology, one surface of the disk pack is dedicated to the alignment patterns, which are read by a servo head. This servo surface expands and contracts in step with the other surfaces, canceling out errors due to temperature changes. The loss of one surface is wiped out by the increase in storage capacity allowed by narrower tracks that can now be reliably accessed.

On target

The second quantum leap was Winchester technology. The name came about because the project number at IBM was the same as the model number of the famous rifle. The Winchester disk drive departed from tradition by fixing the disk pack in the drive so it could not be exchanged. This led to a number of advantages. The entire assembly could be sealed against dirt, so the flying height of

continued on next page ►

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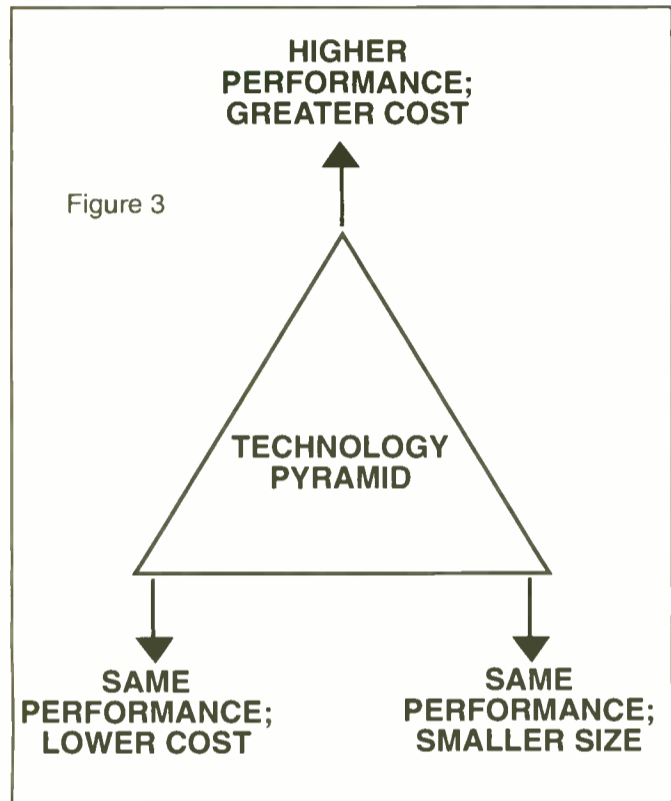
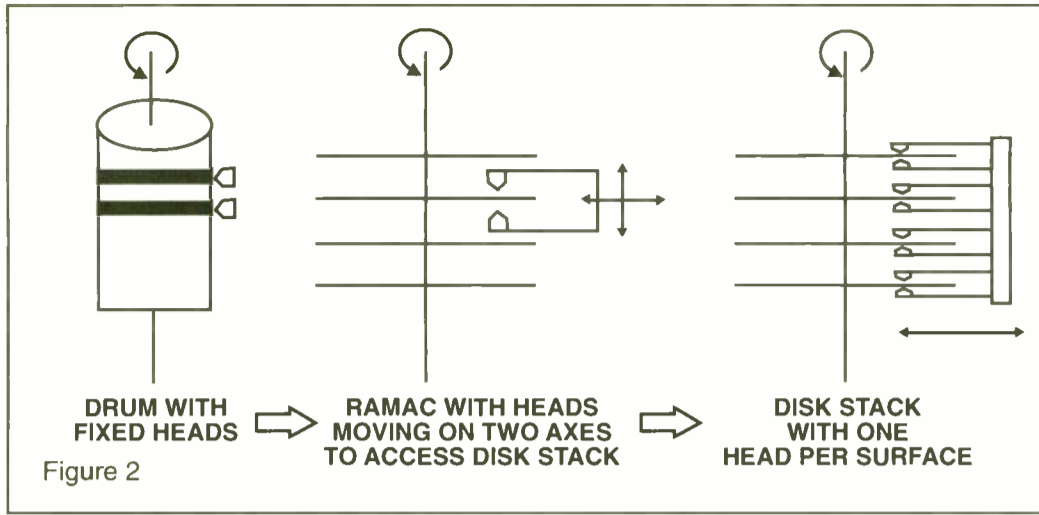
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the heads could come down, reducing spacing loss and driving up the along-track density and the data transfer rate. With no need for interchange, the tracks could be made narrower and put closer together. The drive would only have to read tracks it had written itself, so no head adjustment was needed.

While the Winchester drive was a giant breakthrough in disk technology, it brought about a requirement for high speed tape drives to back up the data because the disk packs could no longer be removed. Unlike exchangeable pack drives, failure of a Winchester drive usually led to loss of the stored data. So much for the myth that disk and tape compete.

Figure 3 shows how disk technology



developments take several directions. At the leading edge, applications that were impossible become feasible. At the trailing edge, existing applications may become cheaper, or they may become smaller. There are many good reasons for making disk drives smaller. A small disk requires a shorter positioner travel and smaller, lighter head arms. The entire positioner can be driven much faster with benefit to the access time. Today, very small drives are available that are no larger than a postage stamp. These plug into chip sockets and compete with RAM where the fastest access time is unnecessary.

For a given storage requirement, it will be faster to use several small drives rather than one large one. As the greatest volume

market for disk drives is in personal computers, small drives may well be cheaper as they are made in greater quantities. A further advantage of using a series of small drives is that error correction techniques can be used to protect against the loss of a drive.

In RAID (redundant array of inexpensive drives) technology, data to be recorded is assembled as code words that include a certain amount of redundancy. The code words are not recorded on a single drive, but are uniformly distributed across several drives. The redundancy in the codewords is such that the data lost by the failure of any one drive can be fully restored by the error correction systems. The failed drive is replaced and the system recreates the data it held.

□ □ □

John Watkinson is an independent consultant on digital audio, video and data technology and is the author of seven books on the subject, including the Art of Digital Audio and the Art of Digital Video.

He is a fellow of the Audio Engineering Society and contributes to RW's sister publication, TV Technology. John can be reached at +44-1734-834-285, or read his web pages at <http://www.probel.com/guests/john/>



Norm Pattiz (r) and Michael Jackson broadcast live during the ribbon-cutting ceremony and gala to open the Museum of Television & Radio in California, March 17, 1996.

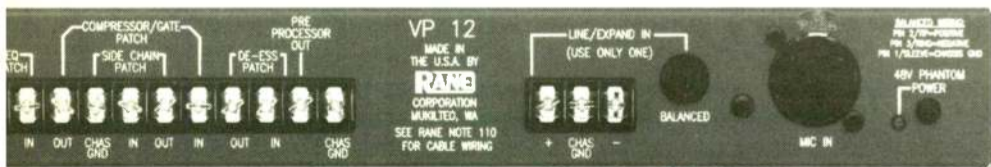
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Wilmington, Del. In its answer to the Federal Government's monopoly suit RCA sets forth that it caused the National Broadcasting Company (called Broadcasting Company in the answer) to be organized in 1926, and that the new company acquired WEA from the American Telephone & Telegraph Company on October 30th of that year. The NBC now owns and operates WEA. The answer continues: "This defendant admits that by written documents, profert of which is hereby made, it granted to Broadcasting Company a non-exclusive license under the patent rights of this defendant to use apparatus in the field of broadcasting. This defendant alleges that similar rights have been and are freely granted by this defendant and by Telephone Company to hundreds of others, many of whom are engaged in the broadcasting business in active competition with Broadcasting Company. "The stock of Broadcasting Company was originally divided between this defendant, General Electric and Westinghouse, but that stock is now all owned by this defendant."

PIONEER PROFILE

Welcome South Brother — WSB

In 1922, Long Before Crossownership Rules, The Atlanta Journal 'Scooped' The Constitution with WSB(AM)

by Barry Mishkind

TUCSON, Ariz. As the year 1922 began, fewer than 30 stations were authorized as "broadcast" stations and on the air. Nevertheless, that "newfangled thing" called radio was starting to be noticed all over the country, and not just in the biggest cities.

Although most of the fledgling stations were either in New England or California, amateurs and experimenters

around the country were listening and scrambling to get their own licenses. Of course, getting a useable transmitter was no trivial matter in those days. Equipment was difficult to obtain.

Meanwhile, wireless enthusiasts sought backing to get on the air; each wanted to be among the first to have a piece of the new radio service. Indeed, before the year 1922 ended, the infant industry of broadcasting had exploded from one side of the country to the other; 570 stations

had been authorized.

Among those in the southeast seaboard states who were interested in broadcasting was an ex-Navy man who had served in WWI as a ship's wireless operator. Walter Tison wanted a job doing something he enjoyed, and figured he would put his naval experience to work. So Tison went to Maj. John Cohen at The Atlanta Journal, determined to sell him on the idea of putting a station on the air.

Cohen apparently was a quick convert, seeing the potential public service uses for a radio station. He sent Tison to see the editor of the paper, and after Tison discoursed for two hours on the reasons The Journal should build a radio station, the editor recommended getting such a station on as soon as possible.

The competing newspaper, The Atlanta Constitution, was also constructing a transmitter, in an attempt to "scoop" its rival, The Journal. As the second week of March 1922, ended, both companies had filed requests for licenses for their stations.

The Journal did have one problem not uncommon to broadcasters even today: the transmitter manufacturer failed to deliver the unit on time. Expecting its license to be issued at any moment, Maj. Cohen arranged to purchase a transmitter from a local ham and immediately had it installed by Tison and station director, George Iler.

Cohen's timing was perfect. A collect telegram arrived on March 15, 1922, and The Journal's new station, WSB, went on

transmitter to keep it from blowing up. Fortunately, the opening night ceremonies ran out before the ice did!

So it was that radios in the Southeast crackled to life with the greeting "Good evening. This is the Radiophone Broadcasting Station of the Atlanta Journal." Telegrams, letters and telephone calls verified that WSB was being heard from Canada to the Panama Canal.

Not unexpectedly, The Journal ran many stories about its new station, initially eschewing all commercial interests. Even before the Federal Radio Commission issued its mandate for broadcasters to operate in the "public interest, convenience and necessity," WSB had staked out such a position.

Journal policy was that the station be operated "purely for the benefit and enjoyment of the public." True to its word, WSB made its microphones available to anyone who sought airtime. And sure enough, as all sorts of Georgians walked through the doors, WSB programs became examples of true variety. Listeners could tune in to enjoy all sorts of things: talks, musical instrumentalists, singing groups, even whistlers.

While there was ample evidence that WSB was being heard around the country, the station primarily wanted to serve the Atlanta area. Because radio receivers were selling for \$600 to \$700 at the time, the station felt it was necessary to take steps to ensure the audience would be more than just the very rich.

For example, a truck equipped with a receiver and loud speakers was taken all around Atlanta and surrounding communities. Also, regular evening classes were

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The Journal staff got the soda jerk to agree to stay open, so they could run down periodically for ice, which was packed in the transmitter to keep it from blowing up.

the air that same night, two days before The Atlanta Constitution received its authorization for station WGM. (Being second apparently was an impossible burden for WGM. It was deleted from the federal list of broadcast stations less than a year-and-a-half later.)

Looking at pictures of the early transmitters, long before the FCC's Good Engineering Practice (GEP) rules were put in place, it is amazing that there was no epidemic of electrocuted broadcasters. Exposed wires, tubes, batteries, generators, microphones and all sorts of knobs and dials were everywhere. Performers, visitors, engineers and "Danger" signs all shared the cramped makeshift studio/transmitter room.

Even with all this equipment, WSB was not exactly a powerhouse upon its debut. In order to transmit the opening night's programming, the 100 W transmitter was pushed to its limit. According to an employee, to produce the necessary voltage, "fruit-jar chemical rectifiers with a lead-and-zinc-with-Borax solution" were used. However, they began to "boil over" from the current drawn.

Fortunately, there was a drugstore down on the street, five floors below. The Journal staff got the soda jerk to agree to stay open, so they could run down periodically for ice, which was packed in the

set up to teach people how to build their own crystal receivers. After demonstrating how to construct the set, the instructor presented it to someone in the class.

Perhaps you have heard that the letters WSB stand for "Welcome South, Brother." While the letters originated as a random sequential call sign when issued, WSB ran a listeners' contest in 1922 to put a slogan to the call sign. "Welcome South, Brother" was chosen for its warm inviting sound, and it stuck over the years.

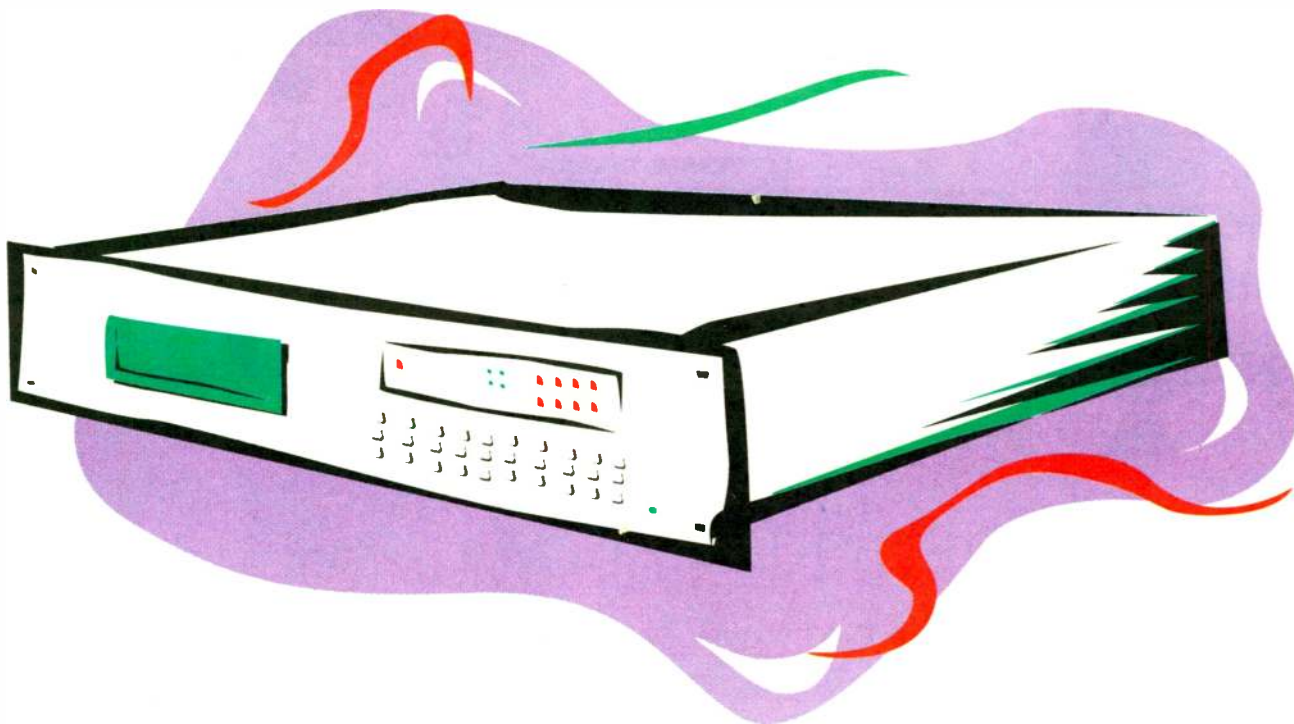
As the station grew to 200 W, then 1000 W, and finally in 1933 to 50 kW, it developed as a true voice of the South. Over the years, the station moved several times from its original 833 kHz to finally land on 750 kHz in 1941. Seventy-four years old, now going on 75, the Southern Belle, WSB, continues serving the Southeast from Atlanta, welcoming listeners to enjoy its southern hospitality. It makes you thirsty for a Mint Julep!

□ □ □

Please share with us anything that would help illuminate the pioneer stations and the men who built them. Information can be sent to: Barry Mishkind, 2033 S. Augusta Place, Tucson, AZ 85710. Barry Mishkind can be reached at 520-296-3797, or barry@broadcast.net via the Internet. You can find his home page at <http://www.broadcast.net/~barry/>

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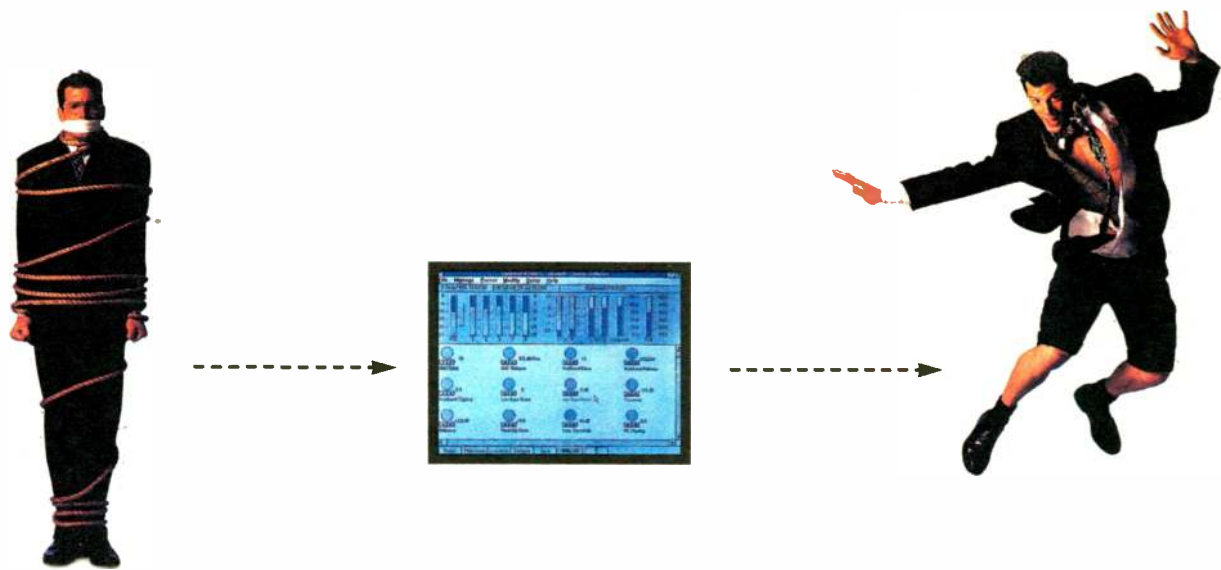
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Studio Sessions

Check Out the
Tascam DA-20 DAT.
See page 30.

Equipment and Applications for Radio Production and Recording

PRODUCT EVALUATION

beyerdynamic Drums Up Interest

by Ty Ford

BALTIMORE It has been a while since I've been surprised by a dynamic mic, but I always enjoy the experience. As such, I was heartened to run into the beyerdynamic TG-X 50 (\$249) recently.

This is a mic that radio stations can embrace. It is hefty (.83 pounds), takes up a commanding space, does nice things for the human voice and resembles a black hand grenade.

This is a hypercardioid pressure gradient dynamic mic that is lower in output than a U-87, but quite a bit higher than a Sennheiser 421 or an Electro-Voice RE-20. Open circuit voltage at 1 kHz is listed as 3.2 mV/Pa, ± 1.5 dB.

The TG-X 50 was originally intended as a mic for kick drums. But quite often, microphones end up in applications well outside their original design and intentions. Such is the case here.

Because of the extreme amount of proximity effect the TG-X 50 demonstrates, level differences among other microphones is difficult to gauge.

The TG-X 50 uses a high-output neodymium magnet and has perhaps the largest diaphragm (1.25 inches) of any dynamic. The Hostaphan diaphragm — a very lightweight, low-mass material developed by beyer some time ago for their vocal mics — provides transients similar to those of to ribbon mics. The capsule is shock-mounted and is relatively resistant to popping.

The hypercardioid pattern is very tight on the front side. This mic must be worked pretty much straight-on. As the polar pattern confirms, once you get more than about 50 degrees off-axis either horizontally or vertically, you are out of the pattern.

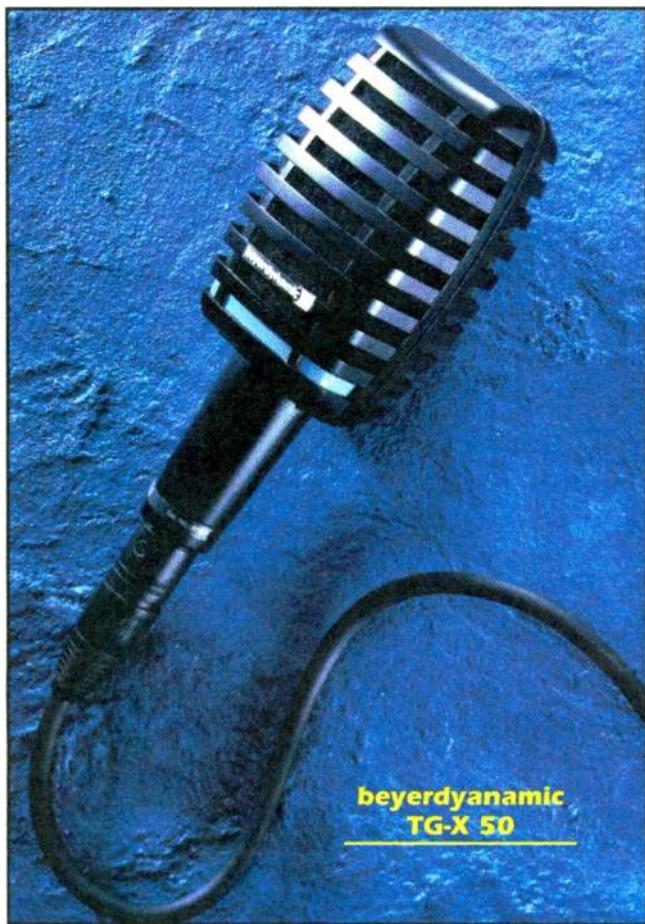
As such, it is much less forgiving than an RE-20 or a 421 on the front side. I would not stick this mic in a talk studio for use by guests who do not know how to work a mic.

Because the TG-X 50s has a hypercardioid pattern, it "hears" slightly more from the rear than cardioid mics like the RE-20 or 421.

Side rejection on the TG-X 50 is particularly good: at 110 degrees at 1 kHz there is 25 dB of rejection. So a pair of TG-X 50s a few feet apart and side by side, or

closer at right angles to each other, would offer only minimal leakage.

What differentiates the TG-X 50 from other proximity-prone mics I have heard is the sudden increase in bass when worked at a distance of two inches or closer. The difference is so great that beyer quotes two



beyerdynamic
TG-X 50

different frequency response specs; 40 Hz - 16 kHz at 1 meter and 15 Hz - 18 kHz for "close miking."

