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See pages 32 to 39

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Class A's to Deny NAB Dues

by Alan Carter

Washington DC ... Some Class A FM broadcasters intend to withhold 50% of their NAB dues to protest the association's opposition to a 3000 W across-the-board power hike for Class A's.

The move, centered mainly in Connecticut, Rhode Island and New York, is a show of support for the New Jersey Class A Broadcasters Association, which successfully petitioned the FCC to propose a rule making for a power hike from 3000 W to 6000 W. Broadcasters withholding full payment of dues to NAB said they will donate the money to the New Jersey group.

In response to the action by Class A's, NAB President and CEO Eddie Fritts

sent a letter to Class A broadcasters explaining the association's position. He claimed "a great deal of misinformation about the nature of NAB's position" has been circulated.

NAB supports a power increase for Class As, provided the action does not create new interference for existing FMs, Fritts stated. NAB also "prefers" that the Commission grant power increases based on individual applications because the agency can continue to record how each station is implementing the power increase.

"While not specifically addressed by the board (of directors), a 'blanket' power increase probably would not be opposed provided the Commission's implementation strategy successfully pre-

vents creation of new interference," Fritts wrote.

Position statement

Asked if the NAB is backing down from its opposition to a blanket power increase, NAB spokeswoman Susan Kraus said the association "probably" would not oppose a blanket increase if the FCC established a method to grant the increases without creating new interference.

"Most importantly, we want integrity of the spectrum to be maintained," Kraus said.

NAB Science & Technology VP Michael Rau said NAB's "preference and main position" has not changed. "The big concern is protection against interference," he said. "The process that you use to get there is of less concern."

The NAB "left the door open" in its pleading on the rule making for other
(continued on page 7)

Congressional Action Slated for AM Stereo?

by John Gatski

Washington DC ... A bill authorizing a single AM stereo standard introduced in the waning hours of the last session of Congress will likely be reintroduced again when Congress reconvenes next year.

Rep. Matthew Rinaldo (R-NJ) introduced the AM Radio Improvement Act (HR-5499) 11 October during a last minute flurry of congressional activity. The bill, however, did not have time to move through the legislative process.

Terry Haines, Republican counsel for the House Energy and Commerce Committee, helped put the bill together and said he is "fairly confident" the bill will be reintroduced.

If approved, the bill would require the FCC to begin deliberations on selecting a standard within 60 days and choose an AM stereo standard within six months after the legislation goes into effect.

Saving AM

With a high concentration of AM stations in the New Jersey and New York area broadcasting in Rinaldo's district, Haines said, the congressman is concerned about the band's nationwide decline in recent years.

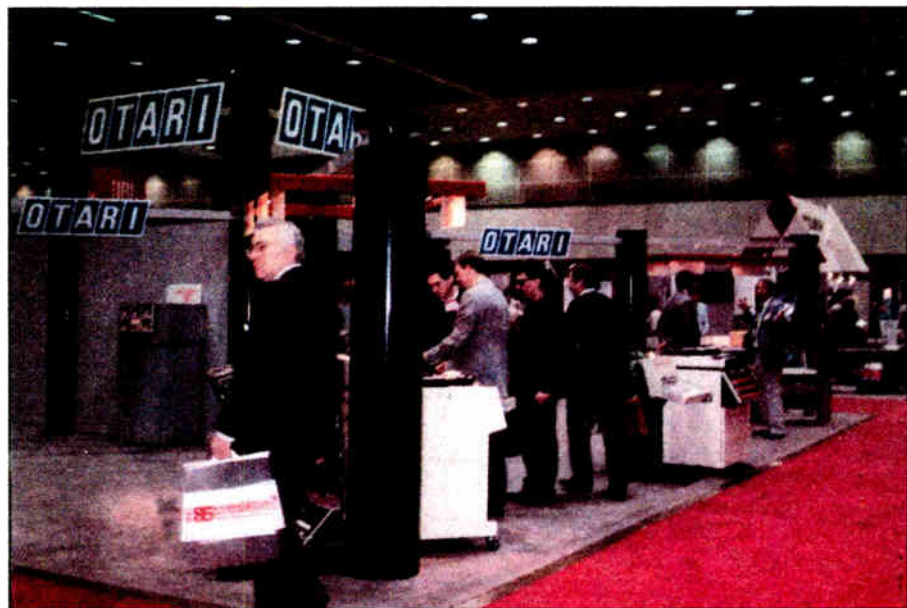
In co-sponsoring the legislation with Rep. Don Ritter (R-PA), both congressmen, who are members of the Energy and Commerce Committee and its Telecommunications Subcommittee, believe AM stereo holds enormous significance for AM's future.

In comments introducing the bill, Rinaldo said the FCC's refusal to choose either the C-QUAM AM stereo system developed by Motorola, the ISB system invented by Leonard Kahn or any other AM stereo system has accelerated the de-

mise of AM radio.

Less than 15% of AM stations now broadcast in AM stereo, the largest segment utilizing the C-QUAM system. Proponents of a single standard are convinced that the market's reluctance to accept AM stereo is being prolonged by not having a standard.

In 1981 and again in February, the FCC declined to choose a system because, ac-
(continued on page 17)



The 85th AES show in Los Angeles brought a glimpse of the audio future. See coverage, p. 14.



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Emmis Swaps Signals in NY

by Charles Taylor

New York NY ... Like most mornings, Frank VanDyke of Oakland, NJ, got into his car, turned the key and tuned in to 97.1.

Only this time, instead of hearing his usual country fare, VanDyke heard the less traditional verbiage of rap music.

"It took me a little while to realize what was going on," he said. "I knew the Judds had never sounded liked that."

Fortunately, thanks to a city-wide media blitz, VanDyke and an estimated 2.6 million other New York radio listeners realized that this must be the day when WYNY at 97.1 and the urban contemporary-formatted WQHT at 103.5 swapped frequencies, the first time such an event has occurred in a major radio market.

The flip-flop is one of several recent changes in New York's radio market as a result of some major maneuvering by broadcast conglomerate Emmis Broadcasting after the purchase in March of five radio stations from NBC, which
(continued on page 3)

FCC FILES

To file a petition or comments with the FCC, send an original and five copies of your filing to the Office of the Secretary, Federal Communications Commission, Washington DC 20554. When filing comments in support of another party's petition or comments, send a copy of your filing to the original petitioner and provide the Commission with a signed statement verifying that this has been done. For more information about a particular proceeding, call the contact person listed.

NRSC

Reply comments are due 22 December on an FCC proposed rule making that would make the NRSC audio standard mandatory and also include an RF emission standard.

Comments were to be filed 22 November with broadcasters expected to push for the audio standard without mandatory application of the RF mask.

The Notice of Proposed Rule Making, MM 88-376, was adopted 20 June. Comments are being sought on either the audio (NRSC-1) or transmission (NRSC-2) standard or a combination.

A second part of the NPRM, which stems from the FCC's inquiry into AM

improvements begun in 1986, would give AM stations the option of proposing facilities whose coverage area would be subject to some interference from other stations.

NRSC-2, the RF emission standard or "RF mask" that addresses the signal from the transmitter out, has a station's signal parallel to the NRSC audio standard to 10 kHz.

For information on MM 88-376, contact Hank VanDeursen at the FCC, 202-632-9660.

AM Synchronous Transmitters

The FCC was expected to act imminently in mid-November on a proceed-

ing examining the feasibility of AM synchronous transmitters.

Action has been delayed more than a year because of problems in obtaining data on transmitter tests.

The Association for Broadcast Engineering Standards recommended that the Commission suspend or terminate proceedings until test results are more complete. The NAB also asked the FCC not to issue a rule making until there is "significant and consistently positive data" on experimental operation of the transmitters.

The docket is MM 87-6; contact Jim McNally at the FCC, 202-632-9660.

AM Band Expansion

FCC action was expected by year end or early 1989 on a plan to implement the expanded AM band. The FCC proposed adding 10 new channels under a national licensing plan by 1 July 1990.

CBS, the Association for Broadcast Engineering Standards (ABES) and the NAB filed comments against the concept

of national licensing.

ABES urged the Commission "to avoid using the new channels as an administrative test tube to introduce radical changes in the traditional regulatory approach to the issues of diversification of ownership and network broadcasting."

The NAB cautioned that "an undeveloped, short-sighted regulatory scheme could lead to the kind of interference climate, application processing dilemmas and other problems with which the Commission currently is grappling in other parts of the broadcast spectrum."

But the three groups supported the Commission's suggestion that assignment preference go to current daytime-only stations. They also recommended a stay of duopoly rules to allow those stations to operate both their daytime frequency and expanded-band station until the new band frequency has had time to prosper.

For more information on this issue, Docket 84-467, contact Wilson LaFollette at the FCC, 202-632-5414.

FM Translators

The FCC is evaluating comments on two separate dockets that examine FM translators.

Under MM 86-112, the FCC and industry organizations are debating a 24 March ruling that allowed noncommercial translators to use "alternative technologies" for signal delivery. Previously, the translators were required to be fed by an over-the-air link.

The NAB, National Public Radio (NPR), the National Federation of Community Broadcasters (NFCB) and the Association of Maximum Service Telecasters in May filed a motion of stay with the FCC, claiming the rule making would deplete currently limited noncommercial educational FM spectrum, undermine localism and community access to local spectrum, create a land-rush application process and lead to interference on the reserved FM band and to channel 6 TV stations.

Under Docket MM 88-140, the FCC is studying the effects of translators on full-power stations, looking at relaxing rules, competition from additional licenses and

(continued on page 8)

NEWS BRIEFS

Jorgenson Joins Hubbard

Tampa FL ... NAB Joint Board Chairman Wallace Jorgenson has joined Hubbard Broadcasting Inc. as executive vice president in government and industry relations and strategic planning.

Jorgenson, 65, retired 1 November as president of Jefferson-Pilot Communications, Charlotte, NC.

Jorgenson will be based in Tampa. Hubbard, headquartered in St. Paul, MN, owns one AM, one FM and nine TV stations in Minnesota, Florida and New Mexico.

"After 47 years in broadcasting I still thoroughly enjoy this industry," Jorgenson said. "I'm not ready to retire and leave the profession."

Satellite Funding

Washington DC ... President Reagan has signed legislation reauthorizing funding for the Corporation for Public Broadcasting (CPB), including \$200 million earmarked for replacement of pub-

lic broadcasting's aging satellite.

The authorization bill covers fiscal 1991-1993. Reagan already signed legislation appropriating funding for 1991, including \$56.8 million toward the satellite.

The satellite, Westar IV, will go dark in 1991.

PBS is looking at vendors to replace Westar IV, and considering two systems, either a four C-band, two Ku-band system or a six Ku-band system.

NAB Announcements

Washington DC ... Several staff announcements have been made by NAB.

Lynn Claudy has joined the Science and Technology Department as a staff engineer. He was manager of communications engineering operations for Hoppmann Corp., Chantilly, VA, a company specializing in specification, design and implementation of advanced communications systems. He also is an adjunct professor of physics at The American University where he teaches acoustics

and the fundamentals of audio technology.

Ralph Justus, director, engineering, regulatory and international affairs, has been elected president of the Institute of Electrical and Electronics Engineers' (IEEE) Broadcast Technology Society.

Donna Leonard has been named director of Radio Membership. She formerly was director of marketing at a Washington communications firm and also held similar positions at WWYZ-FM, Hartford, CT; WKRL-FM, WUSA and WFLA, Tampa, FL, and at Cox Broadcasting, Atlanta.