Scoping out

The TG-X 50's graph shows a nice, wide 4 dB bump centered at 90 Hz that spans 40 - 300 Hz. There is also a nice, wide 4-5 dB bump centered at 7 kHz that starts at 2 kHz and does not cross zero until almost 15 kHz.

At a distance of 8 to 9 inches, the frequency response of the TG-X 50 resembles that of a Neumann U-87 on male voice. At a distance of 6 inches the TG-X 50 is actually brighter than the U87. At 3 inches, while the U87 proximity is less pronounced and lower in frequency (40 - 60 Hz), the TG-X 50 starts to show its pronounced proximity effect at about 100 to 200 Hz. At 2 inches or less, the TG-X 50 bottom becomes huge.

Coloration has a lot to do with which mic preamp is being used. The API mic preamps I used made the Sennheiser 421 mic sound a bit too edgy, even in "M" position. The softer shape of the high frequency bump of the TG-X 50 was a better choice. Again, working distance makes a big difference. While the 421 had more proximity effect than the TG-X

50 at distances greater than 3 inches, the TG-X 50 shows much more bass boost at closer working distances.

On other less-colorful preamps like a Mackie 1604, the peakiness of the 421 was less apparent and the top end of the TG-X 50 was more muted. Of course, you have to consider the entire chain. If you are losing edge due to compression and limiting, you may need a mic with more edge to cut through.

Comparing the TG-X 50 to an RE20 in another studio using Symetrix preamps corroborated most of my earlier findings. The TG-X 50 had at least 5 dB higher output than the RE20, and that increased even more when both mics were worked at a distance of less than 3 inches.

At 2 inches or closer, the TG-X 50 had a much bigger bottom, with high frequencies about the same. The RE20's proximity buildup is much more linear than the TG-X 50's. At 12 inches, the TG-X 50 was noticeably brighter than the RE20.

The optimum working distance for the average male baritone is about 3 inches, with excursions to 2 inches for "intimacy." I do not advise working this mic any closer than 2 inches, unless the voice or instrument is very thin. Working "lips on" resulted in an unnatural amount of boominess.

I did not care for the simple mic clip because, especially in broadcast, any more than moderate handling might snap the mic loose from the clip. A cable tie would probably prevent this, but beyer also makes a suspension mount, the EA 1925, \$49.

The things I like most about the TG-X 50 are its sound and shape. It is a big hunk of metal that delivers a full rich tone. I expect to see this mic being looked at very closely for air studio use.

□ □ □

Ty Ford's new e-mail address is tford@jagunet.com. Download his voice demo from the jagunet.com FTP site. Go through the Pub and Users directories to tford and snag TyFord.AIFF. His "Advanced Audio Production Techniques" can be found at <http://www.bh.com/bh/fp/24080082.htm>

SHORT TAKE

Another Cool Henry Box

Studios with very simple production consoles have difficulty using effects processors as these boards lack an Auxiliary or Effects Send to feed an external unit.

Henry Engineering has come up with yet another "Henry Box" that can address this issue: the StereoMixer. This is an eight-channel (four stereo-channel) balanced line-level mixer in a typically small Henry enclosure.

As a utility mixer, this device is ideal for "tacking on" a few extra line-level inputs to a console, but is especially useful for the frustrated production director having to wrestle with an old "Prog/Aud" rotary fader console without an effects bus.

If you were to parallel all appropriate sources heading into the console (mic preamps, turntables, et al) across the inputs of the Henry StereoMixer, you would have an external Aux Send. Direct the mixer's output to the effects box and run the processor's output to an unused pot on the console, now set up as an Aux Return.

To process an announcer with reverb or a CD with flanging, set the console fader for a good dry level then set the

corresponding level knobs on the StereoMixer to send mic signal to the processor. The Return pot on the console controls the amount of "wet" signal to be mixed into the track.

Turntable preamps, CD machines and reels can all be fed into the StereoMixer, each with its own set of stereo input level controls. A feature called "buss in"

allows several StereoMixers to be linked together. While not very elegant-looking — sitting on top of a console with wires coming out all over — it gets the job done quickly and inexpensively; the very philosophy of the



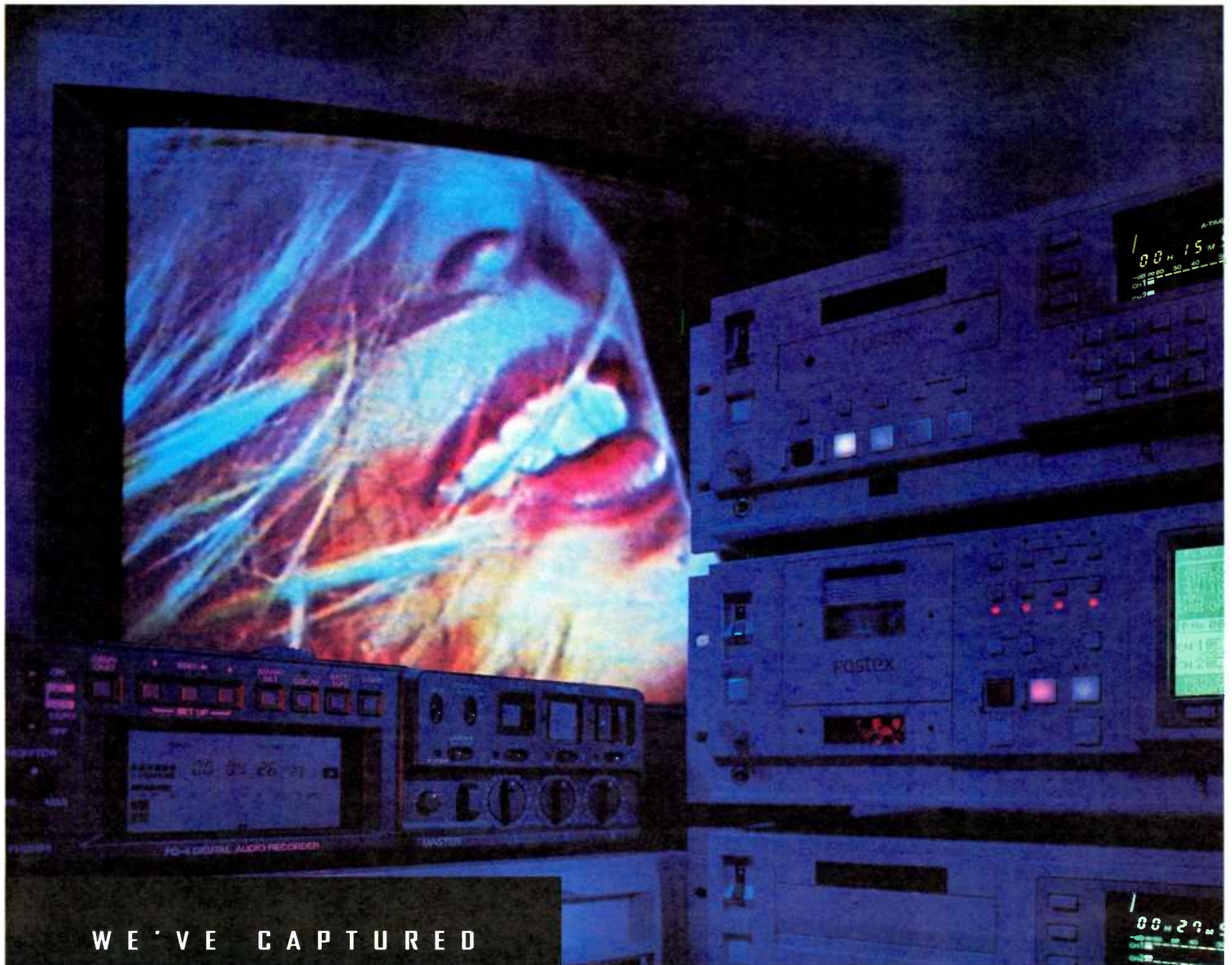
Henry Engineering's StereoMixer

Henry product line.

An Aux Send box is only one use for this versatile new micro-mixer. Clever production people are bound to think of more.

The Henry Engineering StereoMixer specs out very well. Input levels can be from -10 to +4 dBm, response is DC to 20 kHz and distortion is less than .01 percent IM/THD. The entire box is slightly bigger than a digital clock-radio and has a fused internal power supply. Op-amps are LF363Ns and 5532s.

For information on the StereoMixer, contact Henry Engineering at 818-355-0077 or circle Reader Service 13.



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PRODUCT EVALUATION

Clark Sets the Clock with GPS-100

Use Satellite Technology to Synchronize Station Clocks, Computers, Servers and Automation Systems

by Rich Rarey

WASHINGTON Quick, what time is it? At W. Clark and Associates, Ltd., timing is everything. The company has introduced the modestly priced GPS-100 receiver that allows one to receive the extremely accurate timing signals from atomic clocks aboard Global Positioning System (GPS) satellites.

The GPS-100 emits SMPTE time code that is accurate to within 10 microseconds. There are many uses for such accurate timing signals such as radio station automation, radio station time checks, television station network synchronization, field recording using multiple DAT sources, and accurate setting of computer network server clock time. Commercial banks have found the GPS-100 useful for super-accurate time-stamping purposes.

Priced at \$795, the basic GPS-100 package includes power supply and passive GPS antenna. For \$995, W. Clark and Associates offers the GPS-100, a TCR-200 SMPTE reader card for DOS-based platforms and driver software that automatically syncs the computer's clock every 30 seconds.

Included is the TCRsync NLM software that locks a Novell Server clock to timecode. This package gives any radio or TV station the building blocks for detecting and using the GPS precision. For longer coax runs from the antenna, several preamplified antenna packages are available that include a pipe-mount antenna that has 26 dB gain, and 50 or 100 feet of .25-inch coax.

The package I tested included the GPS-100, the TCR-200 PC card, an optional active 26 dB gain antenna (this model was magnetic mount), 50 feet of .25-inch coax and the software. I opened my PC, inserted the TCR-200 card into an empty slot, plugged the GPS-100 cable into the card's rear connector, then plugged the pre-amplified antenna into the GPS-100.

Set the clock

After plugging the power supply into the GPS-100, I walked the antenna over to a second-floor window, not really expecting any results. After all, GPS reception depends on receiving three of 18 satellites in low Earth orbit — in this case, capturing the signal with an antenna the size of a computer mouse. Imagine my surprise when the GPS-100 locked on to the satellites and began sending Universal Coordinated Time (UTC) timecode to my computer!

For a permanent installation, W. Clark and Associates president William Clark recommends mounting the amplified antenna externally using the antenna's pipe mounting with an unobstructed sky view. The GPS-100 takes a few minutes on first power-up to get a fix of several

GPS satellites. After that, the "fix" information is internally stored and backed up by a lithium battery. Even if the battery fails, the GPS-100 will work; it will just have to reestablish the fix.

Other internal jumpers select among 25 or 30 frames per second, non-drop; and select 0, 5 or 12 VDC for the antenna's preamplifier. Once installed, the GPS-100 needs no other maintenance.

Conversion

If plain UTC SMPTE is not suitable for your operation, W. Clark and Associates makes the TCI-232 time code interface that has a variety of uses for the radio and TV station. The TCI-232 interface accepts timecode from the GPS-100, and can regenerate the timecode for your local time zone. As is, the GPS-100 emits UTC time as sent from the GPS satellites.

The TCI-232 has a number of other useful outputs. For example, the time information is output using RS-232 or RS-422 and a TTL pulse or a dry contact closure can be set to fire once a second, minute, hour or day. Heathkit



W. Clark and Associates' GPS-100

WWV clock emulation — popular with GrassValley video switchers — is also available. Although I did not use a TCI-232 for this evaluation, it certainly will simplify GPS-100 interface tasks.

I loaded the software included in the GPS package into my PC to examine how it worked.

The TCR-200 card in the PC receives SMPTE from the GPS-100, and can be installed so that it "interrupts" the computer at the beginning of end of each SMPTE frame. The Terminate and Stay Resident (TSR) application loaded from your computer's autoexec.bat file intercepts the interrupts from the TCR-200 card. Every 30 seconds it forces the PC clock to conform with the GPS-100 time, which can be offset for your local time zone.

Another DOS application included with the package is a simple display application that shows the hours, minutes, seconds, frames and date. Complete, well-written assembly language source code of these applications is included, along with C language source code used in some of the applications.

Using the source code provided,

Microsoft Macro Assembler, Visual Basic and some free time, I converted the low level TCR-200 card software into a Windows DLL, using Visual Basic to do the display chores.

A caution if you begin to design your own time-code reader: Microsoft Windows and Visual Basic have a response "latency" that makes display of frames not meaningful. It is still okay for showing hours, minutes and seconds.

Although the GPS-100 does all the hard work, the basic principles of GPS reception and transmission are quite interesting. The U.S. Defense Department originally designed the

GPS satellite system for use by American and allied military forces to accurately locate themselves anywhere in the world.

GPS works because GPS satellites orbit the Earth in extremely predictable paths. Coded signals broadcast from the satellites enable the receiver to get an approximate "range" of distance from a satellite. When three satellites' ranges are determined, three "spheres of location" intersect, where you and your receiver are. Atomic clocks on each satellite provide the time basis to transmit the coded signals at known times.

An excellent article detailing the history of GPS and how it works was written by Dr. Thomas Herring and published in the February 1996 Scientific American. Detailed on-line descriptions of GPS systems can be seen at <http://wwwhost.cc.utexas.edu/ftp/pub/grg/gcraft/notes/gps/gps.html>

continued on page 28 ▶

Imagine my surprise when the GPS-100 locked on to the satellites.

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PRODUCT GUIDE

Companies with new product announcements for Studio Sessions Product Guide should send them to:
Radio World, c/o Studio Sessions Editor, 5827 Columbia Pike, 3rd floor, Falls Church, Va. 22041

Fearn Tube Preamp

D.W. Fearn has introduced the VT-2 two-channel vacuum tube preamplifier for mic or line levels.

The 3 RU, 18-pound unit has all-tube design, custom Jensen input and output transformers, point-to-point wiring and high quality parts used throughout.

Designed primarily as a mic preamp, the VT-2 can accommodate line level signals



with the optional LP-1 line pad accessory. The VT-2 can then be used for overall warming of the entire stereo mix.

Suggested price of the D.W. Fearn VT-2 is \$3,500.

For more information, contact D.W. Fearn at 610-793-2526 or circle Reader Service 16.

Music Bakery CDs

The Music Bakery of Dallas announced four new music categories in its buyout music library.

Bold Orchestral Scores are movie-like and corporate/industrial themes. Positive

Motivational Themes are high-profile contemporary tracks. Warm Romantic Cuts are emotional, nostalgic tracks. Unique Contemporary Grooves are described as "an unusual mixture of ultra-contemporary styles."

The Music Bakery library is updated bimonthly and feature studio musicians performing on actual acoustic instruments. A demo CD is available and free music excerpts are accessible online at The Music Bakery's website (<http://www.musicbakery.com>).

For more information, contact The Music Bakery at 615-370-4256 or circle Reader Service 20.

SoundField Microphone

QMI of Holliston, Mass., will begin shipping the SoundField SPS 422 Studio System in May.

The microphone features the tetrahedral capsule configuration featured in the earlier SoundField Mk. V system, providing unrivaled spatial resolution and versatile pattern control. The SPS 422's matrixing circuitry allows the microphone to function as a single mono mic or a virtual stereo array. The



degree of stereo spread can be dialed in by two controls on the front panel. The microphone can be set to any polar pattern, including cardioid, omni or figure eight.

For more information, contact QMI at 508-429-6881 or circle Reader Service 21.

Marantz CD Recorder

Superscope Technologies is introducing the Marantz Professional CDR620 Compact Disc Recorder.

The CDR620 includes a sample rate converter, digital audio delay and can perform automatic track incrementing.

Inputs to the CDR620 include analog and AES/EBU or IEC digital. A cascade feature allows simultaneous parallel operation of multiple machines. A nine-pin parallel interface allows external automation.

The CDR620 is compatible with Red Book and Orange book specifications and has a suggested price of \$5,000.

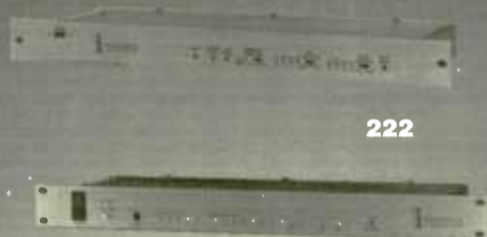
For more information, contact Superscope Technologies at 708-820-4800 or circle Reader Service 23.

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510 RDS/RBDS Decoder-Reader

Connects to any Mod-Monitor to give accurate subcarrier injection measurements, and to decode and read all the common RDS/RBDS data groups. Features an 80-character LCD display, simple, menu-driven operation, and an auxiliary RS-232 output port for data archiving.

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Call today for complete technical information on these items, plus our line of FM air-chain products.

Keeping Time with Clark GPS-100

► continued from page 27

Written by Peter H. Dana, this browsable site is packed with GPS knowledge.

Overall, I liked the W. Clark and Associates GPS-100 package. It provided the components to acquire very accurate time signals in a familiar SMPTE time-code format. Those serious about time keeping and tired of dialing the U.S. Naval Observatory time (or trying to reliably receive WWV) will appreciate the GPS-100 ease of use and sensitivity.

When coupled to W. Clark and Associates TCI-232 interface box, you have built the foundation upon which you can add whatever time display (within reason) you desire.

□ □ □

For information, contact W. Clark and Associates, Ltd., 4 Rye Court, Macomb, Ill., 61455. Telephone 309-837-2244 or fax 309-833-5175.

Rich Rarey is the technical director for National Public Radio's "All Things Considered" and the author of the Public Domain series seen here in Studio Sessions.

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Circle (15) On Reader Service Card

World Radio History

PRODUCT EVALUATION

Electro-Voice 'Long Neck' for News

by Lisa Romanello

DANBURY, Conn. The single most important element of a successful news-intensive radio station is the quality of the sound. If someone is going to listen to a local newscast, they want to hear it all: What their local elected official said before last night's vote, not just what the end result was.

When clean sound comes back in from the field, post-producing an effective piece for air becomes easier.

For that reason, I consider a durable and precise handheld mic to be the most important tool in the newsgag. I certainly would not trade away my Marantz or my reporters, but you get the point.

Gimme a longneck

Studio mics are fragile and best left behind while "guerilla" mics that can take it are brought along for the ride. Like many other news operations, we carry the ubiquitous Electro-Voice 635A. RW offered us E-V's new 635L dynamic omnidirectional mic to test, and reporter Scott Rutherford and I jumped on it like Perot into a presidential race.

The 635L is the long-neck cousin of the bulletproof 635A mic. The 635A has a long history of being shot at, run over, thrown around in tool boxes and was once dropped from a crane just to record the impact. It has always survived and come back for more. The 635L is similarly designed.

The first thing you notice about the 635L is the length; a good 3 inches longer than the 635A. From a newsgathering standpoint, this is important. Crowded podiums are common, especially during an election year. For sound quality and station visibility, length can propel your coverage to new heights.

Show me a general manager who has

never wailed on a news director for seeing another station's mic flag — and not theirs — in a TV shot. Mic flags give your station free TV and newspaper publicity and the 635L provides ample room to slide one on without having to grip the mic precariously at the XLR connector.

One of Rutherford's observations about the 635L is, while the length is an asset, it takes a little getting used to in handheld interview situations.

If you are used to holding stock 635s, you might give the mayor an inadvertent whack in the nose with this mic. Electro-Voice packed the 635L with a mic clip for podium or stand use.

Sound

As shown in the chart, the 635L has a frequency response of 80 Hz to 13 kHz, which is more than adequate for good quality broadcast audio. A nice lift in the 5-10 kHz range adds clarity to voice. The mic's steel case construction comes in semigloss "camera" black or the familiar classic gray finish which E-V oddly refers to as "fawn beige."

In the field, Rutherford noticed the 635L had good tone and sensitivity with a clear treble, but with enough lows and midrange to avoid a tinny sound.

He also noted the mic's ability to minimize background; surprising behavior from an omni mic.

In news settings where there was a lot of background noise, or events where lots of listeners showed up, the 635L

did a good job of picking out the sound Rutherford wanted to capture. An especially welcome quality of this mic.

Of course, the sound is best when positioning the mic head-on, even at a moderate distance. Speakers at a podium hardly ever stand still, and moving

While this mic is longer than its predecessor, it is only 8.5 ounces without the cord or connector. It certainly does not feel any heavier than the mics we are now using.

Fortunately, it is every bit as durable. A news-intensive radio station reporter leads a busy life and does not always have time to gingerly pack and unpack equipment. After three weeks in Rutherford's bag of tricks, the 635L still looks out-of-the-box fresh.

Conclusions

I will stop far short of calling the 635L revolutionary. It is not like changing from cassettes to MiniDiscs, but it is a definite improvement in the 635 microphone. Amazing how simply adding extra length to the barrel made such a difference.

News departments always need microphones and because an indestructible mic is a good investment in equipment, it only makes sense to consider this product.

If you plan to hit up your general manager for some

new field microphones, push for the Electro-Voice 635L.

□ □ □

For more information, contact Harris at 800-622-0022 or circle Reader Service 38.

Lisa Romanello is news director for WLAD(AM)-WDAQ-FM Danbury, Conn. Reach her at 203-744-4800.



Electro-Voice 635L Dynamic Mic

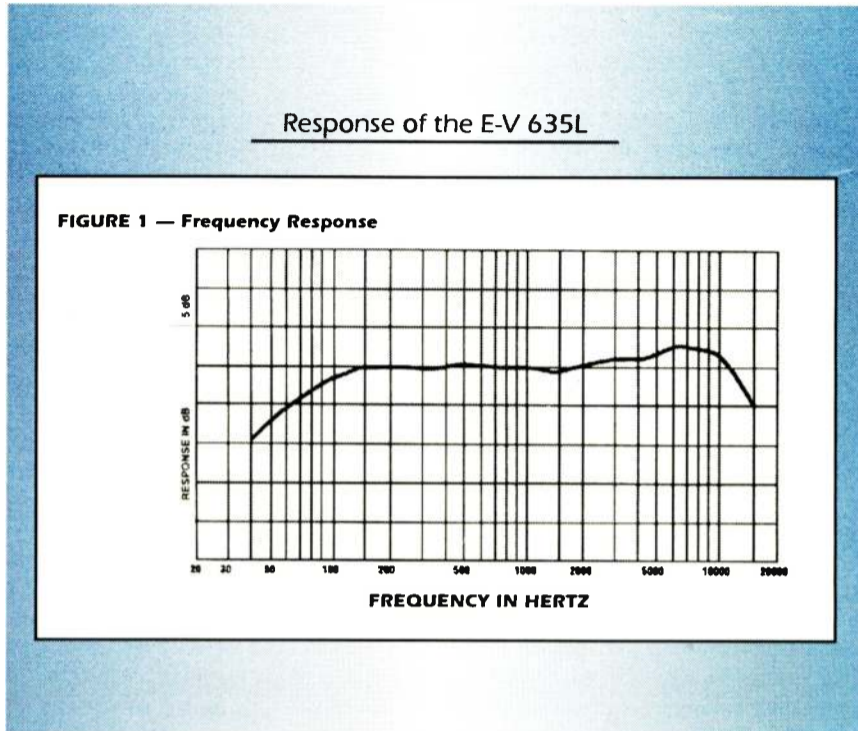


FIGURE 1 — Frequency Response

even a small distance off-axis causes a drop in level. Omni mics are more forgiving than cardioids, but it still happens.

Rutherford found the 635L's mechanical isolation to be a big plus. Mics pick up lots of noise from being rolled around in hands, fingers tapping on desk stands and rustling caused by cable movement. The 635L's internal shock absorber kept these noises tame.

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PRODUCT EVALUATION

World Cafe Checks Out Tascam DA-20

by Tom Vernon

PHILADELPHIA I have always had good luck with Tascam products. They consistently deliver a lot of bang for the buck, and their service manuals are second to none.

Still, I wondered how a semi-pro mastering DAT machine with a street price of around \$830 would hold up in a demanding radio station environment. As it turned out, I had little to worry about.

Our application for the Tascam DA-20 is recording live bands for the "World Cafe," a nationally syndicated program that showcases singer-songwriters. This is a demanding environment, where equipment glitches cannot be tolerated.

Look it over

The DA-20 comes with rack mounts and takes up 125mm of space. It has unbalanced analog inputs and outputs, as well as 75-ohm digital ins and outs. All are via RCA connectors.

A high-speed Search function reads the tune numbers and start positions off the subcode to find what you are looking for considerably faster than conventional searching. Character data of up to 60 characters may be recorded and displayed for each song.

An odd feature of this deck is the bottom panel, which looks like a large waffle iron. Tascam says this is part of the non-vibration, non-resonance design which prevents vibration-induced sound degradation. The transport has a unique cassette stabilizer, which also facilitates this design philosophy.

Our bench tests confirmed Tascam's published specs for this machine. Response was flat from 20 to 20 kHz within .25 dB. Harmonic distortion was unmeasurable at 1 kHz. Wow and flutter were also unmeasurable.

I wanted to check out the service manual for the DA-20, but was unable to obtain a copy. Tascam's manuals are usually first-rate, and if the documentation for this machine follows suit, getting info for repairs

and tweaking should not be a problem. The operating instructions which came with the unit are concise and well-written.

Designed for service

Servicing is also simplified by the clean interior layout of the DA-20. All of the circuitry is contained on four PC boards. There is ample space between the boards, and all wiring is interfaced via connectors. The transport is easily accessible for cleaning the heads, capstan, and pinch roller. Just remove a few screws and lift off the cover.

All of this is in stark contrast to many consumer-grade decks I have seen. These sometimes find their way into a pro environments, and can be servicing nightmares.

All of this under-the-cover mechanical elegance was probably lost on the producers of the "World Cafe." The thing that they did notice however was the outstanding sound quality of the DA-20.

Recording live music is the most critical application of DAT technology, and the difference between the Tascam and our older machines was quite noticeable. High marks were given for the clarity of high end

response, openness, and lack of "digital sound."

This difference may be due to the high accuracy 1-bit A/D, D/A converter, a quantum leap over older sampling circuitry.

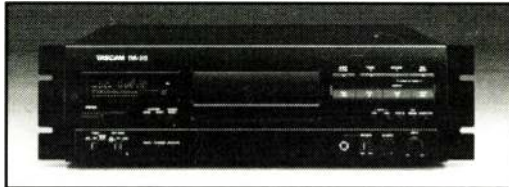
The other thing "World Cafe's" producers appreciated was the front-panel switch to select sampling rates. You may choose between 32, 44.1, and 48 kHz. In our application, this ability to switch eliminated a time-consuming intermediate step needed to dub CDs onto the DAW.

Negative comments about this machine were few: the Skip buttons seem to be too small for their importance. Larger buttons would be an improvement. An auto-fade function is an important function that is missing from the DA-20.

The catch

Of course, you can't have everything for \$830. So what was left out? This machine has unbalanced ins and outs. You will have to buy an ISO to XLR interface box to make it work in a balanced environment, and that can add to the purchase cost.

The DA-20 comes with a wireless IR remote control. This means there are no pro-



Tascam DA-20 DAT Recorder

visions for a hardwired remote control to trip the deck by console logic. If you get the service manual, designing one might make an interesting hacker project.

Even if you could build a remote control, the start time might not be quick enough for on-air applications. This might not be the best machine for an application where tight cueing is necessary. My hunch is that Tascam's goal was to create a reliable, no-frills mastering machine with good sound. I am happy to report it succeeded.

Special thanks to Chris Williams and Joe Taylor of the "World Cafe" for sharing their observations on the DA-20 with me.

□ □ □

Tom Vernon divides his time between consulting and completion of a Ph.D. He also works for the award-winning WXPB in Philadelphia. You can reach Tom via email at TLVernon@AOL.com or by calling 717-367-5595.

Product Capsule: Tascam DA-20 DAT Recorder**Thumbs Up**

- ✓ clean interior layout
- ✓ excellent sonics
- ✓ switchable sampling rate

**Thumbs Down**

- ✓ unbalanced in/out
- ✓ no remote connection
- ✓ no autofade

For more information, contact Tascam at 213-726-0303; or circle **Reader Service 46**.

PRODUCT GUIDE

Companies with new product announcements for Studio Sessions Product Guide should send them to Radio World, c/o Studio Sessions Editor, 5827 Columbia Pike, 3rd floor, Falls Church, Va. 22041

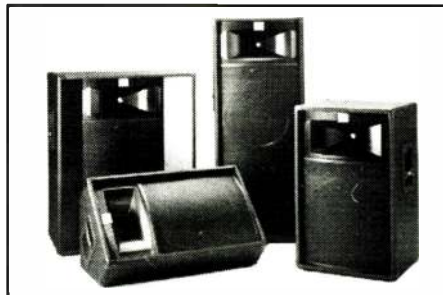
New JBL Speakers

JBL Professional has introduced the new JBL TR series entry-level sound reinforcement loudspeakers.

While designed for concert and musical performance, radio stations will find these

products useful at live remote broadcasts and for large-room monitoring.

The four models feature unprecedented



sound quality and power handling at this price point. Large cabinet volumes coupled with a sharp new innovative design brings JBL performance to a new market segment.

The series also features JBL SonicGuard circuitry which allows sound to remain clear and powerful while protecting the speaker from damage caused by overpowering.

For more information, contact JBL Professional at 818-894-8850 or circle **Reader Service 41**.

Macromedia PC Editor

Macromedia of San Francisco announced the SoundEdit 16 plus DECK II software recording studio.

The package combines SoundEdit 16 version 2 and DECK II version 2.5 software for pro-quality multitrack music and sound production. SoundEdit records 16-bit sound directly to the hard disk and allows editing before outputting a multitrack product in any delivery format. It runs natively on Mac and PowerMac computers.

DECK II version 2.5 allows arrangement and output of up to 32 simultaneous tracks.

The new version also includes real-time in-line non-destructive effects and support for 500 and 5000-series PowerBooks.

Price of SoundEdit 16 plus DECK II for the Mac and PowerMac is \$389. Previous users can upgrade for \$199.

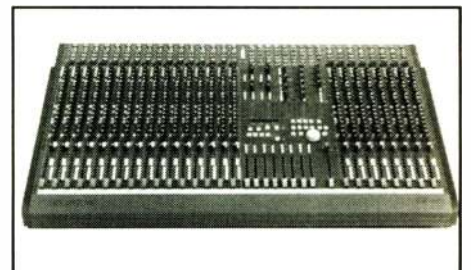
For more information, contact Macromedia at 415-252-2118 or circle **Reader Service 44**.

Soundcraft Ghost Console

Soundcraft recently debuted the Ghost recording console.

The Ghost was designed to work with digital multitrack tape recorders and video recorders via MIDI machine control and Sony 9-pin standard connector.

Performance features include 10 auxiliary send busses, phantom power and phase switch on every input, MIDI controlled snapshot mute recall and four faders dedicated as MIDI continuous controllers. Four stereo returns allow for 56 inputs at mix-down.



Pricing for the Soundcraft Ghost begins at \$4,000 and a moving-fader version is due out this summer.

For more information, contact Soundcraft at 818-893-4351 or circle **Reader Service 39**.



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Circle (22) On Reader Service Card

World Radio History

PRODUCT EVALUATION

DigiTech: The Itty-bitty Button Blues

by Ed LaComb

SYRACUSE, N.Y. I love toys. Sure, maybe this is a guy thing, but when someone says, "Here, take this DigiTech TSR-24S processor and play with it for a month," well ... I just can't help but love it.

The assignment was simple. Check out this digital effects processor box, let the jocks play with it, and then report back on what everyone thought about it. That is what we did, and here are my opinions

along with a few from some of the air talent here.

Nice front

Aesthetically, the TSR-24S is a sleek-looking, one-RU device. The display is fairly easy to read and the program numbers are clear. Program selection is made from your choice of a rotating data entry knob or a series of push buttons.

We found the buttons to be a bit small for the average jock's less-than-nimble fingers, but to

squeeze everything this unit offers into a single rack space is no small feat. Did I mention that the power supply is also internal? No wall-wart.



DigiTech TSR-24S

Life is good.

Technically, the TSR-24S is a serious producer's dream. It is this very quality that perhaps

also makes it a jock's nightmare. The amount of flexibility afforded to people like myself who enjoy tweaking a sound until it sounds just right is great. Most jocks just want to dial up a program and go, which the TSR-24S can also do without any trouble. But I just can't help it, doggone it; all those buttons invite tweaking.

Sometimes a jock can get into some advanced creative

tweakery on the TSR-24S, only to get lost in the menu structure. This is understandable; unless you have seen the TSR-24S's road map, it can be confusing at first. Then I get the inevitable "help" cry from the studio.

I like the feature where you can put a stereo (or mono) signal in and get four out. This allows you to set up the TSR-24S as two separate processors with two discrete stereo outs.

Dialing in

The programming of the TSR-24S is a bit complicated at first. You have a series of algorithms, programs and parameters that must be chained together in the order you want, and then fed into a Mixer program that determines which outputs signals get routed to. Get the hang of it only once and then it is pretty easy to program.

You have a huge library of reverbs, flanges, sampling, EQ, delays and other effects to choose from when creat-

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 countdowns the last 15 seconds of each event.

12:15:38P *Air* 3:27 KTFM Contest Winner Promo Q: Super Stars and Super Cars :01/0:23/C PRO DA0105 12:15:47 Bob Stevens/Gail Lightfoot

Start F2 San Antonio Traffic Report Q: & the Outer Belt :00/0:30/C TRF DA2608 12:18:40

Start F3 World's Easiest Contest Q: I Know the Answer! :00/0:18/C PRO TO2214 12:22:42

Start F4 Burger King \$2 Breakfast RT Q: I Love This Place! :00/1:00/C CM DA1103 12:23:43

Start F5 K-Mart Photo Finishing SB Q: Across from Eastland. :01/1:00/C COM DA4310 12:24:01

Start F6 Jingle Q: Q-102. :00/0:06/C JIN DA1037 12:25:01

Hot keys: Delete, Jingles & Spots, Music Library, Auto, Jingles, Applause, Sweepers, Bumpers, Weather, News Open, News Close, Rimshots, Morning Jin., Oldies Jingle, Legal ID, Animal Noises, Top 8 at 8, Crowd Boos, Happy B'day, More Events, Confst Theme, Crowd Cheer, Weather Service, Options.

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.

Grid of hot keys labeled A-Z: A: Air, B: Bumpers, C: Crowd Boos, D: Happy B'day, E: Legal ID, F: Jingles, G: News Close, H: News Open, I: Oldies Jingle, J: Rimshots, K: Sweepers, L: Animal Noises, M: Top 8 at 8, N: Crowd Boos, O: Happy B'day, P: Confst Theme, Q: Crowd Cheer, R: Weather Service, S: More Events, T: Options, U: Jingles, V: Applause, W: Sweepers, X: Bumpers, Y: Weather, Z: News Open.

12:21:38A *Air* 0:11 Doc Vertical Promo Q: Cheers! :00:22/C PRO DA0104 12:21:47 Thursday Morning Only

Start F2 Earl Pitts White Q: Pitts off :00:1:03/F BIT DA2908 12:24:40

Z-103 Congratulates the latest Winner in our "Win It Before You Can Buy It" Contest: Dave Scott of Dallas has won the CD of his choice from Blockbuster Music. Stand by... Your chance to Win is coming up in just minutes, here on

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Current File: SC736

00:00:45

Buttons: Play, Stop, Revert, Enter, Zoom, Copy, Scrub, F.Fwd, Rewind, Mix 2, Solo, F.Fwd

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

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

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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.

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

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All those buttons just invite tweaking.

ing your programs. The unit has quite a few factory programs that you can use right out of the box, with only about 30 percent of them being radio production-friendly.

A word about sound: the TSR-24S is incredibly clean. You would be hard-pressed to find a bad-sounding digital box these days. If you are using MIDI control anywhere in the production room, the TSR-24S reads Program and Parameter changes.

You can program a sequencer to move the TSR-24S from reverb into flanging and beyond with MIDI commands.

Troop report

I asked a couple of my morning show guys to put the TSR-24S through its paces. What I got back was going to be predictable:

"It sounds nice, but takes too long to get what I want out of it," and "I never really had the time to get into it completely... lots of great reverbs though."

I also called a buddy of mine who has been using the TSR-24S for radio production for a couple of years now. His take was pretty much the same: "Nice, but too complicated when you're under deadline pressure to produce." He has had

continued on page 38

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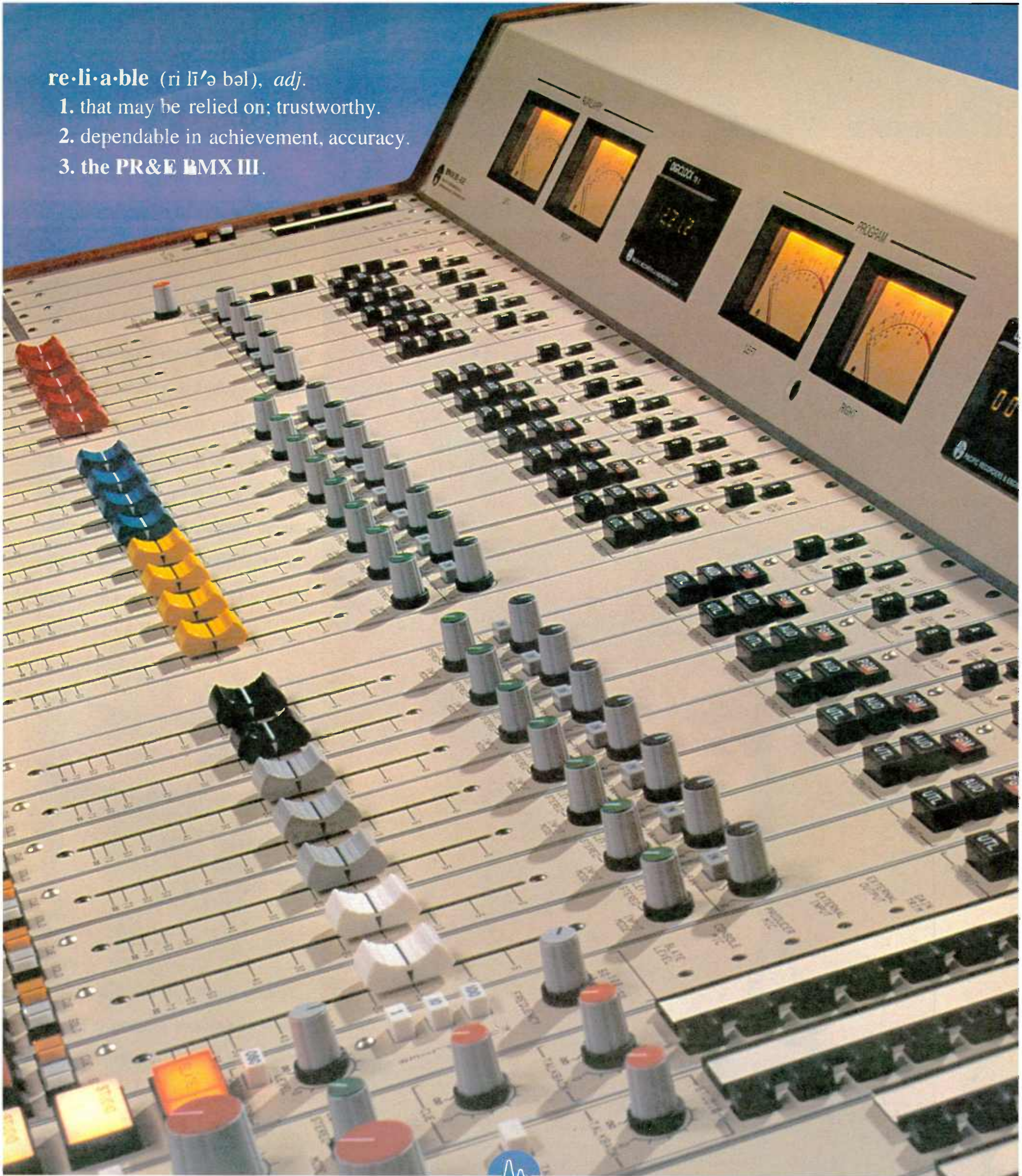
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re·li·a·ble (ri lī'ə bəl), *adj.*

1. that may be relied on; trustworthy.
2. dependable in achievement, accuracy.
3. the PR&E BMX III.



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DIGITAL DOMAIN

SES Software Saves Voice Recordings

by Mel Lambert

LOS ANGELES I make few excuses for spotlighting another product from a company I mentioned recently in these pages. You may recall my waxing lyrical in last September's *Digital Domain* about the new AD-1 Pro Audio Analyzer from Intelligent Devices (ID). This was a Mac-based program providing full-color VU/PPM meters, phase and waveform displays plus third-octave spectrum analysis.

At the time I mentioned that, ID was in the midst of developing additional applications for the Macintosh. This month I would like to tell you about its latest offering; the ID Speech Enhancement System (SES). It is one that I am convinced will truly cause a dramatic impact within the radio industry.

Cleanup tools

What Intelligent Devices has developed, in essence, is a powerful set of voice extraction and enhancement tools which improve the overall intelligibility of a live broadcast or recording in real time.

And all of this functionality did not simply spring into being from within a vacuum. For several years now, the firm's main hardware and software designers have been perfecting a series of customized systems from the law-enforcement and intelligence industries — most of which I cannot tell you about, for obvious reasons.

One function that attracted particular attention was ID's ability to perfect a proprietary algorithm that could optimize intelligibility. In essence, you could feed it a voice recording that was barely recognizable as human speech, and back would come a result that was fully understandable.

You're on, caller

A remarkable development, you might hazard, but what has all of this got to do with radio?

Ever opened a fader on a phone call and

wished that the line could be dynamically equalized to bring out midrange articulation? Or had a caller use a mobile cellular phone whose signal strength wandered all over the map, with obvious sonic results? How about being presented with a voice recording that was recorded so off-axis you can barely make out what the talent is saying? All of these examples could benefit from processing through ID's new SES.

The program is designed to run on any standard Apple 68040- or PowerPC-based Macintosh that is capable of accepting a

repair damage and to improve band-limited feeds typical of remote-site satellite downlinks and remote telephone reporting as well as a new curve-fitting broad band noise-reduction module.

What's in there?

Currently available SES modules include an Enhanced Band Limiter Module, a Tone Removal Module and an Adaptive Extraction Module capable of recovering speech from a complex background or foreground interference spectrum.

There is also a Harmonic MultiNotch Module which offers from one to 99 individually controlled, zero-phase shift notches;

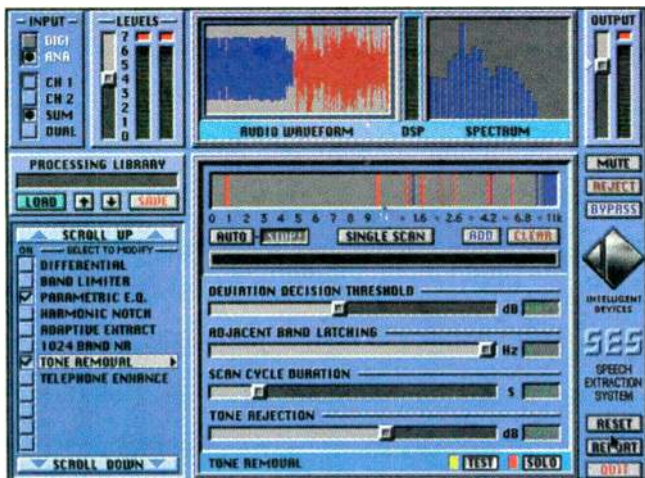
each one can be as narrow as 22 Hz with up to 40 additional, locked odd/even harmonics for each notch. A Parametric EQ Module is also included, with up to 99 overlapping bands offering 12 dB boost and 24 dB cut.

Optional modules comprise a 1,024-band Noise Reduction (NR) Module, with two customizable curve-fitting kits and one self-learning NR function. The Telephone Enhance Module is especially complex, utilizing a 300 Hz to 3 kHz probable-best-case telephone bandwidth reference model to synthesize both curve-fitted upper harmonics and missing low-frequency fundamentals.