Station Totals

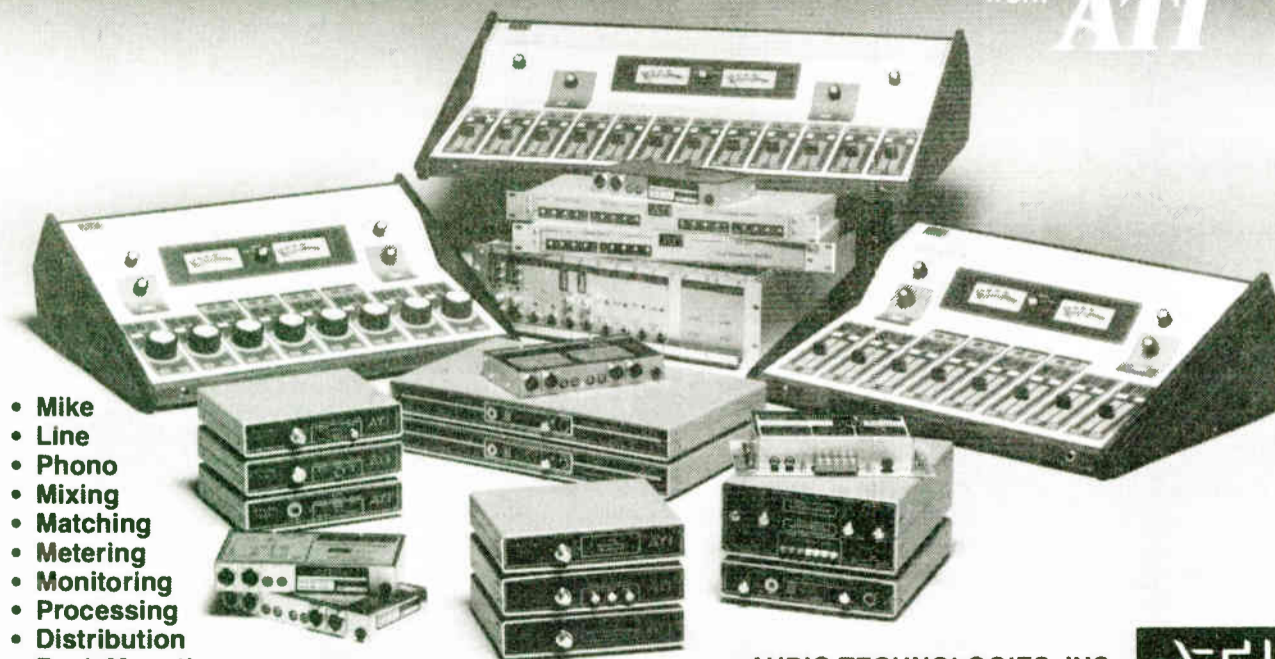
Washington DC ... The FCC said there were 10,416 AM and FM stations broadcasting as of 31 October.

The breakdown included 4,923 AMs; 4,127 FMs and 1,366 FM educational stations.

The report also showed there were 1,634 FM translators in operation.

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NY FMs Flip-Flop Frequencies

(continued from page 1)

decided to sell its radio O&Os. Two of Emmis' new stations—WYNY and WNBC-AM—served New York, but since the company already owned WQHT-FM and WFAN-AM in New York, one-to-a-market rules forced it to sell one AM and one FM.

Retired WNBC

On the AM side, Emmis decided to retire WNBC after 66 years of service to the city, and on 7 October, it moved the all-sports WFAN, which had been at 1050, to WNBC's former home on the dial at 660.

It then sold the license for 1050 to the Spanish Broadcasting System, which for now is simulcasting its programming at 620 and 1050.

The move of WFAN to a new frequency is expected to dramatically improve the station's chances for success, according to WFAN's Director of Promotion Steve Sloane.

First, the station's antenna position fills in numerous nulls that prevented even coverage throughout New York and the New Jersey suburbs. And because of a non-directional antenna, its 50,000 W now cover a wider area.

"On a clear night, we now reach 38 states," Sloane said.

As a result, advertising already has increased, including a number of new national accounts, he said.

Also, the station expects to profit from the inheritance of Don Imus, a popular DJ in morning drive, who has been with WNBC for decades.

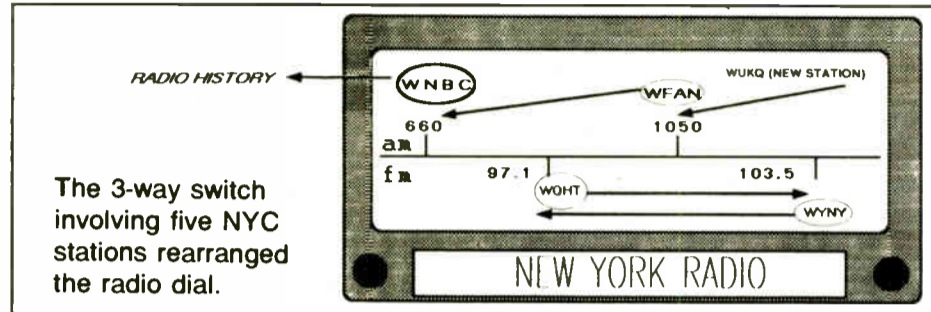
On FM, meanwhile, Emmis decided to

sell WYNY and hold onto its WQHT, in which it had heavily invested and which has been profitable for the group owner.

Before it sold WYNY to Westwood One, however, it decided to swap transmitter sites and frequencies, giving WQHT a more consistent signal. The swap also placed WQHT in a more competitive place on the dial, between two

back-up. WYNY, meanwhile, fed its program through the phone lines into the station's new transmitter site.

"Prior to the switch, we had to transfer monitoring equipment because we were using Belar modulation monitors in the studios, which were fixed frequency," said WQHT CE Jim McGovern, "so we had to swap out our mod moni-



stations with similar music formats.

Despite intense promotional efforts—including TV spots, billboards and subway and newspaper ads, as well as an appearance by Vanna White to debut WQHT's new "Hot 97" logo at a \$100,000 premiere party—the technical end of the FM frequency swap was one of the less expensive and least difficult elements, according to Al Kirschner, director of engineering for Westwood One radio.

"There was nothing voodoo about it," he said.

The actual process began the morning of the switch, 22 September, when both stations hooked into program phone lines.

WQHT used a microwave link for both sites—World Trade Center and Empire State—and the phone lines only for

tors so that we could feed the air studio with the proper (off-air monitor) audio."

Then at 5:30 AM, the frequency switch took place.

We just switched to country

"When we switched over to country on 103.5," McGovern said, "we just switched over from our microwave feeding it to their phone lines feeding an Optimod."

For WQHT, the signal swap will fill in nulls in midtown Manhattan and in New Jersey, McGovern said.

"We've basically got our metro

blanketed at this point," he said. "You can go into shops in Penn Station and walk around the street with a Walkman on, whereas with 103.5 it was touch and go.

"The frequency switch is going to be instrumental in getting the station where we want to be—Number 1," he added. In summer Arbitrons, WQHT was the city's Number 3 station, WYNY was Number 17 out of about 40 surveyed stations.

Of course, by taking on WQHT's former transmission site, WYNY will inherit some of the problems that WQHT has alleviated. Kirschner acknowledged that there have been listener complaints about loss of a strong signal in certain areas.

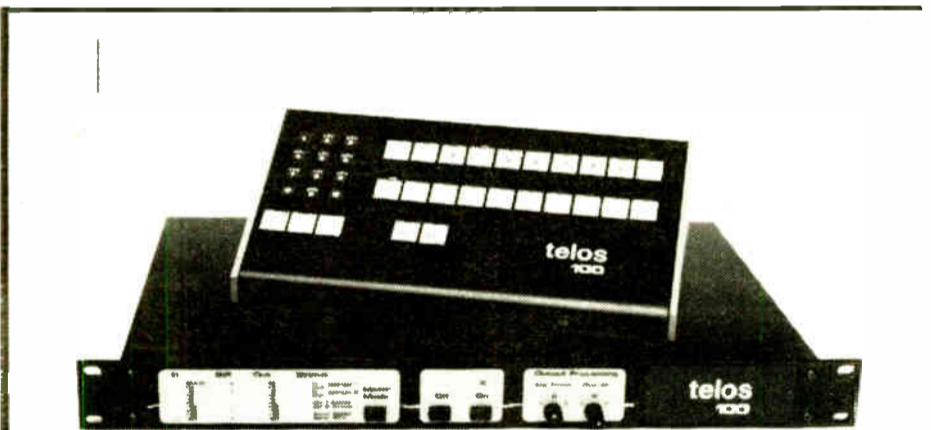
Reasons for those nulls include the station's directional antenna atop the World Trade Center that protects two radio stations in New Jersey. Also, the signal shoots over Manhattan to a degree to protect the building's observation deck from signal interference, McGovern said.

Another NYC modification

For the market in general, the swaps across the FM and AM dials add another modification to New York's volatile airwaves.

Said Kirschner, "I can just picture anyone who's been out of town for four months coming back and not knowing what's going on here."

For more information, contact WFAN at 718-706-7690; WYNY at 212-986-7000; or WQHT at 212-268-0089.



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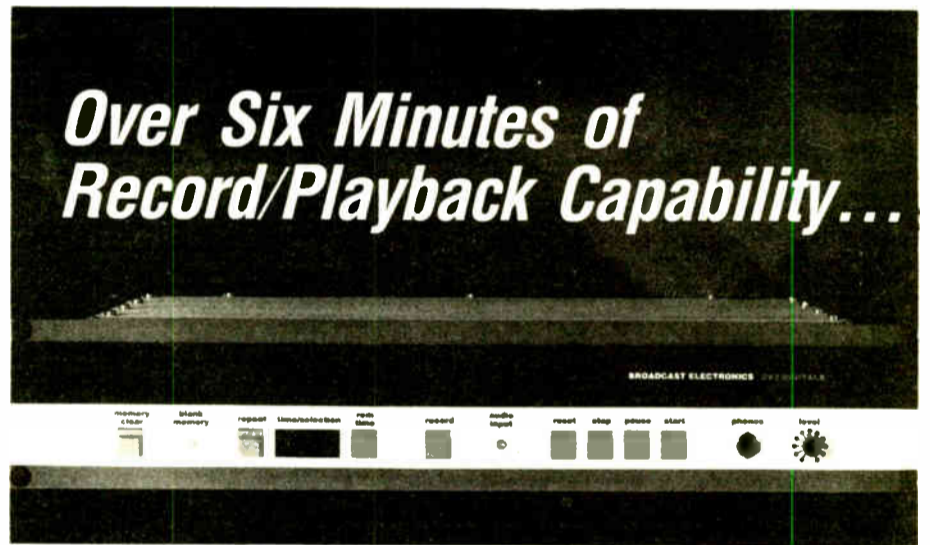
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Down the Digital Road to L.A.

by Judith Gross

Falls Church VA ... A digital workstation in your future? Could be, if the annual AES gathering was as much of a bellweather as it has been in the past.

They were everywhere, with smaller and less expensive models aimed at radio stations. For some, all you need is a PC and voila—the days of splicing tape and aligning heads are over.

OK, it's still a little premature, but with the cost of storage coming down and most stations heading towards being digital-analog hybrids anyway, it makes sense to plan ahead.

The companies who make them obviously feel there's a market here. Expect to see New England Digital and companies like Dyaxis putting on a heavy push to get stations' interest, say, around NAB convention time.

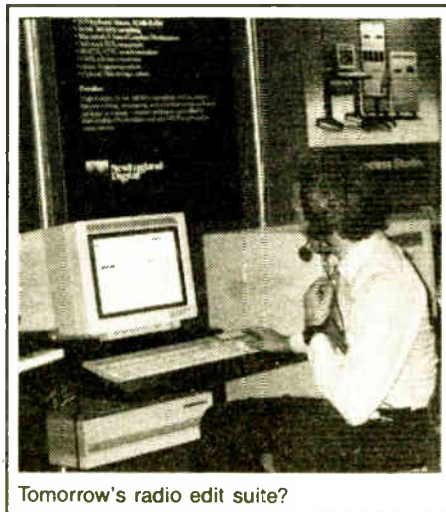
Also at AES, DAT is still coming on strong, at least for production, with nary a mention of copycode, RIAA lawsuits or the like anywhere.

Of course it isn't really a problem with

and alfalfa sprouts.

Got a chance to get a second, more thorough look at the Finial laser turntable, and a listen too. I think Finial should invite skeptics to bring the worst of their vinyl favorites and hear them play.

An amazing amount of work went into the technology, because, it seems, there



Tomorrow's radio edit suite?

are incredible variations in the way vinyl discs are recorded. We're talking about differences in groove depth and angle, in thickness and other such characteristics which become an optics expert's nightmare.

Suffice it to say that after hearing the technical paper on the subject, I can truthfully report that it's all done with mirrors (literally).

While we're talking AES, it was a surprise to see two companies who have made their name in RF gear present at the professional audio gathering. Gent-

ner and Broadcast Electronics both reported good shows, as they featured their non-RF gear. And I thought you guys had had enough shows what with the fall schedule and all!

But the most tantalizing innovation coming out of AES came from Eventide. I'm happy to report that in addition to its regular milk chocolate bars, the company now has dark chocolate bars for all of us bittersweet chocaholics.

☆☆☆

A few things that strike me about the SPE's efforts to get state licensing of "engineers" in the broadcast industry.

First, it's already hard enough to get competent technical people to enter the ranks of broadcast engineers these days. We need one more reason for them to look elsewhere?

Second, maybe it's all just a matter of semantics. OK, so maybe the hard-working folks who fix cart machines and

particular unit to Hank, but he wouldn't tell me what.

That's how he authenticates the winner of the 500 smackeroos. The winner, by the way, can't be anything other than an end-user at a station. Oh yes, and the check will be in the winner's name, not the station's. (Duke it out with the GM, or whatever.)

☆☆☆

The folks at WGEZ in Beloit, WI really get into their work. Their business cards, as you can see, are even in the shape of a radio—an old radio, because the station is, after all, an oldies station.

OK, folks keep wanting to know why I like to talk about Target Tuning, the company that's making those single frequency personal listening radios. I'll give you three reasons.

1) They are a US manufacturer of receivers. 2) They are one of the few receiver manufacturers who are gung ho

about making AM stereo radios, read: better radios for AM. And 3) they are based in Moonachie, NJ.

Anyway, Danny Flohr called to tell me that TT has just shipped its first samples of AM stereo Target Tuners (they're C-QUAM, OK?). He says the company is gearing toward high volume production and wants some feedback from the field.

The chips are in production as I write

this and he expects to be able to ship the first orders shortly after the first of the year. So, it's a good time to be thinking about maybe getting a corporate promoter and hitting your market with them in time for the spring book.

All the switching around of call letters and frequencies on NYC airwaves (see story, this issue) has caused more than a little confusion in some listeners' minds.

I was listening to country WYNY on its new place on the dial recently, and not only did one caller from da Bronx mistake the frequency for WQHT (with which it had swapped places), he even got the wrong band.

"Hello, is this the NFL Today?" he asked, obviously thinking he had reached all-sports WFAN-AM, which also switched with the now defunct WNBC.

The country DJ took it in stride, however—he answered the question about Cowboys football the best he could. Guess WFAN must be getting requests for numbers by George Strait and Merle Haggard, too. (Haggard and Strait? Relief pitchers for the Mets, right?)

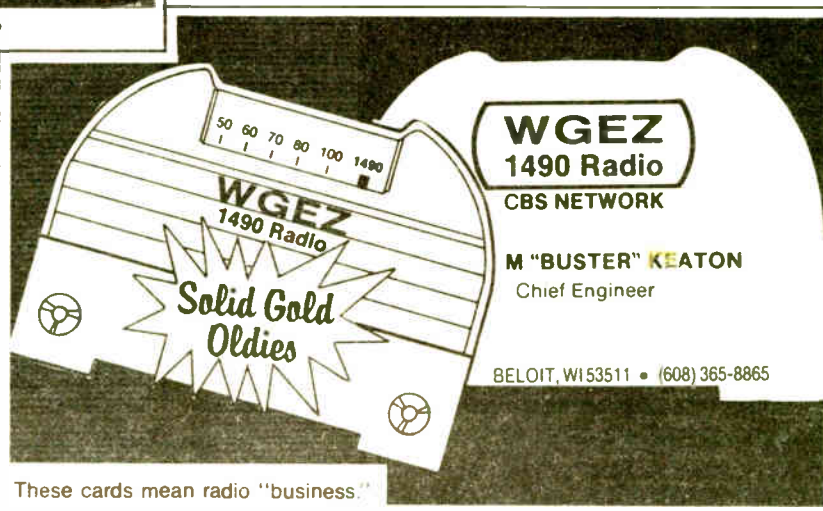
And a long overdue thanks to all you stations out there—AM and FM—which make a lengthy trek on a long weekend go a little faster with their songs, talk and jokes. Where would we be without you? Asleep at the wheel no doubt, so I'm glad that you aren't.

Heard something interesting? Spill your guts to Earwaves. Write PO Box 1214, Falls Church VA 22041, or call me at 703-998-7600. Best tidbit of the month wins a coveted Radio World mug.



the pro models, which are able to record the magic sampling rate—44.1 kHz, the one CDs are recorded at.

But voices from the field tell me the consumer player-recorders are quietly and steadily finding their way to market as well, in spite of RIAA threats to sue the vendors. At least, that's the word from the west coast, amid all the yogurt



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put transmitters back on the air don't have the right to call themselves "engineers" in the true sense of the word (picky, picky, picky!).

So let's come up with another name. How about "broadcast technicians?" or just plain "Chiefs" for the DEs and CEs? Maybe you have a cleverer title that would keep the SPE quiet? Send it along.

Third, where has the SBE been in all this? The reaction I'm hearing shows that it's of crucial concern to most "engineers" out there. It's been at least 3.5 on the Richter scale.

☆☆☆

Contests, giveaways, everywhere. Some reminders about a few we've mentioned before.

First, there's RW's search for the Great Idea of the month. Remember, there's a \$50 certificate towards dinner in it for you if we use your build-it project or special tech tip, so send 'em in!

Then, don't forget that Allied is giving away the NAB Engineering Handbook. You enter that one just by writing to them on your company or station letterhead.

And now, here's a nifty one from Henry Engineering. The company is on the verge of shipping out its 5000th Matchbox. In the packing of that particular unit, Henry's president Hank Landsberg has placed a certificate worth \$500!

If you're the lucky customer who purchases that unit, you can qualify by sending Hank a photo of yourself with the certificate (which we will print here as well). You also have to identify something a "little different" about that par-

OPINION

Keeping Radio Out of Television's Stray

by Michael Starling

San Diego CA ... Congressman Thomas Tauke's comments at the Denver SBE reported in the 1 November issue of *Radio World* struck a nerve.

He said radio is not at the forefront and is "lost in the stray" of television.

Television's dominance in dollars, audience, spectrum usage, and national impact need not relegate radio to the backburner. In the 1990s the FCC's deliberations on advanced broadcasting spectrum will be the single most important issue facing our industry since the National Radio Conferences of the 1920s.

Notice I used the term advanced broadcasting, not advanced television.

Radio broadcasting may not always possess the captive audiences we enjoy today. The current demise of AM is compelling evidence that consumer preferences for better audio eventually prevail.

There continues to be an influx of digital audio for consumers and the growth of cassette aural magazines, books and self-improvement tapes is significant.

Yet some skeptics dismiss the day when listener selected topics and the latest news capsule will be recorded over-

night on the optical recorder card attached to the living room Open Architecture television Receiver (OAR).

Americans may pop that news update, or a book or magazine excerpt into their digital audio deck while taking a last zoom on the live aerial view of the commuting route (via the Traffic Watch channel) and head for the office.

How many listeners will opt for a mere 60 dB SNR, complete with multipath artifacts and line-of-sight limitations when current, compelling and clean audio will be a push button away and starting on the listener's schedule rather than on the log's schedule?

With the Saudis' announced plan to reduce production to drive up oil prices, the inexorable move toward mass transit will be sharply accelerated by the end of this century. By 2010, everyone will have an ATV and perhaps today's preoccupation with cars and radios won't be the dominant mindset of the commuting public.

The work to establish a new standard for ATV is speeding. Yet efforts to establish a new Digital Modulation (DM) methodology to replace FM and AM broadcasting are well kept secrets.

While the NAB is doing its best to save AM radio under difficult, deadline conditions (à la NRSC and the "ultimate" radio), the groundwork to reallocate the RF spectrum to accommodate High Definition Television continues apace absent significant radio presence.

Admittedly, radio's needs regarding spectrum are paltry compared to HDTV, but unless we are participants in the great spectral reorganization, tradeoffs with land mobile or other users may take precedence, banishing radio forever to an inherently disadvantaged bandwidth and mode of modulation.

AM broadcasters and the NAB are rightly distraught over the plight of AM radio. Hopefully all of broadcasting will also get to work on the promises of the 21st century.

If not, as engineers, we may be working (in the same AM/FM bands) repairing taxicab radios instead of maintaining broadcast facilities.

Could a threshold trade "agreement in principal" combining AM and FM broadcasters into a new DM band be achieved in the near future?

Will FM broadcasters insist that their endorsement be predicated upon relegating AMers to 7.5 kHz digital audio, instead of 20 kHz (that is, will FMers insist on a "leg-up-ecy")?

Won't land-mobile insist on the benefits of digital service as well? How these questions are answered will determine if and how the spectrum may accommodate the simultaneous emergence of ATV and Advanced Radio.

Perhaps (NAB Science & Technology VP) Mike Rau's most important message was left to the last paragraph of *Radio World's* SBE article: "be part of the management team" and strive toward further education and flexibility.

Guest Editorial

60 dB SNR, complete with multipath artifacts and line-of-sight limitations when current, compelling and clean audio will be a push button away and starting on the listener's schedule rather than on the log's schedule?

The move by the Society of Professional Engineers to have states certify station engineers raises some serious questions.

First, what are the SPE's motives? Generally, the use of certified professional engineers is required in situations where public safety is an issue.

Such protection is hardly a concern in the day to day operations of radio stations.

Assuring a high level of competence among station engineers is certainly desirable, but the routine chores of the average CE really doesn't justify the burdensome requirements of becoming a certified PE.

In radio's early days, when FCC regulations were paramount, requiring a certified technical operator at a station made sense.

Licensing CEs Isn't Necessary

But even the Commission, in the era of deregulation, has acknowledged that such accreditation is no longer needed and did away with license requirements for broadcast engineers.

Now the SPE seems to be taking a step backwards by asking for licensing in order for broadcast engineers to practice their craft.

Certainly, if the technical chores at a station go beyond the routine, a station should seek the services of a qualified PE.

But if the SPE wants to help keep the level of technical expertise in the broadcast industry high, they should be working through technical organizations that already exist—SBE and NARTE.

And SBE and NARTE could more vigorously promote their own certification programs and educate station owners to make sure that only qualified engineers are working at stations.

In this way the broadcast industry would be its own watchdog. It doesn't need the additional efforts of the SPE.

—RW

Without astute technical input, the efforts of the communications lawyers, congressional lobbyists and even the attitudes of local station managers may fail to keep radio broadcasters on a level playing field with competing technologies as we move deeper into the Age of Information.

If radio broadcasters continue to be "lost in the stray" of television, as an industry, we'll be scrambling for inclusion in the "grand plan" under the least

favorable of circumstances.

Ask anyone familiar with the creation of the Public Broadcasting Act how close it was to becoming the Public Television Act until the eleventh hour. Let's hope we can learn quickly from public broadcasting's past and AM radio's present.