Get out the checkbook

The only potential fly in the ointment for any broadcaster looking to equip themselves with a full-blown system is its asking price:

continued on page 38 ▶



Intelligent Device's SES

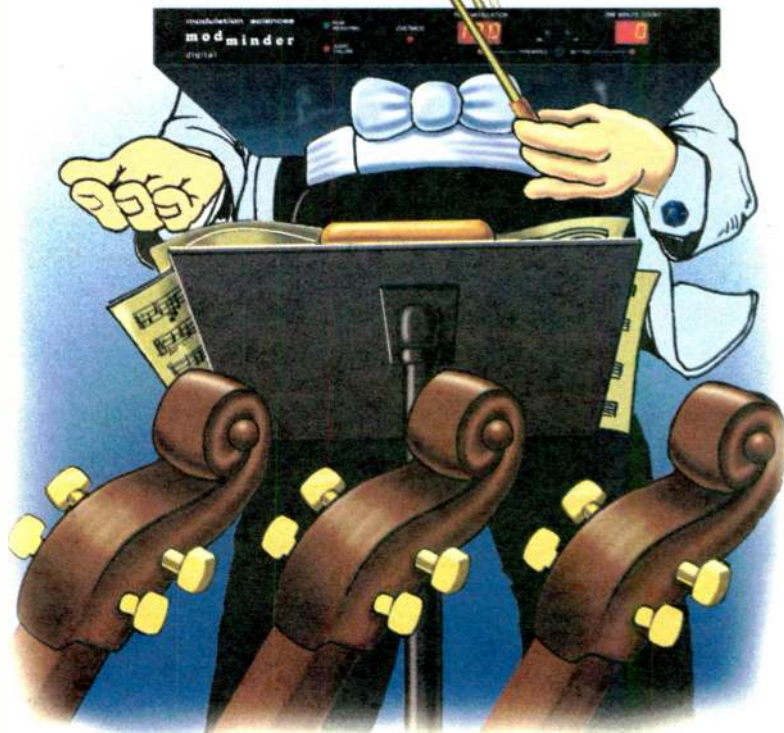
Digidesign Audio Media II card. SES comprises a main "shell" of optimized algorithms plus various application-specific processing modules. An additional Audio Media II card can be added for particularly calculation-intensive operations. Inputs can be either analog or a digital SPDIF format at a sampling rate of 44.1 kHz.

Intelligent engines

"Utilizing artificial intelligence recognition engines that operate entirely within the frequency domain," explains Stephen St. Croix, Intelligent Devices' president and primary designer, "SES can dynamically learn and adapt to the material being processed, and then modify its algorithms and parameters in real time to provide what we consider to be startling recovery and reconstruction performance."

St. Croix goes on to say the SES's voice-enhancement modules were designed to

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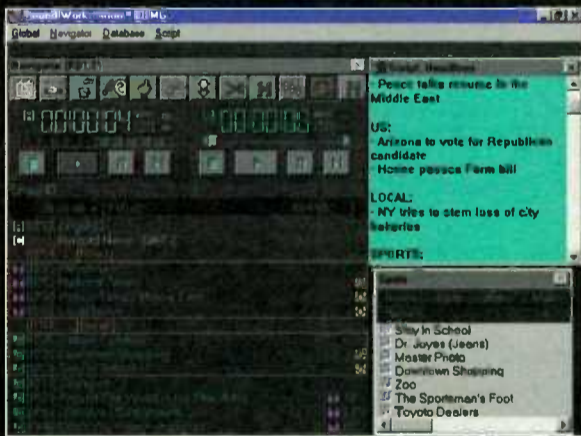


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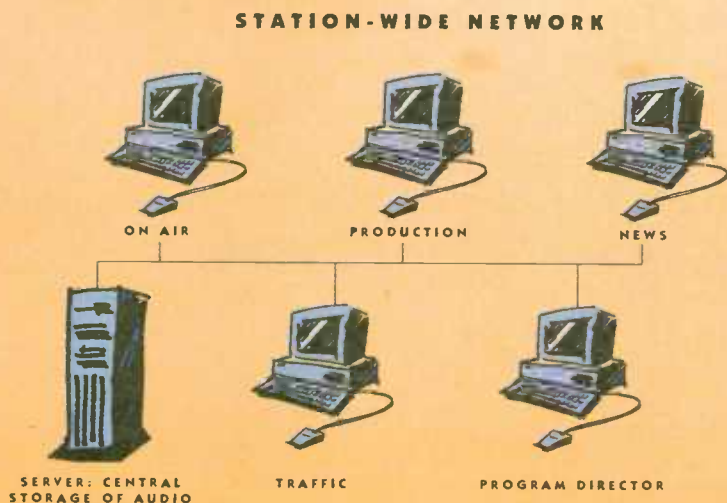
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Dalet
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Systems



DigiTech TSR-24 Effects

► continued from page 32

a TSR-24S for two years and has yet to find the time to get completely into it.

See a common thread here? Time is the radio production person's worst enemy: there is just never enough of it. If you are working with a piece of equipment that costs you time, chances are you will not be using it too often.

I would be curious to get some opinions from others who are also using the TSR-24S. Would they buy it again? Would they recommend it to their friends in radio, in production houses, on the road? Where does it work best?

To sum it all up, I would say that the TSR-24S delivers on price, quality and features. I found it falls short on the user-friendly scale, specifically where

The TSR-24S delivers on price, quality and features.

typical radio station production people are involved. Serious producers who enjoy tweaking and computer programming will definitely find it to be more useful.

If DigiTech were to ask me how to make it more jock-friendly for radio

production, I would offer the following: Build a version that fills two rack spaces.

Now, with all that space, make the buttons larger and easier to hit. Drop in a graphical interface of the mixer outputs. Build in several more radio-usable preset programs and an easier way to tie all the algorithms, modules and programs together.

All this would make this box a winner. Especially for toy-lovers like myself.

□ □ □

Ed LaComb is the director of NewCity Production Services, WYYY-FM, WSYR(AM) and WBBS-FM in Syracuse, N.Y. He invites your comments and questions at 315-472-9797 or edlacomb@aol.com

SES Pricey, Powerful

► continued from page 35

\$17,500 plus the Mac and AudioMedia card. Optional Noise Reduction and Telephone Speech Enhancement modules cost \$3,500 each. All of which means that you would need to shell out close to \$30,000 for a fully-equipped system.

But it is not all bad news. Following discussions with several of the nation's leading networks, Intelligent Devices had developed a system configuration that is tailored more directly at the day-to-day requirements of radio stations, and at a price that won't break the bank. For \$6,500, ID plans to offer an application-specific version of SES.

This version will provide all the processing necessary to clean up noisy and distorted telephone conversations or annoying side-tone whistles and birdies from satellite feeds, as well as time-dependent artifacts and serious interference on mobile phone links.

Let there be any confusion, ID's Speech Enhancement System is not just a digital equalizer or fancy noise-reduction unit. In reality, the software is analyzing every segment of the audio, and making intelligent determinations about how the material might be processed to make it more intelligible.

"Rather than filtering," St. Croix offers, "SES decides what to resynthesize from the material, based on knowledge of the components of human speech, a dynamically learned model of the noise content, and an intelligent adaptive decision engine."

All processing is performed in parallel rather than serially. In this way, each system module is presented with raw, unprocessed signal and, as a result, has the maximum amount of data on which to base its own decisions. Only then is the final resynthesis algorithm generated and applied — based on the results of the individual processing modules — and then constantly retested, re-evaluated and re-optimized to follow changes in the input signal.

Having recently heard the results on a prototype system, all I can do is quote that old adage, "Hearing is Believing." In terms of recovering a usable signal from a noisy and distorted input, the Speech Enhancement System is without equal.

More information is available from Intelligent Devices, Inc., 7 Hickory Ridge, Baltimore, Md. 21228. Telephone 410-744-3044, fax 410-788-6370. Reach them on the Internet at intdevices@aol.com or intdev@chark.net

□ □ □

Mel Lambert has been involved with production and broadcast on both sides of the Atlantic for almost 20 years and is now principal of Media & Marketing, a Los Angeles-based consulting service for the professional audio industry. He can be reached at 818-753-9510 or at mediapr@earthlink.com

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Running Radio

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Roots of Radio
Remembers
George Burns.
See page 41.

Sports and Event Marketing: Why?

by Greg Martin

SHARTLESVILLE, Pa. It is not uncommon for a radio station to be approached by numerous charities for everything ranging from free airtime to PSAs.

In most cases, charities need a station's assistance to further their cause and raise money. Most stations cannot handle all the requests for help from the community. Even if they wanted to, there has not been a prudent or profitable way to do so, until now.

Immediate benefits

Golf marathons are sweeping the country as a method of sports marketing. This form of marketing provides stations with immediate community exposure and goodwill, and best of all, raises money for every charity in your community. Golf marathons can also raise money for your station for day-to-day operations or to pay off debt.

David Fitts of radio station KTSL(FM) in Spokane, Wash., had a few hints regarding golf outings.

"Because I didn't want my sales staff out selling radio time and asking sponsors in the community to support our event, I chose to conduct the typical 18-hole golf event. It is more work than the marathon, but because of our short staff, as the general manager, I took on the task," he said.

Fitts also indicated that he found his listeners very receptive to an event of this magnitude and said, "Radio is the perfect platform."

Radio stations are not the only ones who are now starting to utilize golf as a tool. David Mayo, station manager for WHBR-TV 33 in Pensacola, Fla., is fired up about their first golf event.

"Our first golf marathon is in September; we could have done one sooner but we wanted to make sure that we could have a touring professional golfer at our event. We know our viewers will enjoy participating as we raise funds and have a great time in the process."

Imagine 40 to 50 people getting together at sunrise and being greeted by a nice continental breakfast, a warm handshake from a tour pro and an instructional golf clinic prior to teeing off. This is exactly what the 20 participants of the Mercy Community Crisis Pregnancy Center were treated to last May. Their event raised \$20,000 in only one day. Even after paying the golf course, the caterer and the professional golfer, they still managed a tidy \$15,000, which was enough to pay off their building.

During the course of the day, many holes of golf were played. Among those competing, 60-year-old Richard Jarvis played 90 holes and ran out of daylight.

His goal was 100 holes in one day.

In a typical golf marathon, each player gets his or her own cart and does not have to putt any ball that is within 3 feet of the hole. This saves time.

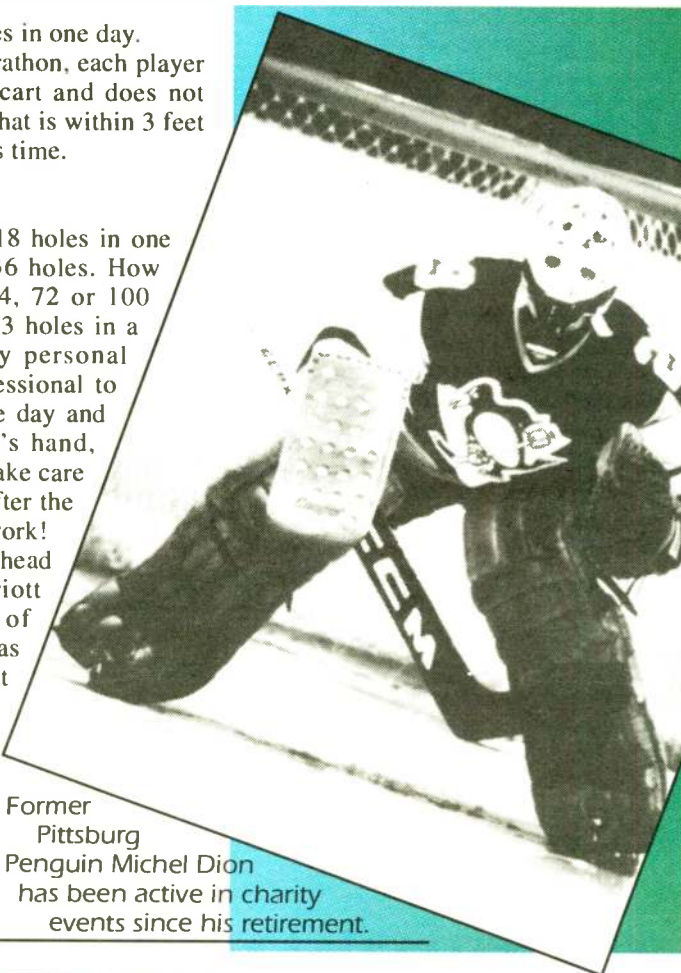
Enthusiasm

Many people play 18 holes in one day and some play 36 holes. How many people play 54, 72 or 100 holes? How about 123 holes in a day? It has been my personal experience as a professional to play 123 holes in one day and still shake everyone's hand, conduct a clinic and take care of the emcee duties after the event. All in a day's work!

Rick Kline, former head pro at Seaview Marriott Resort outside of Atlantic City, N.J., has seen many different golf formats work, but he is intrigued with the marathon concept.

"It is very unusual for a typical 18-hole outing to raise more than a few thousand dollars,

Former Pittsburgh Penguin Michel Dion has been active in charity events since his retirement.



but when a golf marathon is played, the amounts of money are staggering."

Very few people outside the game of golf have heard of a golf marathon, which is similar to a walk-a-thon.

Merrill Smucker, public relations director for Teen Challenge in Rehrersburg, Pa., is not afraid to try something new.

"We at the Teen Challenge Training Center are excited about having our first golf marathon. We feel it is an excellent way to get other people involved in soliciting support for our organization. We also do other fundraisers that require much more work. What I like about the golf marathon concept is that the golfer is responsible for his or her own sponsors and not the golf marathon organizer."

Every organization has different goals; most want to know that when the day is over, they have entertained their clients, made money and done something for the community. Rob Stevens, special projects/marketing director for Teen Challenge of Florida, Inc. believes that sports and event marketing, when done with the right organization, can be a winning proposition.

"The combination of sports celebrities and
continued on page 46 ►

OFFBEAT RADIO

Prodigy Meteorologist Seasons Weather Reports

by Dee McVicker

ALLENTOWN, Pa. Ask any Easterner about the weather this past winter and you stood a good chance of getting an earful of expletives.

So much for small talk.

But 11-year-old Mathias Pakula is an exception. The young weather aficionado is on the air almost every night on "Radio Olé," a program broadcast on WHOL(AM) in Allentown, Pa.

You can actually hear his eyes light up when he reports that snowflakes fell in downtown Los Angeles. Or when he explains the reason behind the unusual weather this winter.

"It's because of a phenomenon which forms — can you believe this? — in the Indian Ocean. That is what changes the weather all over the world," he enthused in his best fifth-grader voice, enunciated in perfect English with a slight Argentine accent.

Even with the boyish voice, Pakula sounds more like a seasoned meteorologist than quite possibly the world's youngest weather reporter.

It is a title that he has worn proudly since the age of seven when he began making

weather forecasts on "Radio Olé," one of two Spanish programs aired by Hispanic Suggestion on WHOL.

The service airs weekdays from 6-9 p.m. under a license agreement between WHOL and Hispanic Suggestion. It provides music, entertainment, and a two-minute weather report by young Pakula for the 80,000 Hispanics in Lehigh Valley, Pa.

Weather watcher

Ever since his family can remember, this youngster has been talking about the weather to anyone who will listen. And listen they do.

Since Pakula has been forecasting the weather, he's developed a steady and growing number of listeners.

It's not uncommon for him to receive five or six calls a day from people asking if they should carry an umbrella or wear their boots.

His popularity has been aided by his appearance on CNN and Univision, a Spanish-language cable network based in Miami, and the articles written on him in

the local newspaper.

He fires off in rapid succession facts about seismology and meteorology like some kids might tick off facts about their favorite quarterback. His hero is also not what one would expect from an 11-year-old: John Morales, a weatherman for Univision. In 1993, Pakula sent Morales a tape of himself doing the weather. To his delight, the tape was aired.

The tools of an 11-year old meteorologist are simple — telephone, stack of books, thermometer, rain gauge, computer and hand-held radio. He will spend up to three hours a day at the library, poring over books and information on meteorology.

Pakula watches the weather reports on television, and lately, since he was given a subscription to Accu-Weather, he's been logging onto his school's computer system for weather information.

"I know the meteorologist there," confided the 11-year-old.

First forecast

Occasionally, Pakula calls the weather research centers in Hawaii, California, Florida, or Alaska, but his mother tries to discourage such calls.

"My mom doesn't like me to call because it
continued on page 45 ►



Mathias Pakula

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Circle (34) On Reader Service Card
World Radio History

ROOTS OF RADIO

Legend of Burns Will Be Remembered

by Read G. Burgan

LAKE LINDEN, Mich. George Burns was a legend. He was also an enigma. By his own admission he was a failure as a vaudeville comedian. The heartiest laugh he ever received was when he asked his vaudeville partner, Gracie Allen, to marry him.

"Oh Nattie, don't be such a kidder," she replied to his offer of matrimony.

Persistence

George Burns was born into an Orthodox Jewish family in 1896. His real name was Nathan Birnbaum and he was one of 12 children. From his earliest years, his one goal was to be in show business — which in those days meant vaudeville. When he was seven, people tossed coins in his hat as he danced on street corners.

He quit school after the fourth grade and, with starry eyes, began a career in vaudeville. It was hard work. By his own admission, he was not good. He teamed up with dozens of different people under dozens of different names. One thing he did have — persistence.

Around 1924, he was performing in an act called "Billy Lorraine and Burns" when his partner quit. A friend introduced him to another vaudeville performer, Gracie Allen.

Gracie and George were poles apart. He had been born in New York, she in San Francisco. He was Jewish, she was Irish Catholic. She was a successful vaudeville dancer, he was a not-so-successful struggling vaudeville comedian. But she was out of work and he needed a partner.

Gracie was born in San Francisco in 1906. Her father, George Allen, was a vaudeville singer and dancer who left his family when Gracie was five years old. Her mother subsequently married a San Francisco police officer named Edward Pidgeon.

Aiming for Vaudeville

Like George, Gracie had but one goal in her life, to be in vaudeville. As a child, she would frequently wander past the San Francisco theaters, looking at the photos of the latest acts, imagining her own picture among them. Her mother encouraged her aspirations and Gracie began by singing in local movie theaters, accompanying sing-along lantern slides.

She and George shared one thing in common: they were proficient dancers; both had taught dancing early in their careers. There the similarities ended.

When George and Gracie teamed up in vaudeville, she was to be the straight "man" and he the comedian. They rehearsed for three weeks. During that time George was uneasy; Gracie was stiff and unnatural. As later learned, Gracie was never good in rehearsal.

At last came their opening night at the Hill Street Theater in Newark, N.J. As it turned out, it was to be George's last night as a comedian. Each time Gracie delivered her supposedly straight lines, the audience increased its laughter. But as George gave the punch line, there was absolute dead silence.

A less astute person might have retreated to rewrite the dialogue. George Burns instinctively understood that the audience knew what was funny — Gracie. For the

second show George gave her some of the punch lines. The audience howled. The die was cast. Burns later commented, "The act kept changing and getting better. The better it got, the less I did."

Therein lies the genius of George Burns. He was sufficiently secure that he could allow his partner to have nearly all of the lines and virtually all of the laughs. For the next 40 years, George was content to be the straight man. Audiences all over the world are forever grateful that he was.

Gracie played the character of a dizzy dame, but she brought a special feeling to the part. She was both simple and sin-

cere. While the illogic of her statements made people laugh, she delivered her lines as if they were perfectly logical. It was this disparity between what she said and how she said it that caused people to both laugh and love her at the same time.

While George was her straight man, he was much more. He knew how to feed her the right lines at the right time. "So how's your brother?" in George's hands was a special tool. George's cigar was his lifelong prop. He liked to say that when he puffed on it, audiences knew he'd told a joke and they should laugh. But Burns

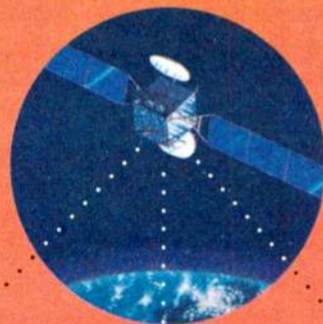
used his cigar as effectively as Jack Benny used his violin.

If Gracie played the part of the dimwit, George played the part of a vain person with aspirations far beyond his abilities, a singer who was never asked to sing. Gracie often encouraged his vanity. For several weeks, their radio program centered around Gracie's attempt to get George the part Clark Gable was slated to play in an upcoming movie. It was all good fun.

What started as a business arrangement blossomed into love. At first, it was a one-sided love, with George increasingly begging Gracie to marry him. But Gracie was in love with another vaudeville performer, Benny Ryan. Finally, at three o'clock on Christmas morning in 1925, Gracie agreed to marry George Burns. Gracie was 19, George was 29.

continued on page 42 ►

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Circle (78) On Reader Service Card

World Radio History

George Burns Legend Remembered

► continued from page 41

For the next few years, George and Gracie took vaudeville by storm. They became headliners around the country. Like other performers before them, when they played the Palace Theater in New York in 1928, they knew they had officially arrived.

1929 was a special year for George and Gracie. First they were asked by Paramount Studios to make a nine-minute short in the new medium of talking pictures. George could hardly believe that anyone would pay them \$1,800 for nine minutes of work — \$200 a minute. By 1931, they had made 14 film shorts and were making their first full length movie, "The Big Broadcast of 1932."

Also in 1929, they made their first radio appearance. It was not in America, but in England where they were asked to make a series of five-minute broadcasts to promote their stage shows. Radio was sounding the death knell for those vaudeville performers whose acts were too visual to make the transition, and eventually killed off vaudeville all together.

Initially, it looked as if Burns and Allen might be one of those casualties. Grape Nuts considered sponsoring them on radio, but an executive killed the idea saying, "Gracie will never make it

and squelched the deal? Fortunately, he

Eddie Cantor had his own radio show and while performing on the same bill as the Burns, he invited Gracie to appear on his show. Gracie. Not George. What would have happened if George had taken offense

Over the years, Burns and Allen's half-hour program switched back and forth between NBC and CBS and a variety of sponsors.

and squelched the deal? Fortunately, he didn't, and Cantor at least let George write Gracie's material.

Two weeks later, Rudy Valle invited both George and Gracie to appear on his Fleishmann's Yeast Hour for \$750. When George gagged on what he thought was an unbelievable amount for a radio appearance, they offered him an even thousand. After that they were signed for a year's contract on the Guy Lombardo program originating on WABC.

When Guy Lombardo changed networks, George and Gracie were given a contract paying \$2,000 a week to do their own show for the sponsor, the General Cigar Company. They chose the song "Love Nest" for their theme, a song they had used successfully on Broadway.

When they began in radio, their were no studio audiences. Advertisers forbade it, fearing that any laughter from the studio audience would harm the show. This was just fine with Gracie, who was always nervous before an audience. But when radio embraced studio audiences, Gracie insisted that the house lights be turned off so that she would not have to see the studio audience.