Mike Starling is CE for San Diego's public station KPBS-FM and a frequent contributor to RW. He can be reached at 619-594-6431.

READERS FORUM

If you have comments for *Radio World*, call us at 800-336-3045 or send a letter to Readers' Forum (Radio World, Box 1214, Falls Church VA 22041 or MCI Mailbox #302-7776). All letters received become the property of Radio World, to be used at our discretion and as space permits.

AM stopoffs on an FM highway

Dear RW:

While I agree with some of the points made in the October 1st RW article "AM Radio: SOS from the Titanic," I must differ with the pretext. The Titanic couldn't be saved no matter who was at the helm once the ship rammed the iceberg.

I submit that AM's plight is more like that of a "Mom & Pop" restaurant on the old AM State Highway, long since passed by the smooth four-laned FM Interstate.

The restaurant still serves meat and potatoes (product with real substance) but is so off the regular route of travelers that it seldom has any new visitors.

Billboards out near the new highway sometimes lure travelers off their familiar interstate for something other than McRadio, serving McMusic Sweeps, but most travelers won't bother leaving the familiar.

Some "Mom & Pop" roadside restaurants have tried to look like the superhighway fast food clones, but that doesn't attract new customers. Travelers

can already get plastic atmosphere at the next exit.

What successful "Mom & Pop" operations must do is make a reputation worthy of making the trip from the freeway worthwhile.

And old highway restaurant owners can use a little help from the state highway department by making it easy to reach their establishments by placing exits near the old faithful locations. (I'm talking about continuously tuned radios.)

As a sales manager of an AM in the shadow of FM, I don't think we are on the Titanic; we are in fact what many travelers have been longing for but have entirely missed because their seek/scan buttons won't take them off the freeway to where the good stuff is.

AM Stereo is great. NRSC standards should be supported. But widespread continuous tuning receivers are what we need most to put AM back in the mainstream.

Mark Mauney, Sales Manager
KCON Radio
Conway AR

Radio World

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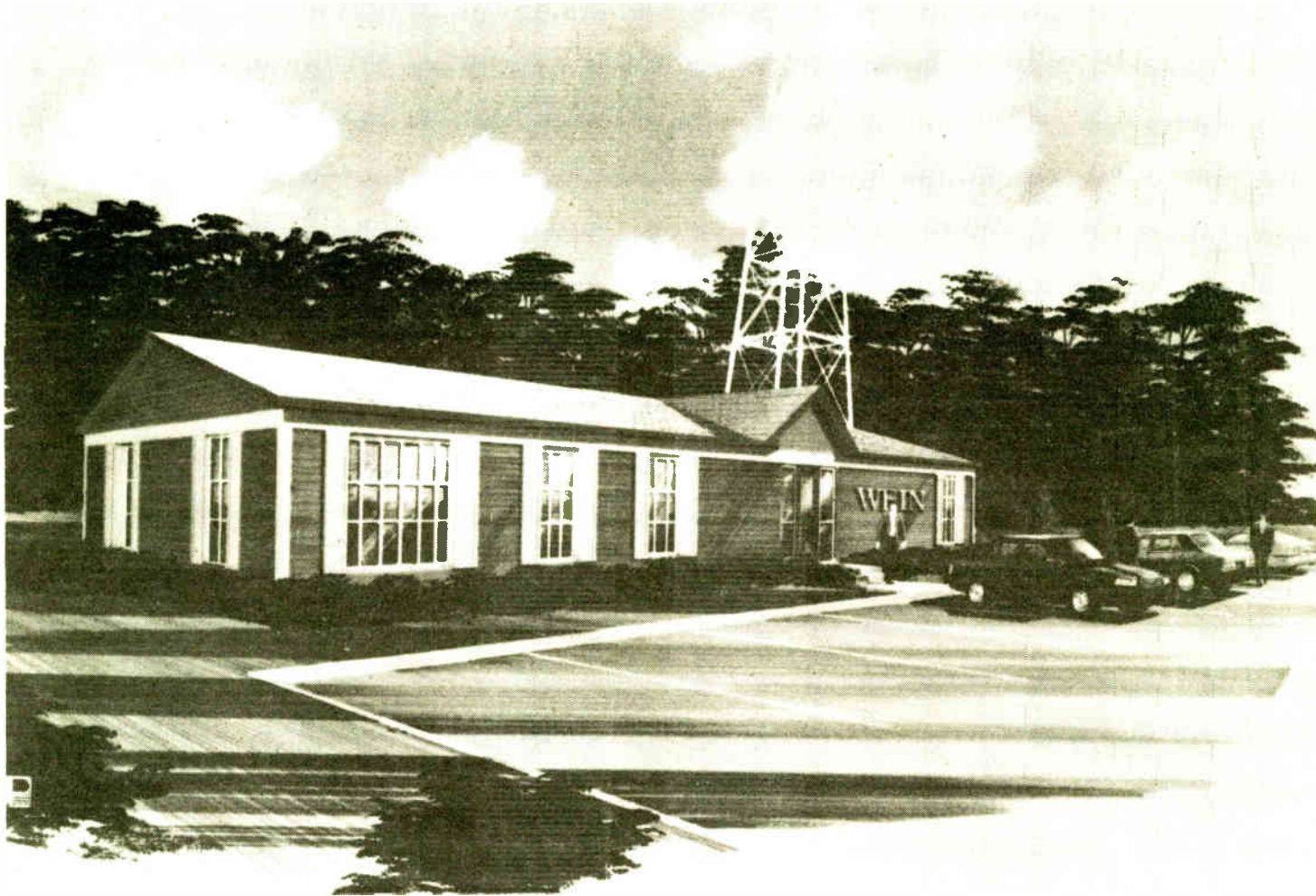
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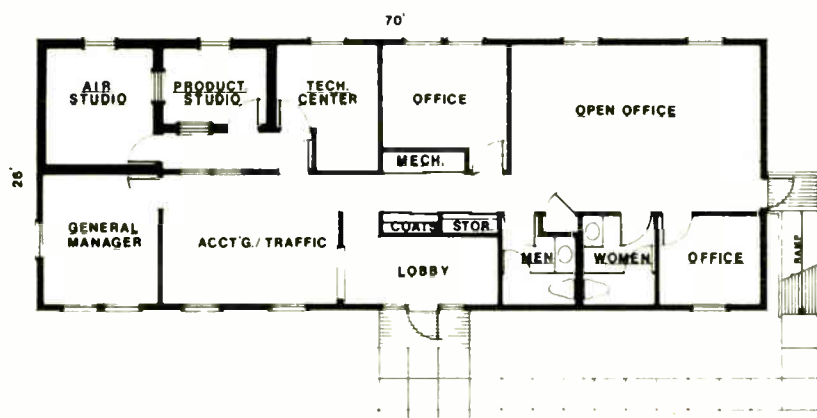
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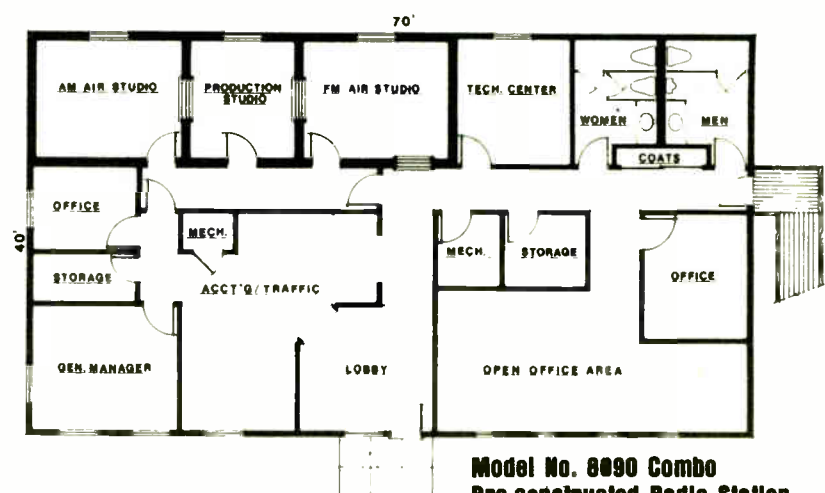
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Class A's To Withhold NAB Dues

(continued from page 1)

ways to allow stations to increase power, Rau maintained. He pointed to the statement that if the Commission intends grant a blanket increase, it should use a mileage table protecting 3 kW stations that may elect to remain at 3 kW.

He declined to discuss what NAB's comments on the rule making would include. Comments were due 22 November with reply comments due 22 December.

When the Commission issued the rule making, it attached another provision from a petition by Petaz Communications filed in June 1987, several months before the Class A move, that sought a power increase for a new class of commercial FMs in Zone II, which represents most of the land area in the US, excluding portions of all of several north-central to eastern states, Puerto Rico and most of California.

The Petaz proposal would establish an intermediate FM Class C3 where stations could upgrade to 25,000 W with antenna heights of 100 meters. Rau said NAB viewed the C3 proposal as a possible compromise.

Dues question

As the filing deadline approached, Class A broadcasters were pressing hard, holding meetings with fellow radio owners and operators. It was at one of those meetings, held in at least six states, where the idea to withhold dues from NAB developed.

Nutmeg Broadcasting President Michael Rice, of Willimantic, CT, who was instrumental in the town-styled meeting, said the idea to withhold dues was a "spontaneous consequence" of people viewing the NAB as "taking a very specific side on an issue where they should have ridden the fence."

Rice did not have a specific number of broadcasters planning to withhold dues, which was planned to begin in November.

Ron Morey, president and owner of WDRE in Garden City, NY, and another broadcaster withholding dues, said about 12 stations in the Southern Connecticut, Westchester County, NY, and

Long Island, NY, areas voted to participate with those in Rhode Island and other parts of Connecticut.

Class A's said they believe NAB took a political position in support of the Class B FMs, when it opposed the Class A blanket power increase. Because NAB dues are based on a station's revenue, Class A's contend the NAB backed Class Bs, which pay higher dues.

Not all Class A owners supporting the position are withholding dues, but some are re-evaluating their membership.

Brad Weeks, president and general

manager of WBFL in Bellows Falls, VT, doesn't think withholding dues will accomplish what Class A's need. He will file comments with the FCC, explaining how the power increase will help him improve the signal in his coverage area.

For Weeks, a 3000 W increase would help his station overcome interference caused, for example, by heavy foliage. His signal improves 15% to 20% when leaves fall off the trees, he said.

Weeks said he will review his NAB membership for one year to evaluate the association's positions. On the Class A question he said, "I just really think they (NAB) jumped on it too quickly. They should have stayed out of it. It's political, and it's truly financial."

At WENU in Hudson Falls, NY, President and GM Don Heckman isn't withholding dues but is disappointed in NAB's position. "NAB should have left the New Jersey broadcasters alone," he said.

A power increase will help WENU fill in the gaps in the immediate coverage area, Heckman explained. His coverage area is "slowly deteriorating" as new buildings are going up, he said.

Heckman said he has an adjacent Class B but said a power increase would

not create detectable interference. "The only people who would hear it are the grizzly bears in the Adirondacks, and I don't think they would object," he added.

Rick Buckley, president of Buckley Broadcasting, Greenwich, CT, which holds seven Class B and two Class A's, supports the New Jersey Class A position and questioned the NAB stance.

He, however, said he believes NAB should have taken a position because "that's what they're there for." But asked if he thought the NAB's position is partially based on Class B clout, he said, "I would be very disappointed if that were the case. NAB is supposed to represent all broadcasters."

Another broadcaster, Dave Underhill at WKVT in Brattleboro, VT, opposed the NAB position because it would create another class of broadcaster, he said. He is not withholding dues but told NAB he will re-evaluate his NAB membership based on the association's position on the Class A rule making.

One last meeting

At a Class A meeting 10 November, NAB General Counsel Jeff Bauman

reiterated NAB's concern about possible interference as a result of a blanket power hike. "I think the most important thing is for Class A broadcasters to understand why NAB took its position," he said prior to the meeting.

NAB Joint Board Chairman Wallace Jorgenson, asked about Class A concerns, said NAB officials met with Class A representatives before taking a position. "You just have to do what you believe is for the greater common good."

Jorgenson said NAB could not back away from controversial issues. "If we did that, because NAB is so diverse, we would be neutralized on about everything."

Robert McAllan, president of the New Jersey Class A Broadcasters Association and VP of the Asbury Park, NJ-based Press Broadcasting, is encouraged by support for the rule making and taking particular notice of the opposition to NAB's position.

"I guess what you're sensing is there are some unhappy people," he said. "If you're going to make a claim that you represent all broadcasters, don't take a stance."

"We haven't sent the Commission on a mission impossible. This is a reasonable request."

For information from the New Jersey group, contact Robert McAllan or Perry Simon at 201-774-7700; for information from NAB, call the Science & Technology Department at 202-429-5346 or the Legal Department at 202-429-5430.

... the idea to withhold dues was a "spontaneous consequence" of people viewing the NAB as "taking a very specific side on an issue where they should have ridden the fence."

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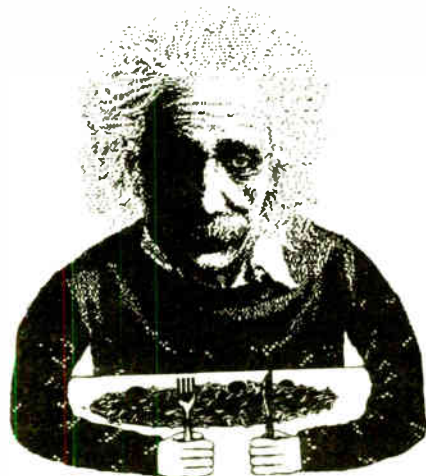
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EPA Levies PCB Handling Fine

KLBJ Cited for PCB Capacitor Violations

by Charles Taylor

Austin TX ... The Environmental Protection Agency (EPA) has fined an AM/FM here \$8000 on two violations involving the handling of four transmitter capacitors containing PCBs.

KLBJ, which is owned by Lady Bird Johnson, within the LBJ Company, was fined because capacitors containing polychlorinated biphenyls, or PCBs, did not contain required labels and because one of the capacitors was leaking, according to an EPA formal complaint filed 27 September in Dallas.

The station has requested a formal hearing to discuss the charges. Hearings are common in such a circumstance, offering the opportunity to explain or deny alleged violations, said EPA spokesman Roger Meacham. A date for the hearing had not been set.

Following the charge, the station sold its transmitters and disposed of the PCB capacitors through a local hazardous removal agent, Meacham said.

KLBJ CE Bryan King confirmed that the station replaced two RCA transmitters with new equipment by Continental. The cost of replacement was \$90,000, he said.

Because of "quick, responsible action to fix the problem," Meacham said the EPA likely will reduce the \$8000 fine. The agency is considering a "3 for 1" option,

which allows a company spending three times the amount of the penalty on equipment replacement to pay only 10% of the fine. In this case, that would amount to \$800.

King said he is also trying to organize other stations in the market to dispose of PCBs as a group to save money. Transportation costs range between \$1000 and \$1400, while actual disposal costs are about 90 cents a pound, he said.

King would not discuss details of the violation.

The inspection of KLBJ was part of the EPA's random inspection policy, Meacham said. An agency representative from Region 6, which includes five south central states, visited KLBJ on 6 and 13 June and presented King with a written Notice of Inspection.

"At the time of the inspection, (the station) had four PCB Large High Voltage Capacitors in use," the Notice stated. "The top capacitor was leaking material onto the bottom capacitor and one capacitor (was) without nameplate

or identification."

EPA guidelines require that any PCB-containing capacitor must be clearly marked and that any leakage denotes "improper disposal." The violation, a civil penalty, is punishable with fines of up to \$25,000 a day.

KLBJ was charged \$3000 for its failure to mark PCB capacitors and \$5000 for the leakage.

"Our purpose," said Meacham, "is not to fine people, though we'll do that when it's called for. It's much more to everyone's benefit to get environmental problems corrected as expediently as possible."

For more information, contact Roger Meacham at 214-655-2200.

RKO Continues Divestiture Sales

by John Gatski

Boston MA ... In RKO General Inc.'s ongoing efforts to divest its broadcast properties, the FCC has approved a \$27.7 million settlement for the sale of WRKO-AM and WROR-FM, here.

Under the agreement, RKO will receive \$17.5 million from the sale while the rest will go to the other applicants who applied for the licenses. RKO's portion of the settlement is 63%, less than the 75% fair market value that a seller can receive for a transfer of a license during a distress sale, according to the Commission.

The settlement is the latest chapter in RKO's 23-year litigation with the FCC, following accusations of corporate misconduct in the operations of radio stations.

As with previous RKO settlements, FCC Chairman Dennis Patrick and Com-

missioner James Quello voted to approve the settlements and avoid further protracted litigation while Commissioner Patricia Dennis opposed the action.

The Commission "concluded that strong public interest considerations favor settling rather than continue what has become one of the most protracted and burdensome proceedings in FCC history."

The majority consensus of the FCC is that ending the hearing process and forcing RKO to sell off its stations at less than fair market value will deter future corporate misconduct.

Dennis, however, believes that stations accused of future misconduct may see the RKO settlements as a precedent for settling future license revocation disputes

without going through the required FCC process.

"By citing the length of these proceedings as a reason for ending them, I fear the Commission sends the wrong signal to station licensees—the way to avoid license revocation is to prolong proceedings until the Commission loses its will to litigate further," Dennis said in her dissenting opinion during another recent RKO settlement.

RKO now has sold radio properties including WGMS-AM, Bethesda, MD; WGMS-FM, Washington, DC and WHBQ-FM, Memphis, TN.

For information on the RKO issue at the FCC, contact the public affairs office, 202-632-5050.

FCC FILES

(continued from page 2)

individual translator studios.

Most groups commenting to the Commission had serious reservations about widespread translator use. There is no indication when the Commission could act on the notice.

For information on Docket 86-112, call Tatsu Kondo at 202-632-6302. For information on Docket MM 88-140, contact Marcia Glauber at the FCC, 202-632-6302.

FM Directionals

Commenters generally oppose, or only give conditional support, to a proposal that would allow increased use of FM directional antennas in short-spaced situations.

The issue under Docket MM 87-121 stemmed from a Notice of Inquiry under which any short-spaced facility would be required to provide a signal of 3.16 mV/m over the community of license.

Existing stations and allotments would be protected from interference to the theoretical limit of maximum permitted facilities, while short-spaced facilities would be protected to actual service area contours only. A uniform 1 mV/m contour protection is proposed for all stations, including Class Bs.

Commercial FMs under current rules must comply with minimum distance separations, except for stations that ex-

isted prior to the adoption of the current table assignments and for stations using designated antenna farms.

For information on MM 87-121, contact Bernard Gorden at the FCC, 202-632-9660.

Dial-up remotes

The FCC has issued a clarification to rules pertaining to broadcast station transmitters' remote control operations, specifically addressing dial-up remote issues.

Engineers complained that the rules were vague about the use of telephone lines. The FCC requires that a specified operator have final control of the transmitter and Emergency Broadcast System (EBS) monitoring.

Among the points clarified, the Commission noted that when a dial-up telephone circuit is used for transmitter remote control, the station licensee must ensure that the dial-up circuit remains available at all times for the exclusive use of the duty operator.

As an alternative, the station can provide a means for the operator to interrupt or preempt any other telephone access to the remote control equipment at the transmitter.

The clarification is FCC listing 88-194 4460. Contact the Commission at 202-632-9660.

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—Bryan King,
Chief Engineer, KLBJ AM-FM

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Circle Reader Service 33 on Page 14

World Radio History

EPA Suspends Work on RF Guide

by John Gatski

Washington DC . . . The Environmental Protection Agency (EPA) has suspended efforts to formulate standards for human exposure to RF emissions, citing more pressing issues the agency has to face.

Growing public concern about radon gas contamination of homes and a lack of conclusive research on RF emissions effects on the general population have resulted in a shift of limited funding to other projects, according to Rich Guimond, director of EPA's Radiation Programs.

Broadcast interest groups and a former EPA employee, however, believe the agency's decision is a mistake.

"There is a crying need for the EPA to have uniform standards. Obviously, this is the wrong choice," said NAB Deputy General Counsel Barry Umansky, who also is a member of the Electromagnetic Energy Policy Alliance (EPEA), an association of users and makers of RF gear.

"It's a major mistake," said Richard Tell, an RF emissions consultant and former chief of EPA's electromagnetics branch. "In my view, EPA was on the verge of where they could go ahead and establish standards for public exposure."

The RF exposure concern stems from scientific theories that exposure to strong electromagnetic fields can damage the neurological and immune systems of humans.

Many communities and jurisdictions nationwide were looking to the EPA to implement RF guidelines for human exposure in order to safeguard the population located near the transmitters.

According to a 1986 survey conducted in Honolulu, HI, the population in areas near broadcast towers showed higher than normal incidences of cancer. Some researchers suggest that persons exposed to a high concentration of RF emissions may experience internal body heating.

Despite such studies, the EPA maintains there are none that conclusively link exposure to RF with increased risk

of cancer or any other diseases.

"That is absolutely incorrect," Tell said. "We have a ton of data that clearly gives us a need for guidelines."

Although no industry standards for RF exposure exist, the Occupational Safety and Health Administration (OSHA) does have a general population standard which is based on an American National Standards Institute (ANSI) recommendation of $1000\mu\text{W}/\text{cm}^2$.

Umansky said broadcasting groups were hopeful EPA would adopt a two-tier standard based on the ANSI standard—one for industry occupation

and one for the general population.

In 1986, EPA considered adopting the ANSI standard or enacting standards five to 10 times as strict. The latter option would mean that many of the nation's TV and radio stations would have to make some type of transmitter changes, including power reductions, radiation pattern changes and/or antenna relocation.