For years they had used Gracie's mythical brother in their routines. On radio they carried it to a new high. They reported him missing, and then had Gracie appear "unexpectedly" on a host of other network programs, interrupting the continuity and asking if anyone had seen her brother. The joke almost backfired when NBC ordered the deletion of the material from the script of the Rudy Valle program. NBC did not intend to give any publicity to a rival network's stars. Alas, Valle accidentally picked up the wrong script and asked Gracie about her missing brother. That caused an NBC engineer to cut off the program. Only four seconds were lost, but what a momentous four seconds!

Radio stardom

From that time on, Burns and Allen's were established as radio stars. Over the years, their half-hour program switched back and forth between NBC and CBS and a variety of sponsors including Chesterfield Cigarettes, Hormel Packing, Lever Brothers and Tenderleaf Tea.

Over the years, the program featured an outstanding cast of supporting actors, including Mel Blanc in the role of the "happy postman." Gale Gordon and Hans Conried appeared regularly. Orchestra leaders included Ray Noble, Paul Whiteman and Meredith Willson. Willson was particularly adept at providing entire musical compositions around which the commercials were interwoven as he compared the parts of a musical composition to ingredients in Maxwell House Coffee.

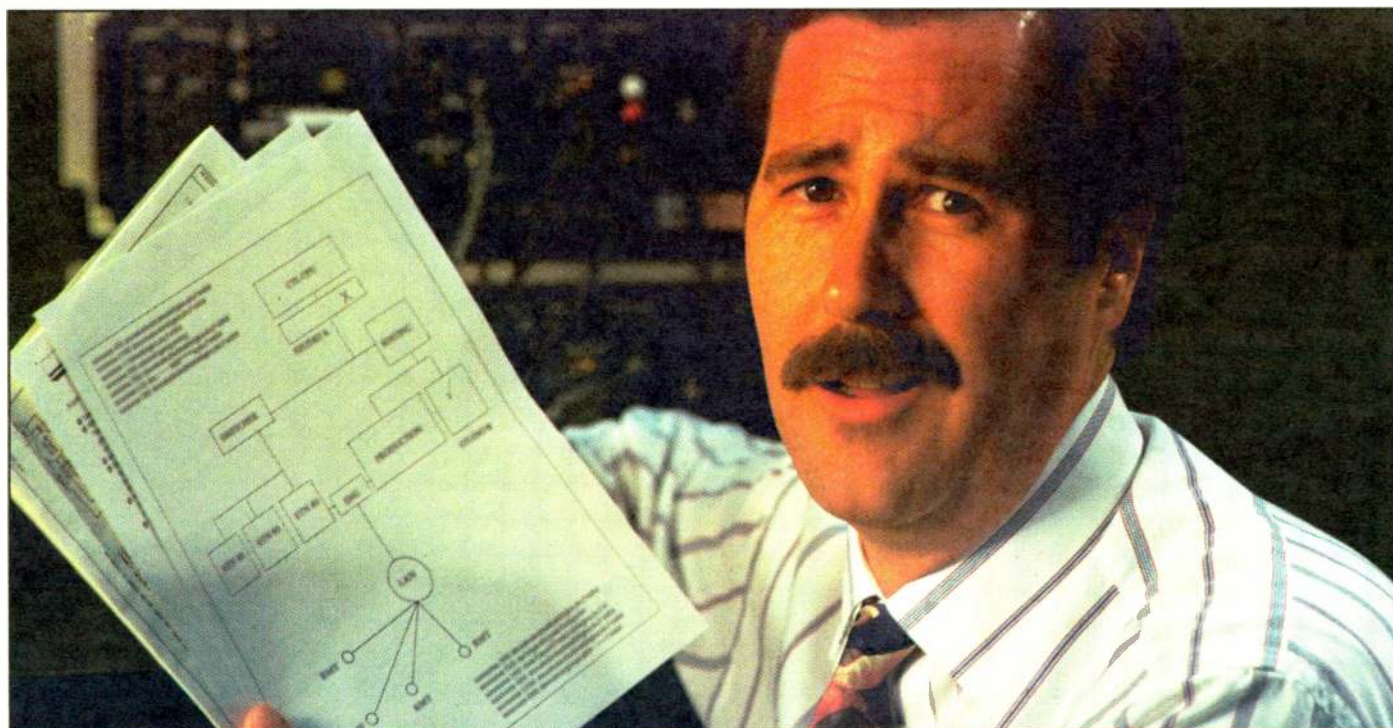
In the early years, the program centered around the kinds of routines they had done in vaudeville. But in the '40s, the program began to lose its popularity.

To their credit, George and Gracie recognized that they had aged and their material needed to age with them. At that point they adapted to a situation comedy format built around their husband and wife relationship.

Their popularity returned and they continued on the radio until 1950, when they moved into television. Radio had been easy. It had taken only a day and a half each week to do their show. Gracie would first see her script one night before the program was to air. She would read through it only once and then do it live. George used to say that the sound effects man was the only one who actually works in radio.

Television was a horse of a different color. In radio you read from a script. On

continued on next page ►



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Burns' Star Shone on the Radio

TV. Gracie often had 26 pages of mind-numbing silliness to memorize. Mondays saw her in wardrobe and learning lines. Tuesdays they rehearsed the entire day. Wednesdays they filmed the actual show, starting at 6 a.m. and often continuing until midnight. On every other Thursday, they reviewed scripts for the next two shows. Fridays she selected her wardrobe for the next show. Weekends were spent memorizing.

Once again they were faced with Gracie's nervousness before a live audience. For the first few seasons, they solved the problem by not having a studio audience. But they missed the laughter. Finally they found a compromise by installing footlights that prevented Gracie from seeing the audience. When she discovered the camera's red light indicating that it was live, they had to tape over the light to preclude

Gracie's nervousness over that.

The television program continued until 1958, when Gracie retired. George was 63. Gracie was 52. At the time, it was the longest running situation comedy on television. Gracie had a history of heart problems dating back to the early 1950s. Her heart deteriorated gradually until she died in 1964, at the age of 58.

George was devastated. Although known as a comedian, he was really a straight man—a straight man without a partner. He languished in retirement for 10 years. Then the death of his best friend, Jack Benny, created an opportunity that revitalized his career and his life. Benny had been signed to play the role of Al Lewis in the film version of Neil Simon's *Sunshine Boys*. When Benny died, the part was offered to Burns who ultimately received an academy award for best supporting actor.

At 80 years of age, Burns was off and running—this time as a solo act. Then came eight more films, including three in which he played the ultimate straight man, God. One of his classic quips was, "I'm sure some of you are wondering why God would come down a second time. There's a very good reason. The first time he came down he made the studio \$65 million."

During the next 18 years he kept comfortably busy making records, movies and public appearances. He even had a contract for a Las Vegas appearance on his 100th birthday.

But in 1994, old age got the best of Burns when he slipped and fell. Since that time, his health gradually deteriorated. Perseverance allowed him to succeed in vaudeville. And perseverance allowed him to reach his 100th birthday on Jan. 20, 1996. But there was no Las Vegas show, only a few close friends.

One of the reasons so many of us have continued to embrace George Burns as an entertainer and a man, is that he was one of the last to tie us to the rich tradition of vaudeville that spawned so many of radio and television's gifted performers. Vaudeville may have died, but it was richly represented in the life of George Burns. We've not only lost a great entertainer, we've lost our roots as well.

At the end of the Burns and Allen Show, George would say, "Say good-night, Gracie." And she would dutifully say, "Goodnight Gracie." Now all of us whose lives were enriched by him say, "Goodnight, George."

□□□

For further reading: *Gracie: A Love Story* by George Burns, Penguin Books, 1988.

Read Burgan is a free-lance writer and a former public radio station manager who can be reached at 906-296-0652 or through e-mail at rgb@up.net

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Details Add Color to Radio Spots

Last in a series

by Ty Ford

BALTIMORE The copy and production seminar I gave in Nashville, Tenn., at CRS 27 went off very nicely. I had a packed room of 140 people, a dozen of whom were copywriters — a rare and endangered species. Others fell into categories of production, on-air, sales, general sales manager, general manager and owners.

Worn thin

We were all pretty much in agreement that the language and production of advertising has been worn too thin and

is in need of some serious attention. A couple of extremely good ideas came out of that room and I'd like to share them with you.

At KNIX-FM in Tempe, Ariz., creative director Geoffrey Erb has come up with a simple but effective solution. It is a one-page form called a Radio Spec Information Sheet, which the account rep fills out while servicing the client. The sheet asks for the following:

- Date submitted
- Date & time the spot is needed
- The account executive's name
- Whether copy, cassette or both are needed
- Client name, contact person, phone number

- Locations and phone numbers
- Type of business/services/brands client sells
- Focus of ad (image/sale event)
- Target audience (sex/age/income)
- Unique selling points (what makes it different)

RADIO spots

- Current slogan or creative used
- Additional information (including attached materials)

Erb finishes out the form by reinforcing the idea that, because KNIX-FM is a country station, country spirit should also be included and that getting the facts right, listening to the client's ideas and addressing his or her needs are paramount to success.

In an ongoing discussion about the idea, someone mentioned that their account executives claim they "don't have time" to fill out such a sheet. There is absolutely NO EXCUSE for an account executive not to take the 10 minutes or less it would take to fill out this form. If that 10 minutes results in a better commercial that 10 listeners decide NOT to tune out on, your station has already made out on the investment. If any of those listeners actually patronize the advertiser, you're in even better shape.

Bad air from the client

One of the oldest nightmare situations in radio advertising is the client-voiced spot that is difficult to refuse without hurting the client's feelings. General manager Mark Levy at WSOM(AM)- WQXK(FM) Salem, Ohio, has developed an extremely useful store survey that combines an in-store promotion with a valuable research tool that lets the customer be the arbiter of acceptability.

The first page of the two-page piece explains how to make it work. To wit, "The purpose of doing an in-store survey is to

help you better identify what your current customers like about you and the areas they think your business could improve in. Having this information will help you super-serve your customer's needs, making it harder for a competitor to steal them from you.

The survey will also give you an indication as to what advertising media best serve your customers, thus helping you to better target your marketing dollars."

The one-sheet survey asks for the customer's name, address and phone number and asks the following questions:

- What did you like best about us? Product selection, Store design, Service, Prices, Other
- What did you like least? Product selection, Store design, Service, Prices, Other
- How many miles did you travel to visit us?
- Your age range: under 18, 18-24, 25-34, 35-49, 50-64, 65+
- Do you subscribe to a newspaper? Which one?
- Have you seen a newspaper ad for us? If so, where?
- What is your favorite type of radio station? Big Band/Nostalgia, Easy Listening, News/Talk, Top 40, Classical, Hard Rock, Oldies, Urban, Country, Jazz, Soft Rock.
- Which three stations do you listen to most?
- Do you listen daily, sometimes, hardly ever?
- Have you heard a radio commercial for us?
- Do you have cable TV?
- Which three TV stations, including cable, do you watch most often?
- Have you seen a TV commercial for us?
- Have you received any mail pieces from us?
- Have you seen our billboards?
- Did you purchase something today?
- If so, how would you rate the value received for the money spent. (1 poor-2-3-4-5 excellent)

Levy suggests placing a stack of surveys next to a registration box near the stores' cash registers. The registration box should have a header offering a prize of some sort, such as a \$50 gift certificate, 52 free rentals, etc. to be given away in a random drawing on a certain date, no purchase necessary.

continued on next page ►

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Heard on 300 Radio Stations

Add Color to Radio Spots

► continued from page 44

(Do "no purchase necessary" to avoid lottery implications.) All a person has to do to enter is fill out the survey and drop it in the box.

When the day arrives, draw a winner. Make sure that the contest lasts at least a week, so you have ample opportunity to get input from as many customers as you can. Be sure to post the winner's name, and, if possible, his or her picture so folks can see you did indeed have a winner. Yes, it's a good idea if someone from the station is involved in going over the paperwork. Seeing negative comments about a spot can be the starting point for deciding how to improve the commercial approach.

Hire the right people

WMDH(AM) in New Castle, Ind., is No. 1 in the market, according to creative director Bryon Maddox. Mike Lees is assistant program director, Randy Lawson is production director and Bob Richards is program director.

"We're a small market station programming to four markets all within a 30-mile radius," said Richards. "That means two to three remotes a week, sometimes even more, and every festival and parade. There's always a lot going on. Bryon is the on-air host of our request show and part of the WMDH brain trust. He's a very creative person. It would be a waste not to use what he has to offer."

"There's also a lot of personal chemistry, friendship and a trust because we've all worked here in different capacities for a long time. When I start running dry, seeing them encourages me to keep on going."

Finally, one person I met expressed a problem with getting the client to change copy. The same spot, it seems, had been running for over a year. When I asked him if anyone had gone to the client to talk about a new spot he said the account executive didn't want to bother the client. After a double take, I suggested that a "30 day maximum" policy on copy be instituted as a service to both the client and the audience.

The devil is in the details. Nowhere is this more true than in the pursuit of quality spot breaks. Hopefully this series has shed some light on the problems and has provided some new perspectives that will help you make programming and commercial continuity a high-quality seamless entity.

□ □ □

Ty Ford continues to deconstruct airchecks of spot breaks for fun and profit. He may be reached at 410-889-6201 or tford@jagunet.com. Ty Ford's "Advanced Audio Production Techniques" can be found at <http://www.bh.com/bh/jp/24080082.htm>. His AIF V/O demo is at ftp.jagunet.com in the pub/users/tford directory.

Prodigy on the Radio

► continued from page 39

can cost up to \$280 a month," he said.

His mother will tell you he's always been interested in the weather. When he was four years old, he wanted his name changed to F-5, after the most powerful tornadoes.

He would show visitors his collection of tornado pictures. For those indicating the slightest interest, he'd pull out a copy of his favorite book, "The Weather Classroom," and flip through the pages.

Mathias was so obsessed with the weather that the first tape he purchased was Dangerous Edge, a recording of hurricanes. His obsession with meteorology

grew with each year and by age seven, the youngster had his sights on radio.

Ricardo Montero, president of Hispanic Suggestion Inc., remembers the first call from seven-year-old Pakula well.

"He told me he would like to say the weather, because that is his business," recalled Montero.

Curious, and a little taken in by the youngster, who had recently immigrated to the United States from Argentina with his family, Montero agreed to air the boy's request one evening.

When the persistent seven year old called back again the next night, Montero asked to speak to the his mother.

"She said, 'Mr. Montero, I must tell you

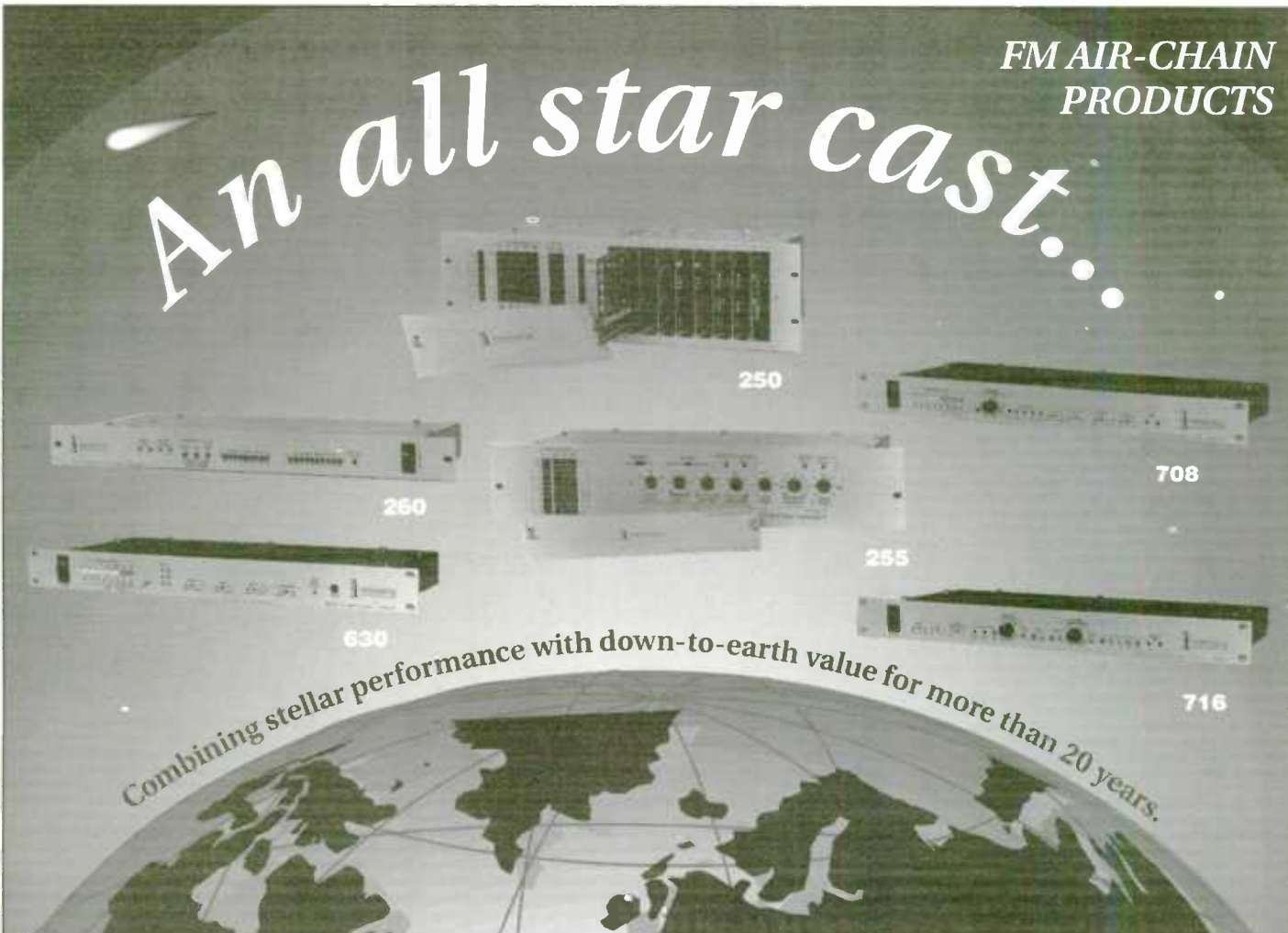
something about my son. My son, at four or five years old, was very interested in the weather. He don't look at the movies, he don't play soccer, because all the time he see only the weather,'" said Montero.

Montero agreed to nightly weather forecasts by Pakula and has never regretted it. "Radio Olé" might entertain the Hispanic community with news coverage, contest giveaways and the latest music from the Spanish Hit Parade, but young Pakula, he said, has won the hearts of his listeners.

"There's a lot of meteorologists," the precocious youngster likes to say, "but not all of them are on the radio."

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Dee McVicker is a freelance writer and regular contributor to RW. She can be reached at 602-545-7363 or via the Internet, roots@primenet.com



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MANAGERS NOTEBOOK

Taking the Bite out of Downsizing

by Sue Jones

BURKE, Va. The word downsizing usually brings to mind massive staff layoffs or dismissals. It is usually a drastic step to reduce costs and improve profitability.

Downsizing does not have to mean large staff reductions.

Smart managers look for alternate ways to manage their resources that takes maximum advantage of them. The following is a real-life success story of resource management. It involved space reallocation and staff restructuring that turned an unprofitable station into a profitable and viable one within 12 months.

Be smart

Bob Snyder is the vice president and general manager of WTEM(AM) Sports Radio in Rockville, Md., a suburb of Washington. After three years of operation, his expenses were exceeding his revenue by millions of dollars annually.

It was time to take a hard look at ways to cut costs. After considering the traditional alternatives, he decided that restructuring the office space and reorganizing the staff were the answers. This approach seemed to have the least impact on the station and staff while holding the greatest potential benefit.

He did not realize that he would reap improved productivity benefits as well. To achieve his goal of turning the unprofitable status around, he reduced the square footage of the station's offices by 51 percent and staff by 30 percent.

To keep costs to a minimum and retain a significant investment in relatively new studios, Snyder did not move the station

to a new location. Rather, he reconfigured the offices based around the broadcast facilities of the station that were only three years old. Reconfiguring the office space around the existing studio facilities was another way expensive technical changes were kept to a minimum. With this plan, only minor telephone and electrical technical changes were required.

The up-front planning was a key to the success of the effort. Snyder and his staff started with the question: "If we had to do it again, how would we establish a station after the past three years of lessons learned?" They focused on reducing and restructuring the office space. They also sought the professional services of Michael Oxman and Associates, a Northern Virginia architectural firm.

"Without a doubt, the best thing we did was align ourselves with a reliable architectural firm that was able to understand what we were doing and able to communicate with us in such a way that we ended up with what we wanted with no surprises," said Snyder.

He attributes much of the facilities successful planning to the skills of Jack Hellman, an architect with Oxman and Associates, who understood their needs and made further cost-saving recommendations.

The major renovations were completed in four months. Minor renovations were completed in the four following months, bringing the total time to complete the project to eight months. All of the expenses were handled as a one-time capital expenditure.

Snyder said the biggest problem he had to overcome was: "Egos!" In this downsizing effort, some staff members who

had private offices now have cubicals for work areas. This obviously took some adjusting from the staff's perspective.

"I am fortunate to have a nucleus of people who cared more about the sum of the parts than the parts," he said. In addition, Snyder said that he led by example. His office used to be a separate suite with an executive bathroom. He now has an office that is 40 percent smaller than his previous one, without a private bathroom.

He said everyone had to check their egos at the door, including the general manager. Undoubtedly, his example paved the way for others to accept smaller, less luxurious work areas.

Staff changes

Another aspect of the restructuring was a re-evaluation of the staff positions. After evaluating workloads and revenue per person, Snyder and his staff realized that all of the station's work could be completed with 70 percent of the existing staff. Duties of some of the positions were merged into other positions, thereby reducing the number of staff needed. Salaries were kept at existing levels even though some duties increased. Some staff members voluntarily separated.

The combination of dramatically reducing/restructuring office space and staff reduction erased the negative earnings within the year.

In addition to the spectacular financial recovery these changes brought, Snyder said the station's staff has improved productivity a whopping 50 percent. He attributes that to the relocation of his

office from a suite in a wing of the office complex to a more central location between programming and sales.