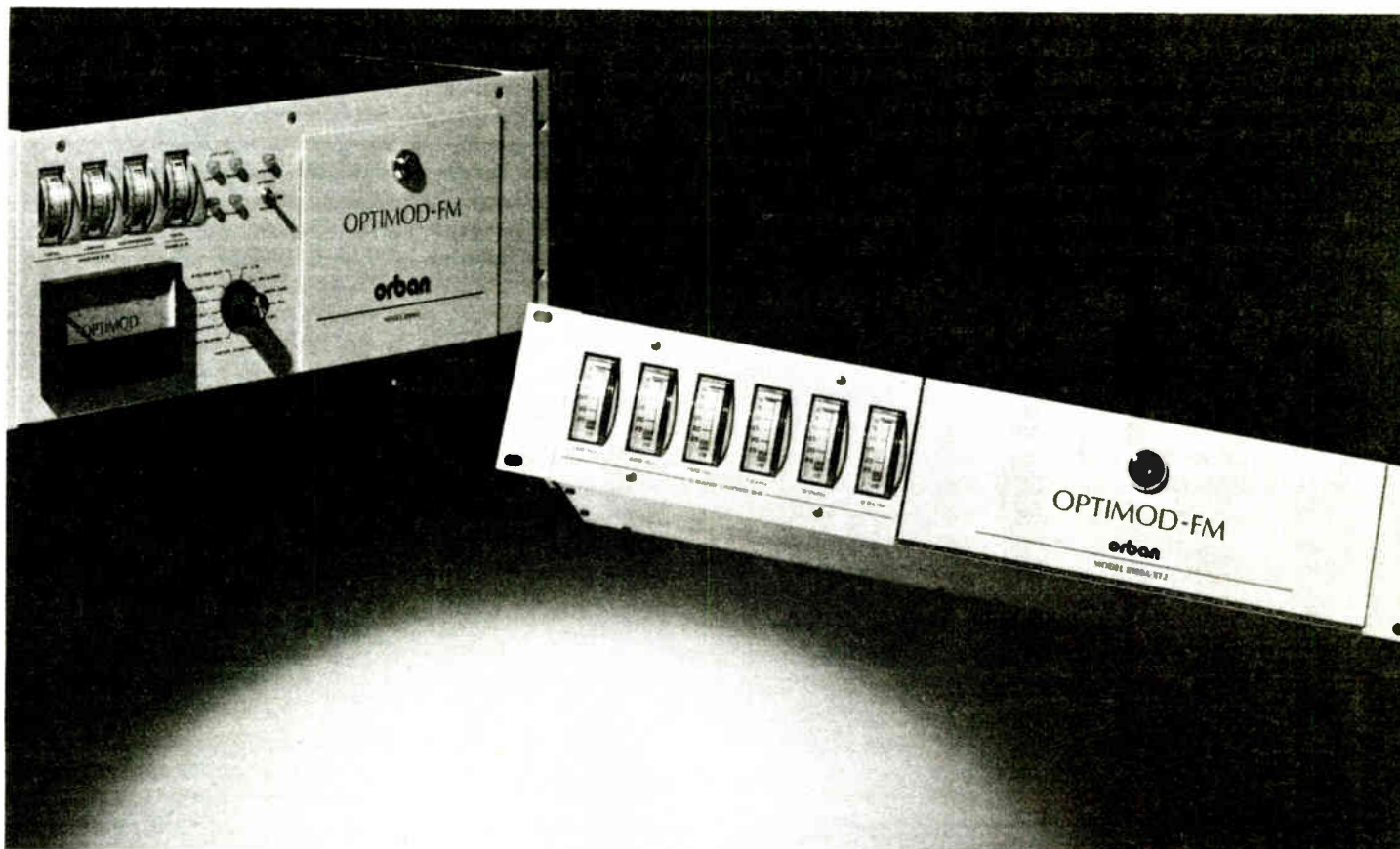
Tell warned that the EPA's decision not to complete work on the standards gives local and state jurisdictions an unofficial go-ahead to enact varying standards that may do more harm than good.

Umansky agreed. Without a uniform standard, he said, local jurisdictions nationwide could enact a plethora of confusing standards—many unnecessarily stringent.

Citing the fact that steps toward a standard were nearly complete, Umansky said the EPA decision "... is a classic case of government waste."

Although EPA has decided to suspend work on the RF emission guidelines, Guimond said the agency will publish a brochure suggesting minimum guidelines for emissions in populated areas.

For information from the EPA, contact Rich Guimond at 202-382-7400, or contact Barry Umansky at the NAB, 202-429-5430. Rick Tell can be reached at 702-645-3338.



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FCC Proposes New Licensing

by Alan Carter

Washington DC . . . The FCC has proposed amending its rules to allow FMs or TV stations to change their community of license without facing competing applications if the new allotment is mutually exclusive to the existing station.

The action stemmed from a petition filed by WCVZ-FM in Zanesville, OH, which sought to move a short distance away to South Zanesville to upgrade from Class A status to B-1 and avoid spacing constraints.

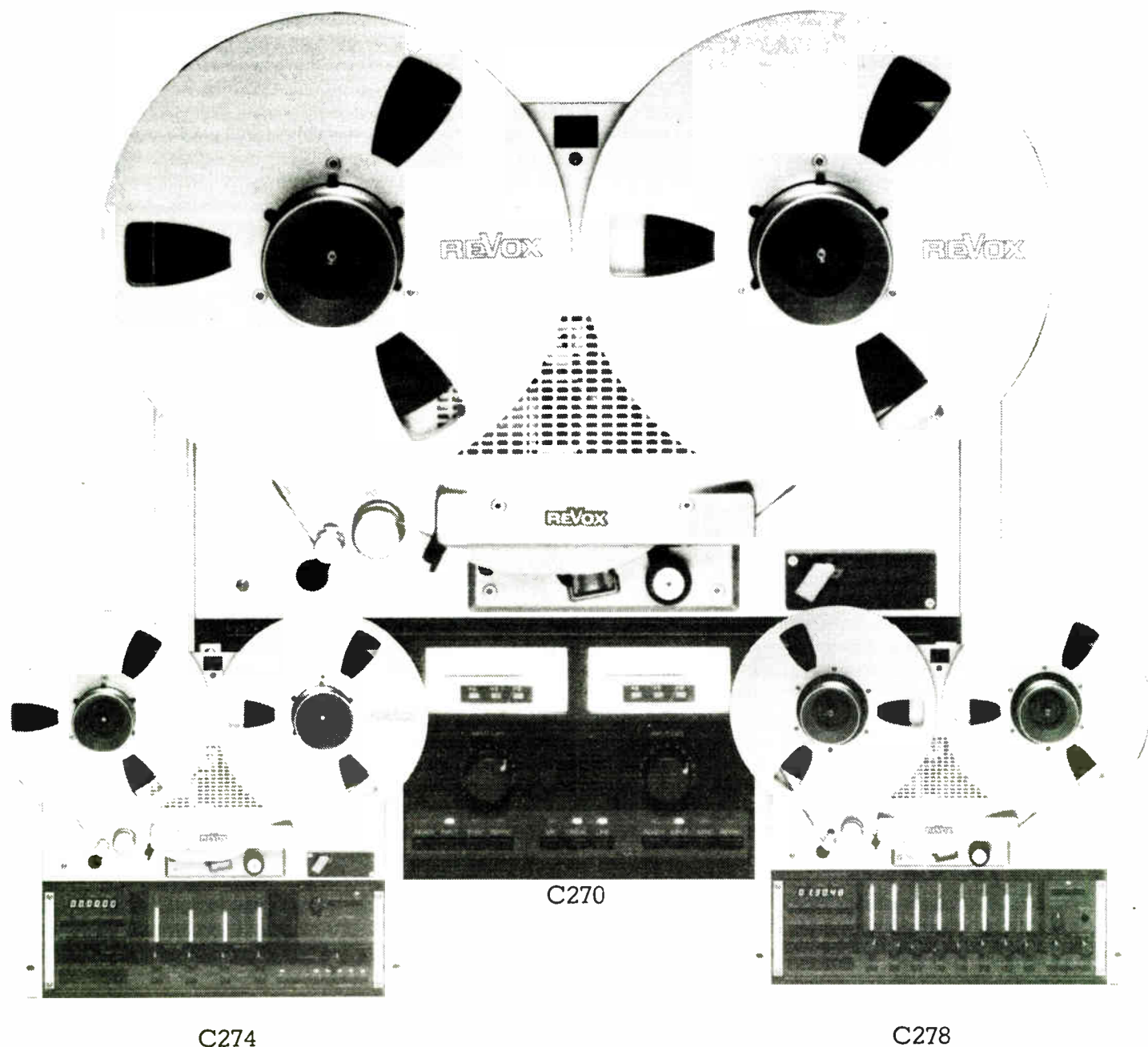
Told that rules would not allow the move without facing competing applications in an open window, WCVZ sought to have the FCC re-examine its regulations.

"We believe that the FCC is at all times most interested in serving the general public," said Pat Patterson, president of Christian Voice of Central Ohio, which owns WCVZ and WCVO-FM in Gahanna, OH. "We believe that's exactly what we propose to do."

(continued on page 15)

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ALLIED
Broadcast Equipment

Pirate Awaits Ruling

by Charles Taylor

Boston MA . . . A federal judge here is expected to make a decision this month regarding the legality of a pirate radio station group that wants to broadcast from an unoccupied frequency in the New York market.

The group, Radio New York International (RNI), is the same that broadcast for four days in July 1987 from the freighter Sarah off the coast of Long Island, NY. At that time, the FCC ordered the station off the air because it violated international communications treaties.

RNI resurfaced in August with the argument that the station should be allowed back on the air, citing the First Amendment.

Dog in a manger

Jeremiah Gutman, the attorney representing RNI through the New York Civil Liberties Union, said the Commission was acting like "a dog in a manger saying nobody can use (unoccupied frequencies) until they decide we can."

The FCC maintained that the government does have the right to oversee usage of a limited resource, such as the radio spectrum.

In the most recent action 4 November, both sides filed comments with Federal District Judge John McNaught in Boston. A decision on the issue is expected sometime in December, Gutman said.

Previously, Gutman and Eileen Hagerty, an assistant US attorney representing the FCC, presented their respective arguments before McNaught on 21 October.

Under advisement

Following that meeting, the judge acknowledged the issue's importance and decided to take it under advisement, Gutman said. McNaught also offered each side the opportunity to file additional comments two weeks later, thus the 4 November deadline. No further oral discussion took place at that time.

If RNI's viewpoint receives a nod from the judge, the station plans to return to the air at 1320 on the AM dial, Gutman said. The decision also would mark a precedent in broadcasting, where an operator's rights to frequency allocation always have been carefully monitored by the FCC, he added.

"I think it's an important case," said Gutman. "The judge has an opportunity to make the First Amendment vibrant here. I think the position will serve correctly that no organ of government can close off an open place for communication."

For more information, contact Jeremiah Gutman at 212-807-9733, or the FCC at 202-632-6345.

Albimar Buys NBC's WKYS

New York NY . . . Albimar Communications is offering NBC \$47.5 million to buy WKYS-FM in Washington, DC, leaving the network with only one owned-and-operated radio outlet left to sell.

The two parties have signed a letter of intent, according to NBC spokesman Dom Giofre. The FCC must approve the sale.

WKYS GM Bartley Walsh expected the sale to be complete by 1 December.

NBC is selling the urban contemporary radio station (93.9 MHz) as part of the network's divestment of its O&Os. The deal has been under negotiation since last year, Giofre said.

Albimar Communications, a Boston-

based minority-owned company, owns KDAB-FM in Ogden, UT, and is the former owner of KEZO-AM and FM, Omaha, NE.

Walsh said the station is planning no format changes after the sale. According to the June-September Arbitron ratings, WKYS was ranked fourth in the Washington radio market.

Counting WKYS, NBC has sold six of its seven O&O radio stations since March. Last year the network sold its NBC Radio Network to Westwood One.

KBNR-AM in San Francisco is the remaining NBC O&O.

For information from NBC contact Dom Giofre at 212-664-2540. Contact Bartley Walsh at 202-885-4330.

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AES Products Hint at the Future

by Judith Gross

Los Angeles CA ... DAT, digital workstations and greater compatibility between digital systems each captured its share of attention at the 85th Audio Engineering Society show held here the first week of November.

While the convention has traditionally catered to the professional audio and

players, including Tascam, Panasonic's Ramsa SV 250 portable and SV 3500 rack-mount model, and an advanced DAT deck with 20-bit D/A converters from Denon.

Ramsa also set up a demonstration with an Apple computer and a DAT player playing an endless loop of DAT tape. The idea was to show the durability of the tape. Ramsa says the error correction of DAT players allows for a 50% error rate—dropouts, etc.—before the machine will refuse to play.

A 50% error rate would show up on the front LED as 5000 (out of a possible 10,000). After 2000 plays, the DAT tape was only showing 230 or .023% error.

One other concern about DAT, especially

system for DAT and was showing the product at its booth.

But a new wrinkle has surfaced with a possible alternative timecode for DAT. It uses DAT subcodes and recognizes and allows for the use of timecodes including SMPTE, EBU and film.

An abstract on the new format was presented by N. Miyajima and M.

usually from a Macintosh PC and a computer, not a musical keyboard.

New England Digital, which has revolutionized music recording with its Synclavier 9600 system, showed a scaled down system, the Synclavier 3200.

The modular workstation offers a maximum of 32 megabytes of RAM, 32 mono voices and 720 megabytes of hard disk storage, plus 16 bit 100 kHz sampling.

This, along with NED's Direct-to-Disk system should prove more attractive to broadcasters. In fact, Gannett and Emmis have already bought NED products for some of their stations, and NED plans to gear its marketing toward the radio industry at next year's NAB show.

Finial showed that its laser turntable is finally a reality, and also explained some of the technology that went into the turntable's design in a technical paper given by Robert Stoddard.

The laser beam "plays" the record



Broadcast Electronics was a first-time exhibitor at AES.

music recording industries, this year's show drew more exhibitors from the ranks of broadcast equipment vendors.

Gentner and Broadcast Electronics were first-time exhibitors, leaving their RF gear at home and concentrating on the audio production market.

In one other product highlight, the Finial laser turntable made its AES debut, and a paper was given by Finial engineers on the technology that allows vinyl discs to be played with a laser beam.

Several companies showed pro DAT



The Finial LT-1 laser turntable is a reality.

for music recording and production attendees, centered on the use of timecode. Fostex has been marketing a timecode



Harrison showed its new on-air console.

Tsukatani of Japan's NHK and the format has the informal backing of several manufacturers.

One other area which is beginning to have implications for radio stations is that of digital workstations. Companies are offering scaled-down versions of the large hard-disk systems with control



Ramsa hooked its DAT player to an Apple to test durability of DAT tape.



Orban and Otari showed products of interest to production pros.

from a place which is higher on the wall of the groove than the area which has been previously worn by the stylus. The beam is angle sensitive and therefore not sensitive to tracking velocity errors.

The Finial turntable has independent left and right optic systems to avoid crosstalk and also has a height (on next page)

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DAT, Digital Take Show Spotlight

(continued from previous page) tracking system to allow for warps in the record or other differences in thickness.

The Final turntable at the AES show was a consumer model which has a price tag of \$3786. A pro model is also planned by the company but no price has been set for it yet.

In addition to Gentner, which had its prewired patch panels, and Broadcast Electronics, which showed its Mix Trak 90 console and Phase Trak 90 cart machines, a number of AES exhibitors showed gear aimed at broadcasters.

Denon displayed an updated version of its CD cart machine, with another updated version due out in January. Tascam, Shure and Studer all had pro CD players; Tascam's CD-701 player had the RC-701 control unit as well.



Denon showed its CD cart player.

ANT, Dolby and dbx all showed noise reduction units. Dolby offered, for the first time, a single unit with switchable SR and Type A noise reduction.

Orban displayed its mic processor and

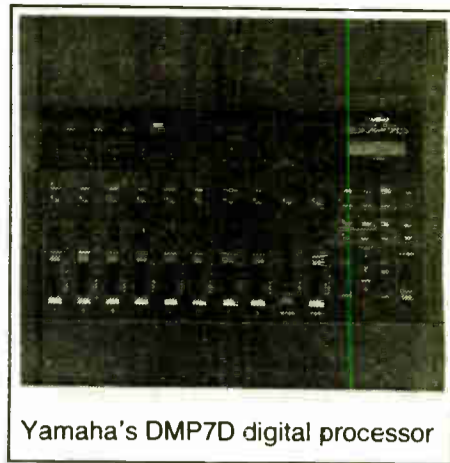
shortwave processor, as well as its spatial image enhancer. Also in the realm of processing, Valley International showed its DDP digital dynamic processor and Full Compass Systems had its DAP-320 digital audio processor.

In the area of consoles, Harrison introduced its AP100 on air console and Soundcraft showed its SAC 200 for both on-air and production.

Yamaha, which sells its products mainly through music dealers, generated broadcasters' interest with its DMP7D, an 8 input, 2 output all-digital mixing processor which sells for under \$6000.

Yamaha also showed its cost-effective digital multi-effects processor.

More digital effects were unveiled by



Yamaha's DMP7D digital processor

Eventide in the AES debut of its Ultra-Harmonizer.

And in the area of test gear, Dorrough showed its stereo signal test set which can test stereo signals in transmission and phone lines.

Licensing

(continued from page 11)

Patterson said that if the station is allowed to upgrade, which would require moving, it could reach a "vast area" covering "hamlets and little villages" that otherwise could not receive the station's local religious programming.

But WCVZ, which is noncommercial, could not afford the "terribly expensive situation" of facing possible competing applications, he explained.

Under the proposal, the Commission would amend its rules to allow a licensee or permittee to petition the FCC for an amendment to the FM and TV Tables of Allotments and modification of its license, without placing its existing authorization at risk.

This would apply whether that change involves a change in transmitter site, a change in class of channel or both.

The proceeding does not include AM because the band does not use a table of allotments; rather AM allocations are based on individual applications and fitting the allocation to an opening, according to an FCC spokesperson.

The FCC said the proposal would provide greater discretion in choosing and modifying technical facilities.

"By using the proposed procedure either in conjunction with a transmitter site relocation or in conjunction with the Commission's procedures for modifying licenses to a higher class of channel in the course of rulemaking proceedings to amend the tables, licensees and permittees may be able to improve their technical facilities in circumstances where they might not otherwise be able to do so," the Commission stated.

No comment deadlines have been established. For information on the proceeding, under Docket MM 88-526, contact Karl Kensinger at the FCC, 202 634-6530.

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Circle Reader Service 5 on Page 14

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Circle Reader Service 2 on Page 14

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Circle Reader Service 6 on Page 14

Contractor Embroiled in Scandal

by Charles Taylor

Washington DC ... The US Attorney General's office was expected to seek indictments in mid-November on a Pentagon scandal involving information exchanged between consultants and government employees on awarding military contracts, but the involvement of a broadcast manufacturer remains unsettled.

Continental Electronics of Palo Alto, CA, a division of Varian Enterprises, however, has been further limited in participating in certain government contracts, according to Continental spokesman Gary Simpson.

When the investigation broke last summer the Justice Department suspended Continental from contracting with any agency in the executive branch of the federal government.

The government extended the suspension to exporting military end-use items, Simpson said.

Indictments to be Handed Down in Pentagon Controversy—Continental Electronics Restricted from Pursuing Government Work

The recent action is not based on any new inconsistency within the company, but is an extension of the original suspension, Simpson said.

Continental's involvement in the national scandal that provoked more than 200 search warrants and now includes 12 companies, came out of telephone conversations between Continental VP Joe Bradley and Mark Saunders.

Saunders, a paid Varian consultant, currently is under suspicion in the federal investigation.

Bradley was placed on paid administrative leave following the incident but left Continental in August. Simpson said it is against company policy to discuss under what terms an employee departed. Saunders has no ongoing relationship with the company, Simpson said.

Since the investigation has been publicized, business at Continental has not suffered, Simpson added, because most of the company's current contracts had been secured when the suspension was ordered. The suspension did not affect contracts in progress or in the bidding stage.

Simpson also said the workforce was unaffected. "They had a substantial backlog, so I don't believe the immediate impact has been particularly significant."

One thing that has changed within the company is its policy regarding consultants.

"We have more specific requirements about how such people are to be retained, what their standards must be, how they're compensated, that kind of thing," Simpson maintained. "In general, they tightened up and updated policies."

Continental, which manufactures broadcast transmitters, is one of 20 divisions within Varian Enterprises, and accounts for about 5% of the company's revenues.

For more information, contact Gary Simpson at Varian, 415-424-5702.

Bill Seeks AM Standard

(continued from page 1)

According to its decision, "the marketplace appears to be moving on its own toward selecting an industry standard."

The FCC also decided against requiring AM stereo receiver manufacturers to equip their products with the capability to receive signals via both systems.

Many in the industry believe the FCC has not chosen a standard out of fear of lengthy litigation by the creator of the losing system, but Haines said litigation is possible when any policy is implemented.

"I honestly think that is a red herring," Haines said.

The NAB encourages AM stations to convert to AM stereo and supports selection of one AM stereo system, but it does not favor one system over another, according to NAB General Counsel Jeff Bauman.

WQXR-AM CE Herb Squires in New York said that congressional action requiring the FCC to choose a single standard will not save AM. His station has broadcast AM stereo since 1983 using the Kahn system.

"I still firmly believe there is no need for a standard," he said. "I don't think it will solve the problem."

If Congress wants to pass laws regarding AM, Squires suggested a requirement for radio receiver manufacturers to adopt state-of-the-art technology.

A Motorola spokesperson declined to comment on the proposed legislation because corporate officials had not seen the actual bill. Kahn was unavailable for comment.

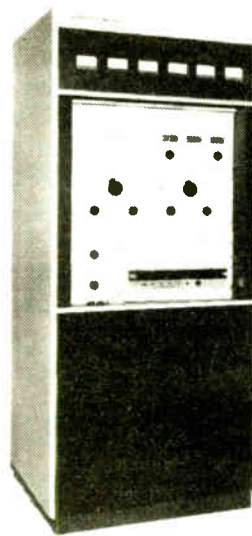
Patent infringement update

In a related matter, motion papers have been filed in the Kahn vs. General Motors AM stereo patent infringement case in US District Court, Southern District of New York, according to a court spokesman. A decision is not expected until January.

In a countersuit by Motorola against Kahn in the US District Court, Northern District of Illinois in Chicago, a hearing is scheduled 25 January.

For information on the AM stereo bill, contact Rep. Matthew Rinaldo's office at 202-225-5361.

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One Dark and Stormy Night . . .

by John "Q" Shepler

Rockford IL . . . Dennis King peered through the slush being moved back and forth by the wipers on his windshield. Ahead he could see the entrance to the hotel, so he signaled and eased the car gently to the right. The back end felt pretty unsteady.

As he pulled up to the lobby, he could see a tall man with a dark beard standing just outside, his hands stuffed into a fur-lined parka. Dennis waved. The man recognized him at once and hurried to get into the car.

"Dennis, good to see you again!"

"Glad you could make it, Doc. A little messy today."

"Hey, it wouldn't be a mid-west Christmas any other way, right?"

They both laughed as Dennis turned back onto the street and headed for their next destination, The Big Bear Steakhouse.

Dennis first met Doc a year ago when the station was sold to the Lakes & Woods Broadcasting Group. Doc was director of engineering for the chain. His job was to support station chiefs like Dennis with equipment purchases and expertise.

Q-Tips

This trip was to evaluate the reliability of the plant and decide what was needed to guarantee zero unscheduled downtime.

Dennis turned the radio volume up so Doc could hear the station.

"Freezing rain with very hazardous driving conditions this afternoon through tonight. The State Police report that many highway bridges are already slippery and advise against unnecessary travel. This has been a K-99 weather special."

"Sounds like it's getting nasty, Dennis. It'll be interesting to see if those new deicers can keep the SWR below 1.1. Right now, I'm hungry as a . . . dare I say Big Bear?"

The two engineers spent the next couple of hours working their way through porterhouse steaks and catching up on the last three month's activities.

Doc was always good for the latest rumblings in the industry. He kept close contact with many of the top manufacturers and often got to evaluate the latest advances before they were even announced.

"Well, you know," Doc said, carving into the last of his cherry pie à la mode, "I've been promised the first Bitsound DAT Librarian in about six weeks. We could install it here and you guys can get your feet wet in all digital production."

Dennis was excited about that

idea. He wanted to get involved with digital recording as soon as possible. Today, though, they had to look over generators, transmitters, power supplies and other mundane matters of staying on the air. "I guess I'm ready to go when you are, Doc."

Exiting the restaurant, they found that the slush had turned to freezing rain and the roads looked like they were made of glass. Dennis carefully maneu-

vered his Nova up the winding hill to the station.

Doc reached over and tweaked with the radio tuning.

"Sidebands sound pretty good on the AM."

He was just about to switch to the FM band, when the song abruptly stopped and the transmitter popped off, leaving only the chatter of distant stations on the channel.