Being strategically located in the center of the office helps keep Snyder in closer touch with the staff and their activities. He said the smaller office area has physically brought sales and programming closer together and, as a result, both groups have developed a better understanding of the other group's problems. Therefore, a more harmonious working relationship has evolved. The result has been the overall improved efficiency.

Advice

Snyder has two points of advice for other general managers considering station space renovations or moves: start with an architect you can trust and work closely with dependable contractors.

He is willing to talk with other owners/general managers seeking additional information. He can be reached at 301-770-5700.

Snyder was willing to share his story as an example of how space management can have a tremendous impact on the bottom line. Not all stations may achieve such remarkable results. However, this is proof positive that aggressively managing physical and human resources can have very positive results in productivity and on the bottom line.

In Snyder's case, it was a matter of survival. He led his station from red to black in a remarkably short turn-around time. For an AM station in a major market with over 30 competing stations, it is truly a success story.

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Sue Jones is a principal in Bisset Communications, a communications management firm located in the Washington, D.C. area. She can be reached at 703-503-4999.

Consider Sports Events

► continued from page 39

fundraising events or corporate outings has given us the opportunity to come in contact with people we would otherwise never have met. The excitement and interest generated from the sports figures have helped our events reach more people and raise more money for our non-profit," he said. Stevens also indicated that substantial sums of money have been raised, from \$10,000 to over \$200,000 in one day for one event.

Proceed with caution

There are few firms that specialize in this type of event. Think twice about any firm that wants to charge an up-front fee for its services or wants a multiyear contract. If the firm does not send a tour pro or sports celebrity to the event, you paid too much. Typically, fees are expressed in the form of a percentage of the gross proceeds, usually 15 percent or less.

Pro athletes are often included in golf marathons. Retired pitcher for the world champion Atlanta Braves, Jose Alvarez, loves to play golf and has a great outlook as well.

"Every athlete enjoys a challenge. I certainly understand firsthand, after participating in three golf marathons, the challenge and rewards that a golf marathon provides, both in the fulfillment of participants finishing and the fundraising accomplishments that have

been achieved." Alvarez is still very competitive on and off the diamond and the golf course, boasting a six handicap.

For a little more excitement, "spice the day up with a million dollar hole-in-one contest and follow that with a single putt for \$10,000," said Rick Bradley of Tournament Promotions. "Every golfer would love to have a shot at one million dollars. Half would go to the charity, the other half to the winner."

It takes less than 60 days to organize a golf marathon from start to finish; money is generated from day one. Determine the dollar goal to be raised and find out who plays golf in your organization. Then, meet with a group that specializes in golf activities, specifically marathons or sports management.

Or, maybe your next-door neighbor just happens to be Arnold Palmer.

□ □ □

Greg Martin is a touring professional golfer on the Nike & PGA tours and conducts many golf events through his three firms: Greenside Golf Outings, Professional Golf Fundraisers and Professional Sports 4 Celebrity Management Group. He also is the owner of Greg Martin Voice Productions. He can be reached at 610-926-0984.

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Build a Two-input Mixer-amplifier

by Andrew Ellis, CSRE

SAN FRANCISCO Events were catching up with us; it was four days before the election and the boss needed four two-input headphone amplifiers in a hurry.

Getting the audio from remote site to studio always gets attention, but return cue and monitoring are often afterthoughts. This time, the return channel was getting the attention it had always deserved.

ISDN remotes

Most of our remotes are done on ISDN, but the story is the same anytime you have separate local and receive audio sources to monitor. Reporters, always a picky lot, demand the ability to cue up their tapes while still listening for their cues. No fair, either, just tying the remote mixer output and ISDN codec receive output together. Doing so would send return cue back to the station — a serious no-no.

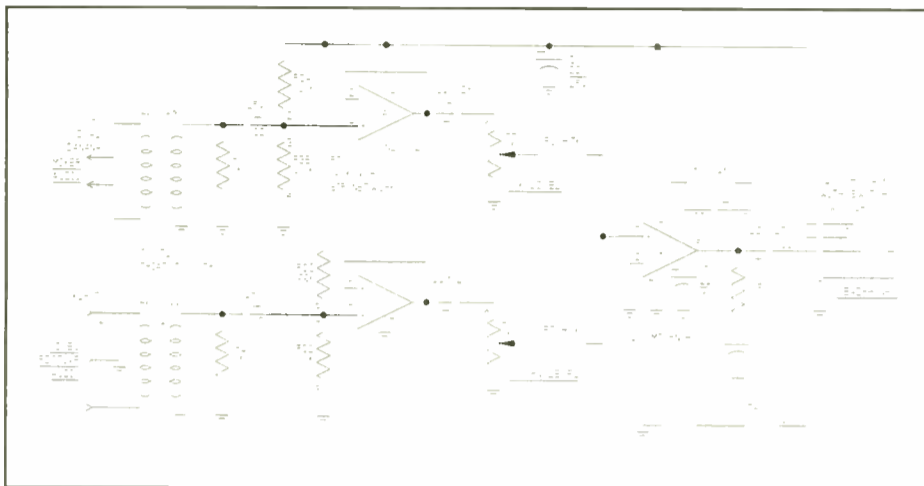
The obvious answer was a two-input headphone amplifier with separate volume controls for each input. One input channel would connect to the mixer output at the remote site. The other would hook up to the receive audio port of the remote site ISDN codec, air monitor receiver or other cue source. Because separate volume controls are used, each reporter could balance the two signals to his or her liking.

At one time, we might have sent two mixers to each remote — one for program and one for monitoring. But cost and lack of "luggability" made that impossible this time. Riding to the rescue was the venerable voltage-follower.

One of the oldest circuits in electronics, the voltage-follower is an amplifier with

nectors and batteries later, and the "election-night special" (ENS) was ready.

Most "election-night special" components mount on perf board. The inputs are wired to captive cables so that the ENS connects directly to the mixer and codec without needing any additional wires. There is no visible power



"Election Night Special" schematic

a gain of 1 — what you get out is what you put in. It doesn't sound like much, but you can mix the outputs of two voltage-followers without connecting their audio sources together, and that's what was needed here.

We whipped up two voltage-followers and joined them with a small headphone amplifier in portable boxes. A few con-

switch. Instead, the unit is turned on when headphones are plugged in and turned off when they are unplugged. It's one less thing to worry about.

The two voltage followers are identical. A bridging transformer prevents loading the audio sources. Using quality transformers for T1 and T2 would give better frequency response. The Triad

TY-303P is intended for narrowband telephone use, but we found it perfectly adequate.

Use better transformers if you're particular. Both voltage-followers are built from one eight-pin NE5532 dual op-amp. Following the level controls, an LM386N-4 power amplifier delivers up to 1 W to the headphone (or speaker) output.

Must be biased

Because the op-amps are running on a single +18 V supply, the inputs must be biased near +9 V. This is done by R3A-R3D. You could use individual 100 K resistors instead, but SIP networks are cheaper, smaller and more closely matched.

After passing through the voltage-followers, each audio channel goes to an audio-taper 1 K pot for volume setting. R6 and R7 reduce the effect of one volume control on the level from the other. Without them, turning down one channel would gradually short out the audio from the other.

It is not hard to come up with a few milliwatts to run headphones. But most small IC amplifiers are intended for low-impedance loads and some professional headphones are high-impedance. That means more voltage is needed to drive them than to drive speakers or low-impedance headphones.

While you could use a matching transformer, a simpler solution is to use a high-voltage power supply for the headphone amplifier. Higher amplifier supply

continued on page 48 ►

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Properly Tune Your FM Transmitter

by Tom Vernon

HARRISBURG, Pa. My recent column on AM noise in FM systems drew a lot of e-mail and related questions about how to tune FM transmitters. There seem to be many myths and misconceptions about the subject, so this month's column will introduce the topic of optimizing an FM transmitter for best performance.

The emphasis will be on high-power tube devices, as the proper adjustment of tuning and loading controls seems to be a point of confusion. Proper tuning of a transmitter is not just a matter of getting the best sound or efficiency. An improv-

erly tuned transmitter can shorten the life of power tubes or lead to their catastrophic failure.

There are several levels of proficiency in tuning a transmitter, each yielding better results, and also requiring more expertise and test equipment. The simplest procedure is to tune according to the directions in the manual. This may just be a matter of using the transmitter's meters and a wattmeter to obtain proper power output and efficiency.

A typical set of procedures would involve matching the exciter to the first stage by adjusting the input tuning control for maximum grid current on the dri-

ver stage, followed by tweaking the input matching control for minimum reflected power. These two settings interact and the point of maximum grid drive may not exactly coincide with minimum reflected power. This is because solid-state exciters may output more power into a complex load than a purely resistive 50W load. Given adequate grid drive, tune for minimum reflected power.

Tuning driver stages requires some special considerations. Many popular transmitters built in the '60s and '70s had driver stages that were quite over-rated for the amount of power they had to supply to the final stage. In some instances, power was reduced by running the tube at near-maximum plate voltage with very light loading.

Such operation is very destructive to power tubes. The resultant back heating of the tube elements can cause hairline cracks in the ceramic vacuum seal, allowing air to slowly leak into the tube and causing premature failure.

To ensure the long life of these driver tubes, operate them with the lowest possible plate voltage and heavy loading. You may want to look at changing the taps on this tube's plate transformer to give lower voltage. It may also be feasible to reduce filament voltage to reduce power and extend the life of the IPA tube.

With these factors in mind, adjust the driver plate/final grid tuning for maximum grid current on the final.

The output tuning control should be adjusted next, as it centers the transmitter passband on the carrier frequency. At the point of resonance, the plate current will dip, while power output and

screen current both rise. With heavy output loading, this dip in plate current may be broad and difficult to observe. Peak screen current is often a better indicator of resonance.

Finally, the output loading control is adjusted for rated power and best efficiency. For a given screen voltage, there is one point in the tuning where this happens. All adjustments should be made into the antenna rather than a dummy load because the optimum tuning point between the two will be different, owing to different resistive and reactive characteristics.

Final results should closely match the manufacturer's final test data sheet. If they do not, round up the usual suspects: power resistors, loose connections and tubes with low emission. Be especially wary of tuning circuits if the transmitter

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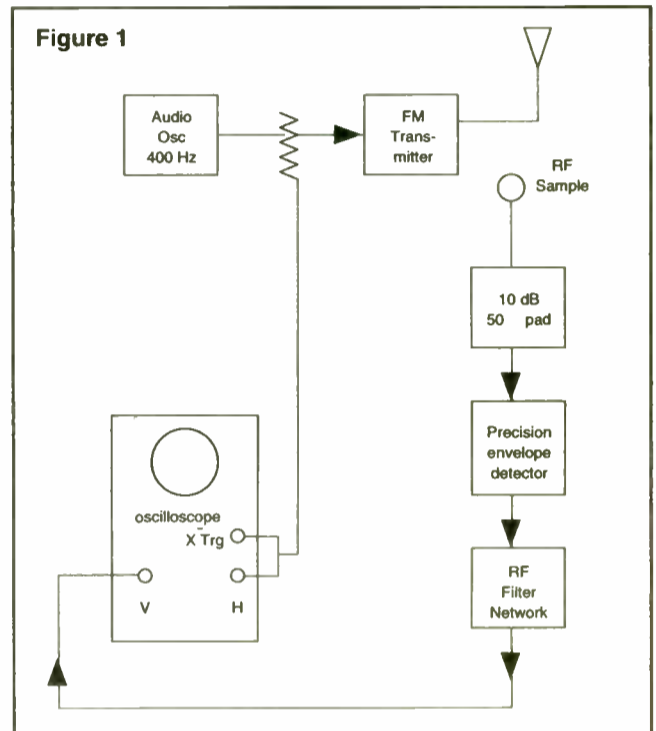


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Figure 1



frequency was changed in the field.

Manuals for some older equipment were written at a time when more advanced test equipment was not readily available in the field and the more broadband requirements of today's FM systems were unknown. These adjustments are a good jumping off point and will get you safely in the ballpark.

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Two-input Headphone Amp

► continued from page 47

voltage means more voltage available for high-impedance headphones. Here, we used two 9 V alkaline batteries to make the 18 V supply.

Workhorse

The LM386 is a workhorse for this type of job. Housed in an eight-pin DIP package, it needs few external components and works well. Originally intended for battery-operated consumer equipment, the common LM386N-1 version is rated for only a 12 V supply. We used the LM386N-4, which will handle 18 V supplies. If you cannot locate the -4 version, you can eliminate one of the two batteries and use the more available LM386N-1 on a 9 V supply.

As shown, the LM386N-4 is set for a gain of 50. It's easy to change that if you need to. The chip can be set for gains from 20 to 200 by changing a component or two. We found 50 to

work well for us. Refer to the LM386N-4 data sheet if you want more or less gain.

We have all had power switches mysteriously left on or bumped on in transit. Our solution to that problem is to use headphone jacks with isolated, normally open contacts to turn power on and off. We used the Switchcraft 113E, but other manufacturers make similar jacks. Just make sure you get the kind with isolated, normally open contacts.

The "election-night special" was a success and earned itself a shelf of honor in the remote equipment cabinet. Quick to build and handy to have around, it won hands-down majority praise from our election-night reporters.

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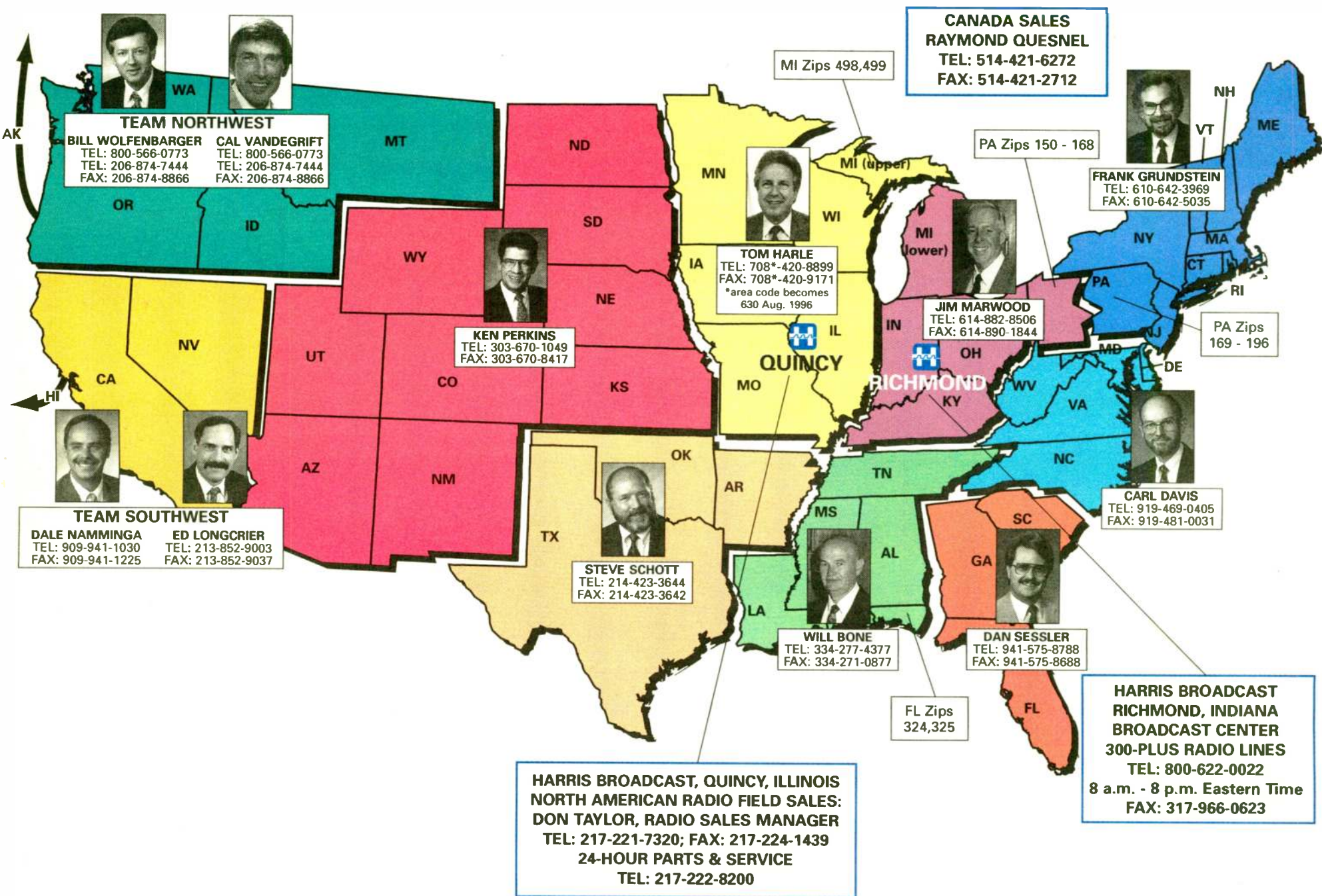
Andrew Ellis is assistant technical supervisor at KCBS and KRQR Radio in San Francisco.

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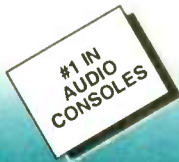
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Discover the Joys of Low-power AM

by Al Parker

HICKSVILLE, N.Y. The joys of AM are numerous and diverse. Most of us think of AM, especially in the context of 75 meters, as a hi-fi, high-power mode. One hundred watts is considered entry level, with 250 or 500 plate-modulated watts preferable, for arm-chair copy.

Renewed interest

A 50 W rig, such as the lovely Johnson Ranger, is considered, by some, as merely an exciter for a behemoth amplifier, or as an RF/audio driver for a larger plate-modulated rig such as the Johnson Desk Kilowatt. This attitude would seem to regulate lower-powered transmitters, especially those featuring low-level audio (screen-modulation), to the scrap heap. Happily this is not the case.

The renewed interest in AM has stimulated a kind of nostalgia for what were once considered Novice rigs. Many of today's middle-aged hams started out as teenagers on these little transmitters. Power output was limited and the emphasis was on CW (continuous wave), in keeping with the limited scope of Novice privileges. Because most were aimed at young

people, low cost was an important parameter. This price-point consideration led to the idea of the "kit." Heathkit and others produced wonderful kit transmitters, killing two birds with one stone. The kit was a radio theory course and an inexpensive transmitter, all in one.

Smart manufacturers realized that these transmitters could be marketed to a wider audience if some form of voice mode was built in as well. Once the Novice advanced to the General Class, he or she could still make good use of the rig for enjoying his or her hard-won phone privileges. In order to maintain the price-point, low-level modulation was usually employed. This eliminated the need for an expensive modulation transformer and high-power audio-amp circuit. Screen-, grid- and cathode-modulation were inherently inferior to true plate modulation, but with careful adjustment, some of these schemes could come close. In fact, a carefully adjusted, tastefully equalized, screen-modulated rig can sound better than some stock plate-modulated transmitters.

These low-power rigs were best exemplified by the superb Heathkit DX-60. This rugged, easy-to-assemble

transmitter was perhaps the most exquisite kit ever offered. The chassis is built like a tank and all components are of the highest quality. Capacitors, coils and hardware were worthy of a high-dollar Collins rig. It was one of the first of the Heathkits to leave the lunch-box look behind. In fact, the DX-60 was downright classy. The matching HG-10 VFO is one of the most stable frequency control devices ever offered. It is also a thing of beauty, with its translucent, back-lit, tumbler-style frequency read-out. You were really cooking if you could mate the DX-60 with the matching HR-10 receiver.

This compact station was (and is) so

good that it made the relatively restricted "prison" of a Novice license seem more like a cozy, gilded cage. The door of that cage could be unlocked with hard work and study. Building the DX-60 and its companions was enough of an educational experience to speed the process along. Let's not forget the most important elements of building a kit — the sense of pride and sheer fun.

While there have been rare cases of Heath rigs being found unassembled, the closest most of us will get to the experience is finding one of these rigs at a flea-market in need of some TLC. One point of concern in buying a radio built from a kit is that the builder might not have been skilled in assembly techniques. Some kits were so poorly executed that they never

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FM Transmitter Tuning

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They are probably not the point of best efficiency or sound, however.

At the next level is tuning to center the transmitter passband on the carrier frequency. This is achieved by modulating the transmitter at 100-percent modulation with a 400 Hz tone and carefully adjusting all tuning controls for minimum AM modulation as observed on a wideband envelope detector. A typical test setup is illustrated in Figure 1.

These adjustments are more subtle, but should not significantly alter output or efficiency figures. If all goes well, you should be able to get synchronous AM noise figures around 40 dB or more below equivalent 100-percent AM, or 50 dB for some of the modern single-tube designs. Note that some older transmitters will have 30 dB of synchronous noise when tuned for peak power output and efficiency, so a drastic improvement can be achieved by using this method of tuning. Failure to get good synchronous reading means going back to do the basic work outlined in my previous article on AM noise.

Stereo separation is also affected by how a transmitter is tuned and these adjustments are more critical than those for AM noise.

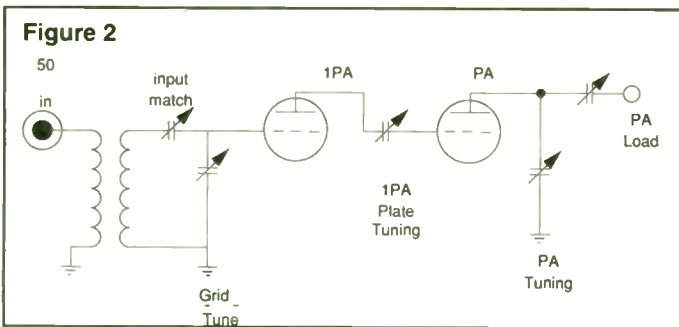
A standard procedure is to tune for minimum intermodulation distortion in the left or right channel.

Probably the most stringent requirements for transmitter adjustments come when the station is transmitting a subcarrier.

The most sensitive adjustment is for minimum crosstalk from the main channel into the subcarrier.

A good procedure is to feed a 4.5 kHz tone into either channel at 100-percent modulation. This will place the L-R sideband atop the 67 kHz SCA. Now retune the transmitter for minimum audio output on the SCA demodulator.

As with most maintenance chores, good record keeping is important.

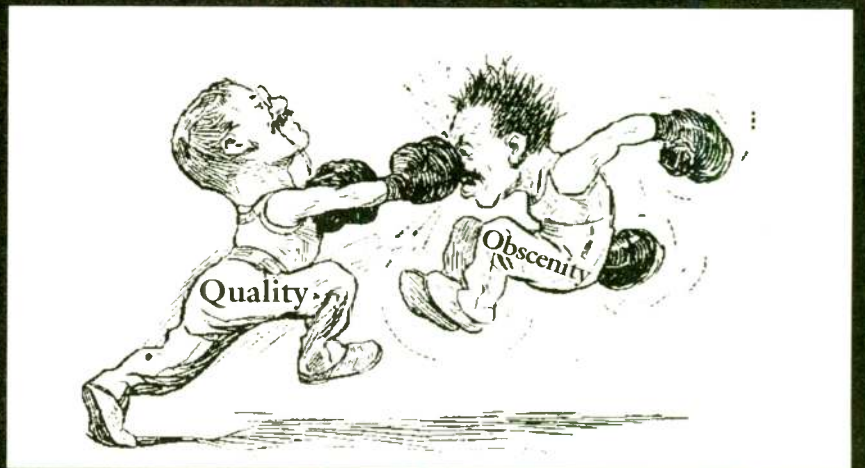


Keep accurate notes of index counter settings, dial calibration and meter readings. A shift away from these points can spell trouble. Of course, your transmission line and antenna live in the great outdoors, so expect some seasonal variation in optimal settings as a function of temperature and humidity.

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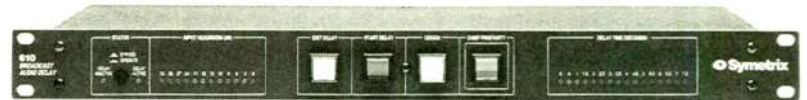
Tom Vernon divides his time between consulting and completion of a doctoral degree. He works for the award-winning WXP(N) in Philadelphia. E-mail at TLVernon@AOL.com or call 717 367-5595.

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Circle (90) On Reader Service Card

More Tips to Improve Power Output

★★★

by John Bisset

SPRINGFIELD, Va. Wow! What a surprise! The e-mail response to this column has been overwhelming, and certainly appreciated.

Many of you got started in this business as a jock, and you probably remember (with me) the nights you spoke on the air, wondering who — if anyone — was listening. Writing a column in a trade publication is similar. You wonder if anyone really reads what you wrote.

To all who have taken the time to send in a tip on supercharging that old Gates transmitter, thanks again. We'll begin with some of your ideas in this month's column.

Thanks also for your words of encouragement with respect to *Workbench*, as they are appreciated.

One of the goals of this column is to provide you with pertinent information as you select equipment to buy or as you maintain existing products. Several columns back, we provided an update on how Tone Commander was handling some problems with their NT-1 Terminal Adapter.

The company has willingly offered to repair or replace NT-1s that "act stupid" when run through certain ISDN repeaters. To that end, Tone Commander president, Steve Hill, sent me a Field Alert statement, which was drafted jointly with Adtran. We reprint the Field Alert in its entirety:

NT1U-220TC field alert Jan. 23, 1996

"We have discovered a compatibility problem in some specific applications involving the Tone Commander NT1U-220TC, Rev. G and prior, and the Adtran U-Repeater III, Rev. F and prior, which may cause longer than normal U initialization. In the configuration, where active terminal equipment is connected to the NT1 and the NT1 is routinely powered up and down, these initialization delays may be unacceptable for some customer's applications.

This compatibility problem is not service affecting, once U initialization is achieved.

Following the recommendations of ANSI T1.601-1992, the Tone Commander NT1U-220TC provides

immediate S/T interface initialization, and will attempt U initialization if an active terminal device is present. The U initialization sequence of the Adtran U-Repeater III and the Tone Commander NT1U-220TC present a timing incompatibility in this initialization process, as a result of the power management activities in the repeater. These timing problems are not exhibited in other Adtran repeater models, and will not conflict with initialization of Tone Commander NT1U-100TC or NT1U-110TC models.

Tone Commander and Adtran have jointly developed a solution that is intended to expeditiously resolve this problem. Tone Commander NT1U-220TC units labeled Rev. H and subsequent revisions will provide timing that is compatible with all Adtran U-Repeaters (past and future releases). Adtran is also providing new firmware that is compatible with all Tone Commander NT1s (past and future releases). In this way, updated units from either company will provide users with complete field compatibility.

For our part, Tone Commander will provide free upgrades for anyone experiencing this problem with the NT1U-220TC. To receive an upgrade, customers should contact our Customer Service Department at 1-800-524-0024 and request troubleshooting assistance.

I apologize for any inconvenience to our customers while we have been identifying and resolving this intricate timing issue."

Stephen R. Hill
President

Mr. Hill has sent updated versions to Multiphase, for use with several of our clients' Telos Zephyrs. We'll keep you posted on the results. Meantime, if you have experienced problems with the Tone Commander NT1, it is obvious the company wants to make things right, so give them a call.

Manufacturing can be a real pain sometimes. In discussions with the folks at Tone Commander, I discovered that they designed the NT1 to the letter of the quoted ANSI spec. What happened was the real world stepped in, and there were some circumstances when the equipment was used in conjunction with Adtran Repeaters and certain data was read as "shut down" commands. These circumstances were not outlined in the ANSI spec and could never have been known until units got into the field.

Unlike some companies that drop you after the sale, Tone Commander has "taken the bull by the horns" and rectified the problem.

We promised some of the great tips to improving power output on that old Gates transmitter. For those of you saving this column, make up a file called "Transmitter Maintenance" and start clipping. These are some really good tips that apply to any make of transmitter.

We'll start with some ideas from Fred Cresce. Though much of his experience was with Motorola Base Stations, Fred listed a number of situations that could cause the PA to fall short of rated power.

The tube manufacturer is the first — is the tube the same brand that was in the transmitter, and is it new? Is the hardware in the PA tank circuit tight and clean? Have you checked the value of the bypass caps? Are any way out of tolerance?

After a safe shutdown and grounding of the HV, are there any PA tank components running hot? Is anything looking hot (purple or color bands indicating overheating)?

Hal Schardin
from WCCO

(AM) in Minnesota added a few tips of his own.

Screen current is affected by transmitter loading, which brings into account the final tank cavity "Q." In some FM transmitters that Hal has worked with, he had to adjust a coupling bar for proper screen current after changing final tubes.

One recommendation that Hal read, but didn't follow, said to load the final tank and reduce its Q so much that you approach negative screen current!

A low Q tank reduces incidental AM, and the wider bandwidth is thought to be better for SCA services at the expense of efficiency.

A low Q cavity could be caused by faulty fingerstock around the cavity door.

Hal also found tubes that required higher than normal screen voltage or higher than normal drive to make the proper screen current, and ultimately make power. Perhaps the grid-1 or screen grid structures within the tube are faulty or, in the case of rebuilds, destroyed through overloads in a past life.

Hal hasn't had great luck with non-U.S. manufactured tubes. One in particular seemed to require excessive drive, and never seemed to tune exactly right.

He raises a good point, because the general manager is constantly pressuring us to save money. What's your experience? Do you get what you pay for?

□ □ □

John Bisset is a principal in Multiphase, a contract engineering and projects group based in Washington. Published submissions to Workbench qualify for SBE Certification credit and can be faxed to 703-764-0751 or e-mailed to wrwbench@aol.com.

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Circle (42) On Reader Service Card

World Radio History

Low-power AM Is Alive and Doing Fine

► continued from page 51

accommodate builders equipped with only simple tools and little instrumentation, restoring a kit-radio can, in some ways, be easier than reviving some manufactured units. This is especially true if you're lucky enough to find a complete original assembly manual.

Some have observed that the real secret of Heath's success was not in the quality of its products, but in the clarity of its assembly manuals. This was brought home to me recently as I worked on a nice little Hallicrafters HT-40. This rig was also offered kit form, created in the mold of the Heath DX-40 (a predecessor

of the DX-60). I had the complete kit assembly manual, but it was so poorly executed, with so many addenda, that I found it virtually useless. Luckily the Hallicrafters unit was so much a clone of the Heathkit that I actually utilized much of a DX-40 manual to accomplish the repair.

It wasn't until I lucked into my own DX-60 that I fully understood its place, deep in the hearts and minds of discerning amateurs. A buddy from the world of SSB mentioned that an acquaintance of his had a small Heathkit AM rig in mint condition. He picked it up for me, knowing my compulsion to adopt wayward boat-anchors. It took several months for it to arrive on my doorstep, but I was really in no hurry. By that time I had a Johnson Viking II. It was a 100 W powerhouse with little need for another low-power rig. I figured that I'd clean the little critter up and just put it on display.

Instantly impressed

When I got the thing, with its matching VFO, I was instantly impressed with its physical appearance — a clean design with a pale green face, deep aqua cabinet and handsome custom knobs. As I took the '60 apart, the thickness of the metal chassis, meticulous shielding and oversized components took me by surprise. There was even a built-in low-pass filter and a well-filtered power supply connection. These measures are so effective that the DX-60 exhibits less TVI and RFI than some modern SSB rigs. The DX-60 only required a few electrolytics, some tubular capacitors and some cleaning.

The cleanliness of the signals coming out of the rig lit a light bulb in the dark recesses of my mind. Maybe I'd finally found the ideal AM exciter for my linear amplifier. AM linear, as it is known, is not a terribly efficient method for producing a higher powered AM signal, but properly set up, it can be an alternative to a behemoth

AM rig like the Globe King or Johnson 500. A well-built legal-limit amp, utilizing two 3-500Zs, for example, can safely produce about 250 W of AM. You can theoretically run about one-fourth the power of your maximum SSB output. Remember, total AM power is not just a function of the carrier. You've got to leave headroom for the sidebands.

Making the little DX-60 even more desirable as an exciter is its controlled carrier method of modulation. The resting carrier level is about 20 W. The carrier level rises to between 40 and 45 W on voice peaks. Properly set, the sidebands

While my original purpose for the DX-60 was an exciter, I have only used it in that context a few times. This doesn't mean that I used the DX-60 only a few times. I just discovered the real spirit of the noble little beast. Just as a lark, I tuned the barefoot DX-60 up for operation in the 40 meter AM window (7.290/7.295 MHz). I was surprised to find that I could contact just about anyone I could hear. The DX-60's real-world capacity seemed to exceed its specifications.

I was experiencing the talk-power of controlled-carrier modulation and the fun of low-power operation. What a better way to challenge the efficiency of one's overall station than to operate with minimal power. I learned from the experience that my 40-meter antenna was very effective. Setting the DX-60 up on 75 meters told me that my 75-meter antenna system could stand some improvement. Running high power can mask inefficiency. I guess that there was wisdom in the basic philosophy of older hams. Running only enough power to make the contact forced them to wring every last bit of performance out of their antennas and feed systems.

Delighted to discover

A few months back, I was delighted to discover that there were other hams devoted to the DX-60 concept, so much so, that they actually created a DX-60 Net. Every Sunday at 2:00 p.m. EST (1:00 p.m. during winter months), Jim McClellan, N8LUV, calls the roll for the DX-60 Net on or about 7.290 MHz. Over 800 hams have checked into the Net over the past three years. The DX-60 Net is open to all, but emphasizes low-power, low-level AM operation.

The Net serves as a clearinghouse for DX-60 modifications such as adding 160 meter capability and push-to-talk operation. Another attraction is a Swap and Shop. The Net was originally founded by Jim and fellow DX-60 devotee, Scott Richards, WB8RAV. Jim's dedication to the Net is challenged weekly, as he pulls all of the little signals out from under the noise and behemoth short-wave broadcast stations. It is the kind of challenge real hams can't resist. Three consecutive check-ins, or five over a 12-month period, entitle participants to a beautiful certificate.

The DX-60 cult and the entire low-power, low-level concept also have significance to hams using Japanese-made rigs. Over 20 percent of net check-ins are using modern imported rigs. The way these rigs generate AM qualifies them as worth successors to the DX-60 legacy.

Over the weeks to come we'll be talking more about getting the most out of your modern rig in the AM mode.

We'll also be exploring the opposite end of the AM universe, the conversion of retired broadcast transmitters to amateur use.

Al Parker writes about photography and amateur radio. He can be reached at 516-681-6733.

The renewed interest in AM has stimulated a kind of nostalgia for what were once considered Novice rigs.

never extend beyond the appropriate level of carrier. On the oscilloscope it looks like pulsating AM. The hidden advantage, to those interested in using the DX-60 or other controlled carrier rigs as exciters, is that the duty cycle is lower than conventional AM. The maximum carrier level is only attained on voice peaks. This reduces the strain on an amplifier between words. In this way, controlled carrier modulation is like sideband.

The amplifier will run cooler for a given level of maximum output power. The downside is that it can be very messy if over-driven. The DX-60 puts out a bit too much power to drive most legal limit amps at the 200-250 W level.

It may be necessary to install a padding device (usually a network of resistors) between the rig and amp. The pad is a kind of power sponge, safely dissipating the excess exciter power in heat. You will probably want to cut the exciter's output in half for best results.

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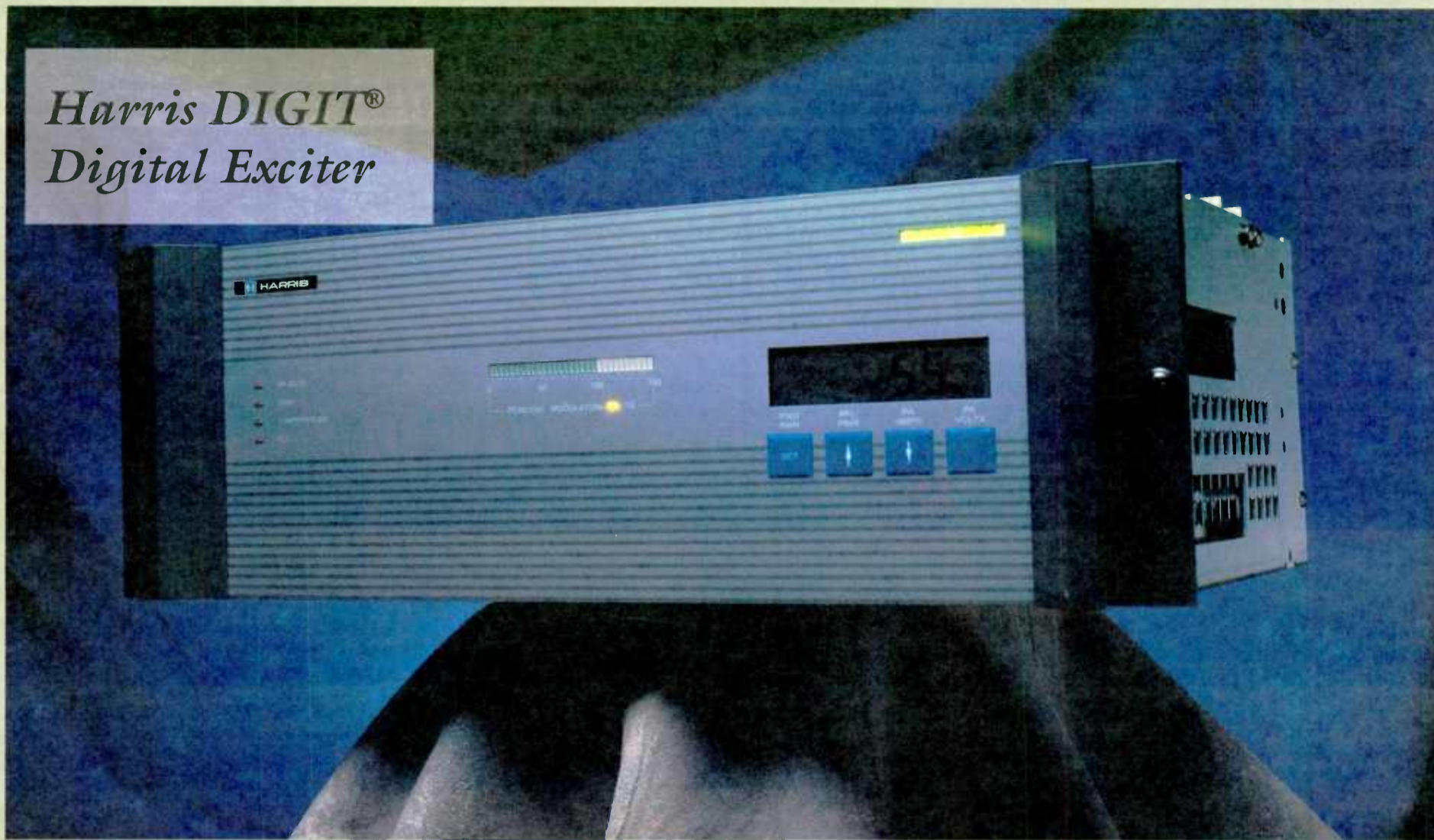
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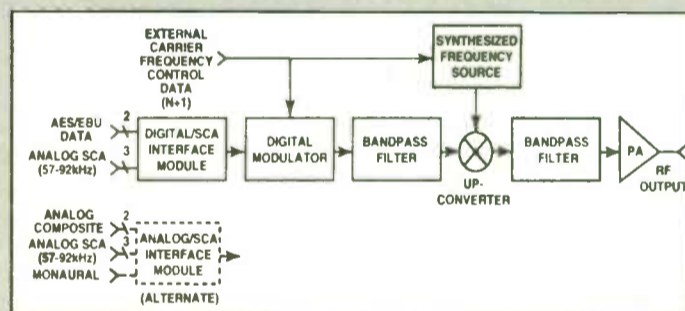
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PAGE #1	Record	Autoroll	Cuts List	Swap		Option Menu
POT 1 (A/S)	POT 2 (A/S)	POT 3 (A/S)	POT 3 (LOCAL)	POT 4 (LOCAL)	POT 4 (LOCAL)	
A APRIL BLOSSOM 00:15 1	B WAGON WHEEL 00:19	C KARLS APPLIA 00:59	D BAKERY CAFE 00:19	E CINNAMON 00:02	F JACKS PLACE 00:08	
G LARRYS RV 00:31	H HDA 00:03 2	I VoiceTRAC fo 00:15 3	J DUDDENS 00:45	K EBS 00:50	L HIRSHFELDS 00:03	
M RADIO SONG 04:08	N DAYBREAK 03:41	O NOTHING'S NE 02:59	P MANDY 03:14	Q WALKIN' AWAY 02:47	R NOBODY'S HOM 03:26	
S LINER A	T LINER B	U LINER C	V LINER D	W LINER E	X LEGAL ID	
1 2 3 4 5 6 7 8						
Sat Mar 2, 1996		POT	Insert	Delete	Mark	
55° High: 58° Low: 32°			17:48:00 ReSync			
06:36:32 PM		1	(0:02) NOTHING'S NEWS CLINT BLACK	02001-01	Adjusted 00:02:59	
23:28			Spot Block		00:03:25	
KOGA FM # 2		2	TOWN AND COUNTRY (GEORG)	07600-01	00:00:21	
SHIFT #04 BILL SMITH	MANUAL MODE	3	KARLS APPLIANCE 1 (John M.)	52060-02	00:00:59	
Block Fill ON	Default Source 01	1	B AND J HITCHING POST (E. LEMOYNE)	52015-02	00:00:13	
Run UDE	Special Menu		Variety center Update Sale (Georg)	40050-01	LiveCopy	
?	Station Data	2	JACKS PLACE	52010-04	00:00:08	
EXIT	Reports		Clipboard-0	Last Delete-0	Hold Bin-27	-02:31
	End F11					Play - Pause
	Skip F12					

Version 5

Live Show Interface (LSI)

The centerpiece of Version 5 is the new Live Show Interface (LSI). This new interface allows the D-J to run even the most high energy shows smoothly. Fully utilizing the power of Windows, the Live Show Interface features:

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- ◆ **Audio Source Management**
Version 5 allows the D-J to specify which audio card a commercial or song will play out of ahead of time. It is easy to pre-position sliders and to crossfade items. Plus, Version 5 actually allows six stereo audio events to play simultaneously for each control room!
- ◆ **Fully Touch Screen Compatible**
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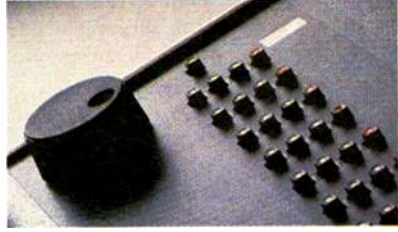
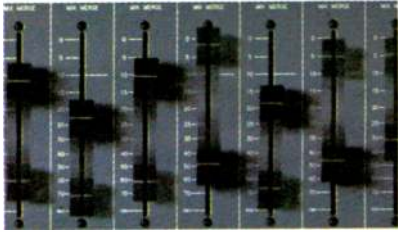
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Proper Main Filter Key to Diplexer

Part II
by Jerry Westberg

QUINCY, III. Last time we discussed the importance of a prematcher to an AM diplex system. The prematcher is important to bandwidth, rejection and component stresses in a diplex system.

In this article we will look at the main filter. Choosing the main filter components is probably one of the most important parts of designing a diplexer. Each main filter affects the bandwidth at both frequencies and the attenuation of the unwanted signal. The components in the main filter will have the highest stress of any components in the system. They must handle the stress of both the pass and reject frequencies.

There are basically two types of main filters used for a diplex system. They are the parallel main filter and the series main filter. The series main filter, which is pictured in Figure 1, is most often used. The parallel main filter, pictured in Figure 2, is just as good in overall performance of the diplex system. Each type of filter will have one component type change (capacitor to inductor or inductor to capacitor), depending on whether it is located on the high- or low-frequency side of the system.

The equations for the design of each type of filter are given in Table 1. The equations assume you have chosen a value for C1.

After examining the equations for each

of the filter types, there are two questions that must be answered to design the main filter. The first question is, how do you choose C1 for any particular filter type? There is a two-fold answer to this problem. If you are not going to use auxiliary filters, C1 should be chosen so that Q_L and Q_H are equal. This will give the minimum total Q added to the system.

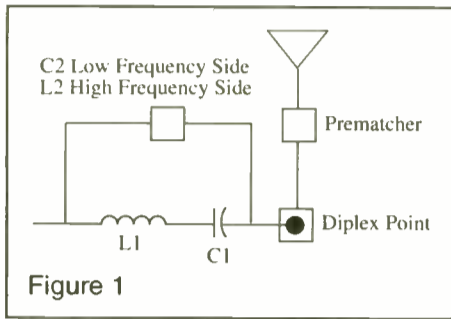


Figure 1

Choosing Q_L and Q_H to be equal in value tends to give the lowest stresses on the components of the filter.

If auxiliary filters are going to be used, the Q value on the side the filter is placed can be chosen to be higher than the other Q value. For example, if auxiliary filters are to be used and you are designing the main filter on the low frequency side, Q_L can be chosen to be higher than Q_H . The additional stored energy on the low-frequency side can be canceled by the stored energy in the auxiliary filter. This technique is known as Q-matching. (Copies of the paper "Diplex Design: Q-Matching Techniques," which appeared

in the 1989 NAB proceedings, are available from the author). Q-matching involves choosing the Q of the auxiliary filter to be the same as the Q for the main filter, and will be discussed briefly in the next article on choosing an auxiliary filter.

The second question in determining the main filter design is which type of filter to use, series or parallel? As mentioned above, both filter types will give the same bandwidth and attenuation performance. So, if you are designing for performance it does not make any difference.

Component stresses should be the determining factor in choosing the type of filter. It may be that the components in the

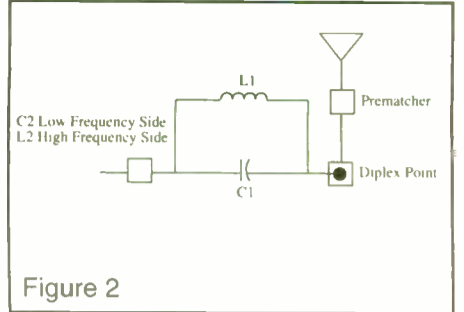


Figure 2

series main filter for a particular design are easier to find or less expensive than the parallel main filter equivalent. Most people are used to seeing a series main filter in the design, so the parallel main filter is overlooked.

Both filter types should be checked before determining the type. Only stresses and availability of parts should be the determining factor. continued on page 61 ▶



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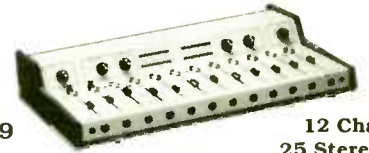
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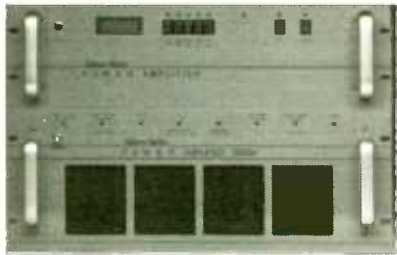
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Choosing a Main Filter

► continued from page 59

determining factors in choosing the type of main filter. It is beyond the scope of this article to give the equations for the stress of each component in the design of the filters, but I have included some guidelines on calculating component stresses.

Stresses for each frequency on any particular component are calculated using superposition. That is, calculate the current at one frequency, then the current at the other frequency, separately. The same is done for voltage stresses. RMS currents are added in quadrature. The RMS value is used for current because heating is the main concern. Also, a multiplier (M_T) should be used to account for modulation

and safety. I use a value between 1.5 and 1.7 depending on how sure I am of the impedances of the system.

Use the formula: $I_T = \text{SQRT}(I_L^2 + I_H^2) \times M_T$; where I_L is the RMS current at the low frequency and I_H is the RMS current at the high frequency.

Voltage stresses should be added. A multiplier (M_V) is factored in to account for modulation, RMS to peak conversion and safety. A value of 4.5 should be sufficient for 125-percent positive peaks. It should be noted that vacuum capacitors are devalued to 60 percent of their DC rating. A CFDS-1000-10 vacuum capacitor only has a rating of 6 kV, not 10 kV, at RF. Use the formula: $V_T = (V_L + V_H) \times$

M_V where V_L is the RMS voltage at the low frequency and V_H is the RMS voltage at the high frequency.

Using the example from last time, design the main filter for the low-frequency side. If a .001mF capacitor is used in series with the antenna, the following values in the box below apply.

If an auxiliary filter is not going to be used, and a series main filter is to be used, a C1 of 400pF will give Q_L and Q_H to both be 5.5. This would be a total system

Frequency	Impedance	R_p	Voltage	Minimum Main Filter Q
800 kHz	90 - j 49	117	342	5.5
1000 kHz	381 + j 151	441	664	1.4

Q of 11 ($Q_L + Q_H$). L1 would then be 99mH and C2 would be 711pF. The RMS voltage stresses on each component are as follows. Each calculated stress would need to be multiplied by the appropriate

safety factor to choose a component.

If an auxiliary filter is used to compensate for the stored energy in the main filter (Q-matching technique), C1 could be

RMS	Voltage	RMS Current
C1	2.8 KV	4.5 Amps
C2	.7 KV	3.0 Amps
L1	—	4.5 Amps

200pF. This gives a Q_L of 11.1 and a Q_H of 2.7. The auxiliary filter should be chosen to also have a Q of 11.1. This will compensate for most of the stored energy giving an equivalent Q_L of 3.0. This new system will have a total Q of 5.7. In the next article, the antenna resonator and auxiliary filter will be discussed.

Jerry Westberg designs AM transmitters at Broadcast Electronics, Inc. and also writes Phasor and Diplex software. He can be reached evenings at 217-223-5702.

Table 1

- $W_L = 2 \pi \times F_L$
where F_L is the low frequency
- $W_H = 2 \pi \times F_H$
where F_H is the high frequency
- $F = F_L / F_H$
F is the frequency ratio
- $Q_M = 1 / (1 - F^2)$
 Q_M is the Q multiplier
- $R_L + j X_L$ is the diplex point impedance at the low frequency
- $R_{PL} = (R_L^2 + X_L^2) / R_L$
 R_{PL} is the parallel resistance of the diplex point at the low frequency
- $R_H + j X_H$ is the diplex point impedance at the high frequency
- $R_{PH} = (R_H^2 + X_H^2) / R_H$
 R_{PH} is the parallel resistance of the diplex point at the high frequency

Series Main Filter — LF Side

- $L1 = 1 / (W_L^2 \times C1)$
- $C2 = (C1 \times F^2) / (1 - F^2)$
- $Q_L = 1 / (W_L \times C1 \times R_L)$
 Q_L is the Q added to the system due to this filter at the low frequency
- $Q_H = Q_M \times R_{PH} / (W_H \times L1)$ Q_H is the Q added to the system due to this filter at the high frequency

Series Main Filter — HF Side

- $L1 = 1 / (W_H^2 \times C1)$
- $L2 = (1 - F^2) / (W_L^2 \times C1)$
- $Q_L = Q_M \times R_{PL} / (L2 \times W_L)$
- $Q_H = 1 / (W_H \times C1 \times R_H)$

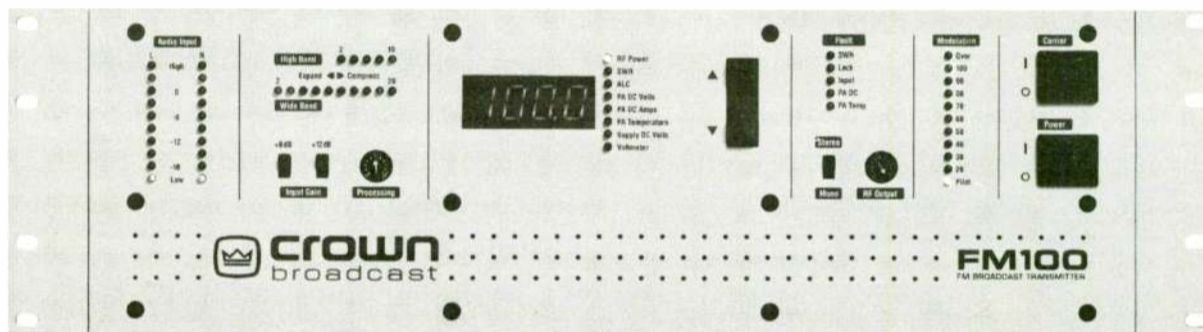
Parallel Main Filter — LF Side

- $L1 = 1 / (W_H^2 \times C1)$
- $C2 = C1 \times (1 - F^2) / F^2$
- $Q_L = Q_M / (W_L \times C2 \times R_L)$
- $Q_H = R_{PH} \times W_H \times C1$

Parallel Main Filter — HF Side

- $L1 = 1 / (W_L^2 \times C1)$
- $L2 = 1 / [(W_H^2 - W_L^2) \times C1]$
- $Q_L = R_{PL} \times W_L \times C1$
- $Q_H = (W_H \times L2 \times Q_M) / R_H$

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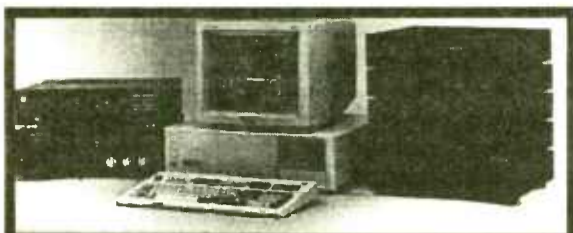
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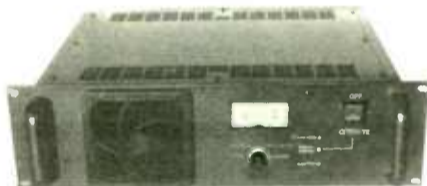
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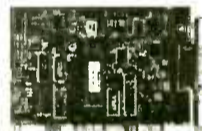
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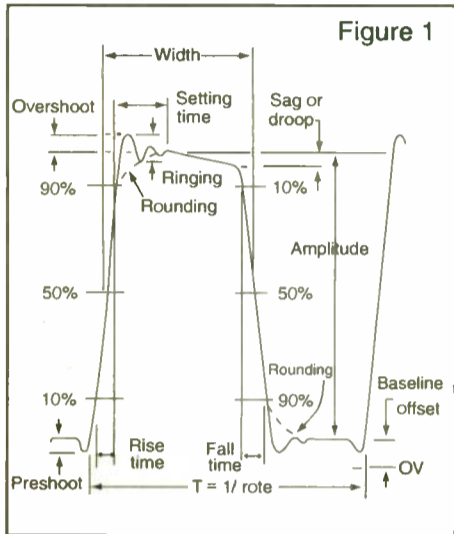
Analyze Audio with Square Waves

by Jim Somich

BROADVIEW HEIGHTS, Ohio A compact, portable, precision square wave generator is a handy addition to your test equipment arsenal. High-quality audio square waves are very useful in measuring the performance of audio devices.

A square wave is a very difficult signal for audio equipment to handle. Even the best equipment will distort the wave to some degree, especially at the frequency extremes.

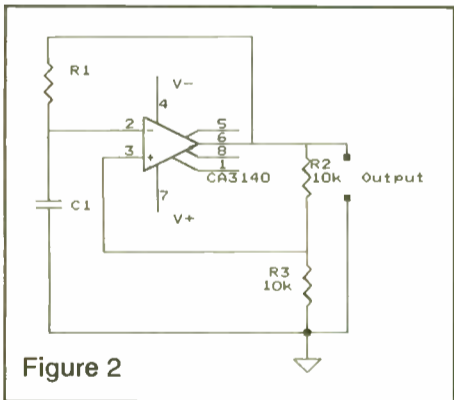
Square waves are used to determine the



time-domain equivalents of amplitude and phase versus frequency measurements. The appearance of the output waveform from the device under test gives much qualitative information about its behavior.

Quantitative measurements can also be obtained from the square wave response. The most common of these are rise time, overshoot, ringing, tilt and slew rate. The first four are measurements of the linear behavior of the device and may be related to the frequency-domain behavior.

The overshoot of a device is the amount



by which the peak of the square wave exceeds steady-state positive or negative amplitude. Large overshoots are indicative of peaking or excess phase shifts in the high-frequency response of the device under test. Ringing is the tendency of band-limited square waves to oscillate on the peaks. Tilt is a measure of low-frequency behavior.

As low frequencies are filtered, phase shifts are introduced that cause the leading edge of the square wave to rise and the trailing edge to fall. This produces a tilt to the top and bottom of the square wave. The tilt is usually expressed as a percentage of the peak amplitude of the square wave. Slew rate is a measure of how fast a signal changes from one instantaneous value to another.

The ideal square wave instantly

changes from one amplitude extreme to the other. Practical devices cannot keep up with this transition and will often have a maximum speed with which they can change.

This speed limitation will result in a tilted straight-line (vertical) portion of the square-wave edge. This should not be confused with the exponential rounding of square-wave edges that results from a high-frequency rolloff.

The effects of bandwidth limiting are linear; the effects of slew-rate limiting are not. A simple way to determine whether a signal is slew-limited is to increase the signal amplitude. A bandwidth-limited signal will make the

transition in the same time; a slew-limited signal will take longer.

Figure 1 defines rise time, overshoot, ringing and droop. Op-amps will produce better square waves than multivibrators.

Figure 2 shows how to configure an operational amplifier as a relaxation oscillator. The circuit's output switches alternately between the op-amp's positive and negative saturation levels.

The voltage divider, formed by the junction between resistors R2 and R3, feeds back a fraction of this voltage to the op-amp's non-inverting input pin, a requirement for oscillation. Resistor R1

continued on page 64 ▶



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Square Wave Generator

► continued from page 63

and capacitor C1 form a time-constant network.

When the output of the op-amp is high, capacitor C1 charges through resistor R1 until its voltage reaches the positive value set by the R2-R3 divider.

The op-amp's output switches positive again, and the sequence repeats, generating a symmetrical square wave at the output of the op-amp and a triangular waveform across capacitor C1.

Figure 3 is a precision four-decade 2 Hz - 20 kHz op-amp square wave generator.

Although most any op-amp can be used, The Harris Semiconductor CA3140 is ideal. It has fast rise and fall times and produces a more sharply defined waveform than common op-amps.

Pots R1 to R4 permit the precise setting of each of the four channels within overall frequency range when preset.

The four ranges are 2 Hz to 20 Hz, 20 Hz to 200 Hz, 200 Hz to 2 kHz, and 2 kHz to 20 kHz. The circuit should be constructed using good layout techniques. It is non-critical, but keep

lead lengths direct and short.

A small piece of perf board makes a good basis for the construction or you can etch a small circuit board.

The finished battery operated unit can be installed in a small plastic enclosure to protect it in your toolbox.

□ □ □

Jim Somich is a radio broadcast engineering consultant and president of MicroCon Systems Ltd., a manufacturer of broadcast equipment. He can be reached at 216-546-0967.

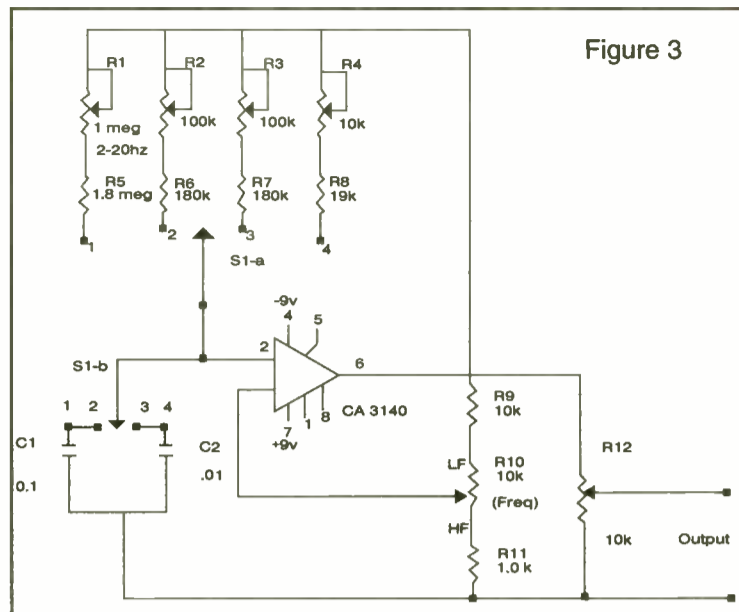


Figure 3

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64 Years Ago

Reprinted from Radio World
April 30, 1932.

Editor's note: The RW of old, printed for a time in the 1920s and 1930s and today's RW are unrelated except in name.

BOARD HEARS DOOM PROPHECY

Washington.

Unable to arrive at a conclusion even after having received the report of its chief examiner, Ellis A. Yost, who had held a protracted hearing on the case, the entire membership of the Federal Radio Commission turned out for a new hearing on the wave squabble between WMCA and WNYC, both of New York City.

WNYC is municipally operated. WMCA is owned and operated by the Knickerbocker Broadcasting Company, which also controls WPCH.

WMCA proposes that the 810 kc channel of WPCH be assigned to WNYC, so WPCH and WMCA will share 570 kc, which WNYC and WMCA now share. But WNYC objects, on the ground it has held 570 kc since 1924, when it went on the air, and that 810 kc is a "graveyard" channel. The examiner recommended that WNYC not only be kept on 570 kc but be given more time, the extra amount being taken from WMCA's time.

Counsel for WMCA said that the station spends more money each year than any other regional station. He gave the following figures: investment, \$100,000; revenue, \$500,000; expenses, \$340,000.

WNYC contended that as it is a non-commercial station it is entitled to more time and should not be shifted to an undesirable frequency. Edward P. Joyce, Jr., of counsel for the municipal station, predicted that it will be going strong in years to come, when all commercial stations are off the air. He intimated blurb advertising is killing interest in commercial stations, whereas municipal and other non-commercial stations are rendering real and enduring service.

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Symetrix CL-150 fast RMS compressor/limiter, \$175. D Kelly, KWPN, Box 84, West Point NE 68788. 402-372-5423.

Texar Audio Prizm (2) w/manual, in gd cond, \$1300/pr. J Davies, WMT, 600 Old Marion Rd NE, Cedar Rapids IA 52402. 319-395-0530.

CRL SPP800; (2) SEP 400; stereo gen, all in excel cond, BO. Howard, KXGO, 215 Fourth St Ste A, Eureka CA 95501. 707-445-8104.

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Teletronix LA-2A's, UREI LA-3A's & LA-4's, Fairchild 660's & 670's, any Pultec EQ's & any other old tube compressor/limiters, call after 3PM CST, 214-271-7625.

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Tascam 38 1/2" 8 track R-R, BO/trade. S King, KMML, 1703 Avondale St, Amarillo TX 79116. 806-355-9777.

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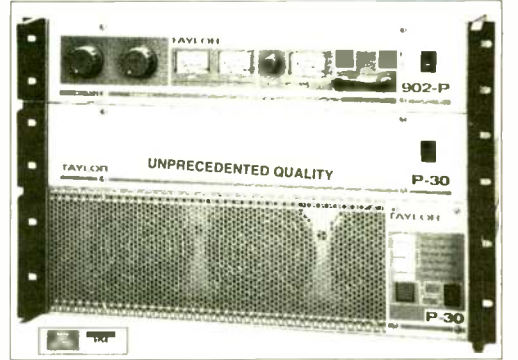
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 PO Box 1214, Falls Church, VA 22041
 Attn: Simone Mullins



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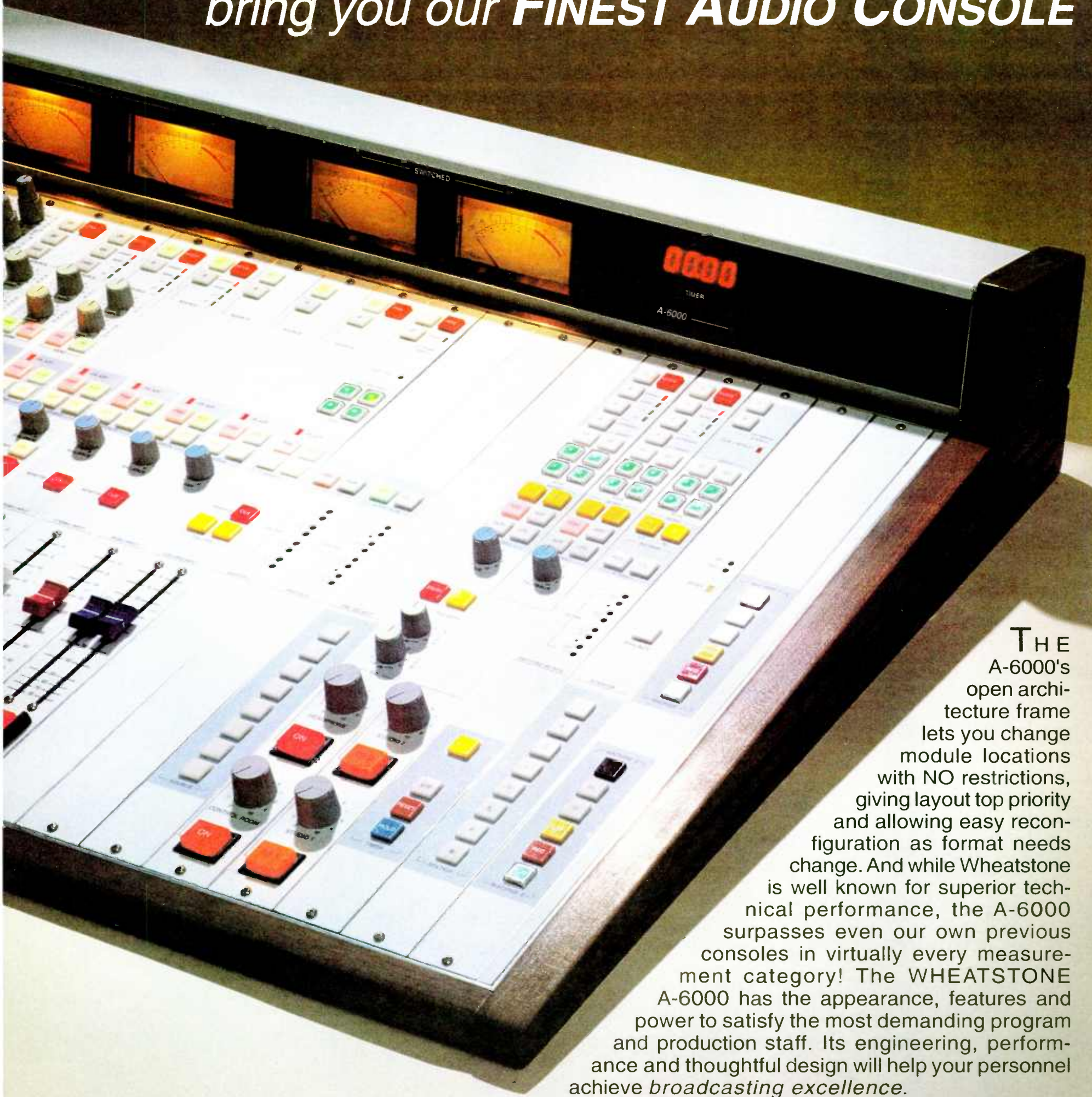
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