Doc and Dennis looked at

each other, each wondering what had caused the station to go off the air.

"Come on, automatic transfer," Dennis mumbled under his breath, half praying the automatic generator wouldn't embarrass him in front of his DE.

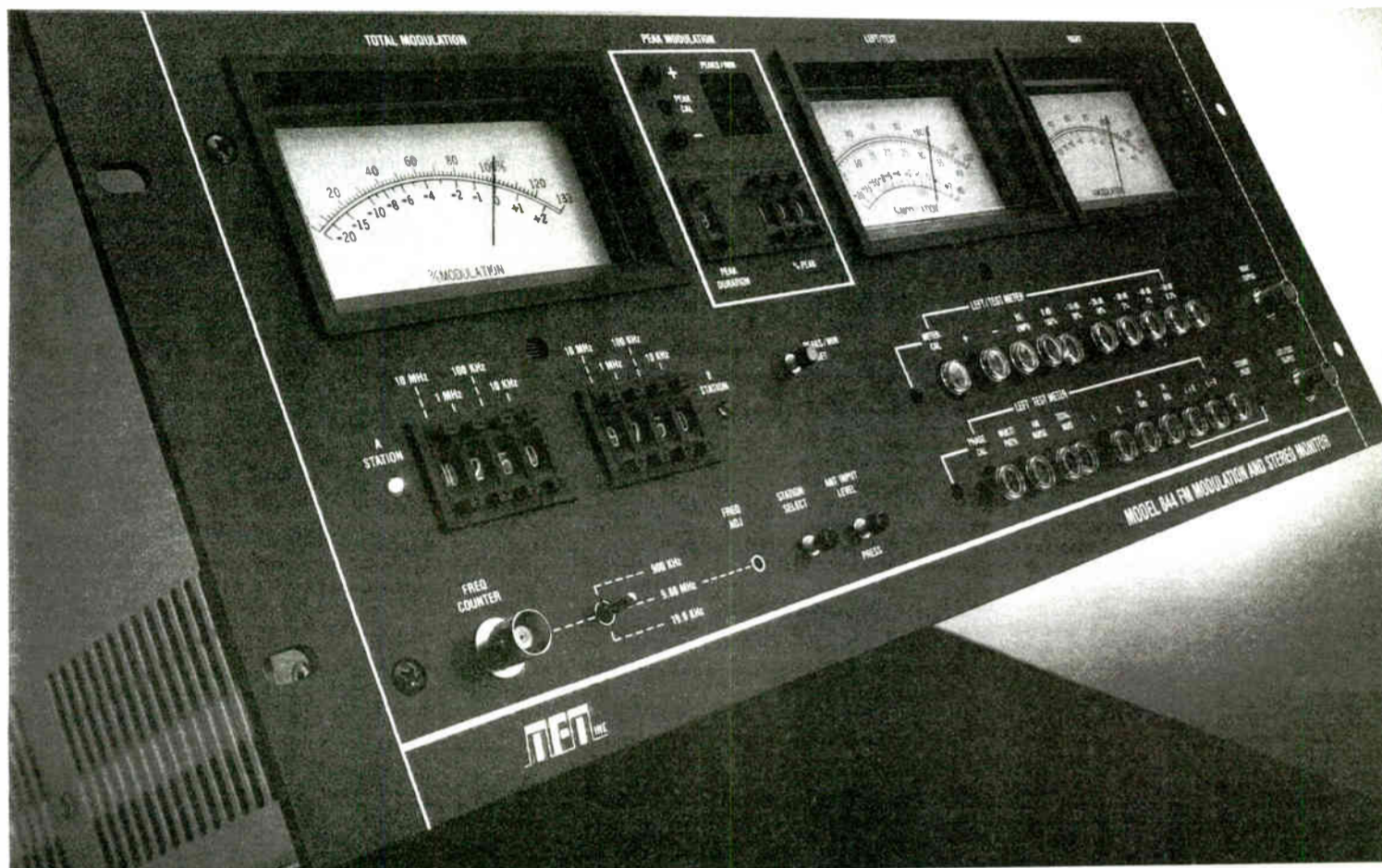
A minute later, which seemed like ten, the carrier came back on followed by an announcement that the station had lost power due to the ice storm and that

they were back on using their emergency generator.

Dennis breathed a sigh of relief and glanced over at Doc wondering if he was going to say something.

"That switchover wasn't too bad. How long can you run?"

"Nearly a week with the underground fuel tank filled. We should be able to ride out just about any emergency with that **(continued on next page)**

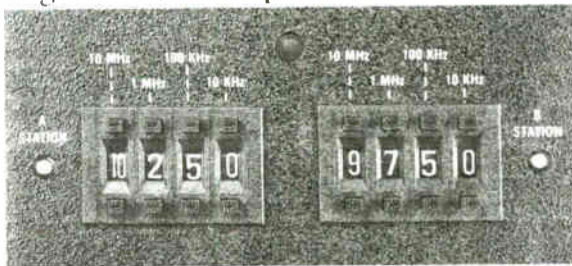


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Ice Storm Emergency Repairs

(from previous page)
much reserve."

They continued driving toward the station, keeping the speed well below the limit. The roads were now too slick to consider making any quick movements, including panic stops. Both engineers were curious as to why the station had lost power when the ice buildup on

the utility lines didn't look that heavy.

About five minutes later, the song on the air started to wow excessively, then stopped completely. A second later, the carrier disappeared again. This time, the station did not return to the air.

It was nearly 15 minutes later before they pulled into the

parking lot and ran for the transmitter room. The station was completely dark, except for the afternoon light coming through the outside windows.

Dennis ran into the announcer on duty, Wally Munz, staring blankly at a darkened equipment rack next to the silent transmitters.

"No luck with the generator, Dennis. I tried the remote start several times, but the run light won't even come on."

Dennis sprinted out the back door and to the garage that held the emergency generator. Doc and Wally followed closely behind.

Dennis jammed his thumb on the generator start button. The

diesel engine cranked but would not fire. It had run, though, less than a half an hour ago. The manifold was still warm. What could have gone wrong with the engine?

Doc stroked his beard. He was also unsure of what to do next. He reached up and rotated the selector switch for the line voltmeter to Main Phase A. Zero. Phases B and C also read zero. The utility power was still dead, leaving this generator as their only hope.

Unraveling a mystery

The difficulty of the situation was being compounded as the generator garage got colder and darker and afternoon turned into evening.

"Could it possibly be out of fuel?" asked Doc.

Dennis gestured toward the fuel level meter. It showed three-quarters full.

"Maybe the line's plugged."

Dennis grabbed an adjustable wrench and unscrewed the fuel line to the engine. He pointed it away from everyone and Doc pushed the start button. The engine cranked, but no fuel ran out the hose.

Now they knew why the engine wouldn't fire, but what to do about it? The fuel level indicator still showed $\frac{3}{4}$, but what if it was stuck?

What if the tank had gone dry a long time ago leaving only enough fuel in the pipes to run for the five minutes it had run this afternoon? If that were true, they were sunk.

Dennis sat down on a cardboard box full of station T-shirts. He had to think this through logically. He had tested the generator only three days ago as part of its normal weekly test. It ran for half an hour with no problem.

Last April he had had the fuel tested to make sure it was still OK. Some of it must have been in that tank for several years and he wanted to make sure it wasn't breaking down chemically.

At that time, the company that took the sample had checked the tank level with a measuring stick and found it to be $\frac{5}{8}$ full, in agreement with the metered float.

Could he have used up all the fuel in just those weekly tests? No. The meter had to be right. There must still be $\frac{3}{4}$ of a tank of fuel still there. So what was the problem?

The culprit

Meanwhile, Doc had been examining the plumbing. The fuel traveled in a pipe from the underground tank to a pump powered by an AC motor and then to a small holding tank mounted about six feet up in the air.

The hose from the bottom of the smaller tank ran downhill to the engine. It was the same hose that Dennis was
(continued on page 30)

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Processing Can Hurt Ratings

by Tom McGinley

Part I of II

Greenbelt MD . . . The quickest way to start a world war might be to give control of a nuclear bomb to a madman.

Some suggest that the broadcast corollary of that would be: the quickest way to start a loudness war is to give control of the audio processing to the program director.

While loudness has long been the battlecry for CHR/Top 40 formats, many programmers are discovering that quality and cleanliness have become more effective weapons in helping to attract and keep listeners.

Getting loud will always come at the expense of staying clean. Although it's a matter of degrees, it is still a simple law of physics.

The role of technical quality

Let's not forget that programming is what attracts listeners first and foremost.

Technical improvement cannot buy ratings for mediocre programming in a competitive situation. As a relative component to overall success, a superb air sound is like better coverage.

If the programming of two competing stations is essentially the same, the station with the more sonically appealing air sound or coverage capability will have the edge.

If people can't find the programming they want elsewhere on the dial, most will put up with a station having inferior technical qualities.

But with all the signals available now, even in the smaller markets, few stations have the option of ignoring this important aspect of their operation.

Other competition

It is well established that the competition is not just coming from other radio stations, but from numerous other sources of consumer audio entertainment: records, cassette tapes, music video and most notably digital audio in the form of the CD.

Perhaps no other medium has had such a compelling ability to wake up the radio business with the urgent plea that it is time to clean up.

Listening to a song on a CD player and then hearing it on a typical FM radio station presents a similar sonic differential when switching from FM to AM on the average car radio.

Hardly anyone in this industry has forgotten what happened to most of the successful music stations on the AM dial.

Listeners switched from AM to FM mainly because music sounds better on FM. It's the same kind of phenomenon that has made color TV more popular than black and white.

High Definition Television (HDTV) is waiting just around the corner to ratchet up the technical quality of television another notch.

With the rapid ascent of CD popularity, it is only a question of how long it will take before digital quality audio becomes the standard.

The lesson here for broadcasters is that the public will identify the best sounding source for the music they want to listen to and will prefer it by choice.

I am not suggesting that all radio stations should sound like totally unprocessed CDs in order to be competitive.

Certainly there will always be the necessity of restricting the dynamic range of radio broadcasts to reasonable limits in order to prevent overmodulation and cope with ambient noise in real listening environments.

There also remains a justifiable need on AM to maintain relatively healthy average levels to better serve fringe area listeners and to judiciously enhance the high frequency response to make up for typical receiver deficiencies.

Format is a factor

Granted that audio processing decisions will to some degree be format dependent. Classical and beautiful music

stations typically need a larger dynamic range with minimal gain reduction or compression.

But on most other formats why must FM loudness wars in which the audio usually gets mangled up against a brick wall still persist in many markets?

As a former program director and chief engineer, I'd like to look at the issue of audio processing in perspective.

In recent years as competition and the importance of Arbitron ratings intensified, the on-air sound became more important and more of a concern to PDs.

In the old days, setting the station's audio processor (then known merely as a

gain controller and peak limiter) was strictly the province of the chief engineer.

Enter the multiband processor

With the advent of multiband devices in the 1970s, the term processor was born to more accurately describe the comprehensive functions of these new breed of boxes which featured tone controls as well as loudness controls (density and clipping).

As a consequence, stations had the ability to "burn a hole" at their spot on the dial with a very loud and dominating signal.

Those who continue to worship at the throne of loudness assume that most listeners are automatically attracted to the station most easily found on the dial, *(continued on page 28)*

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What's more, for upgrades to power levels beyond 10KW, each of these FMQ series

transmitters can serve as the driver section for QEI's 20, 30 or 60KW transmitters, again resulting in major cost savings.

Every QEI "New Reliables" FM transmitter is built to deliver ultra-dependability and performance. So—whether your station is thinking of upping its power down the road, or if the power you start with is the power you stay with—you'll be glad you chose QEI. Call us toll-free at (800) 334-9154 for the full story.



The New Reliables

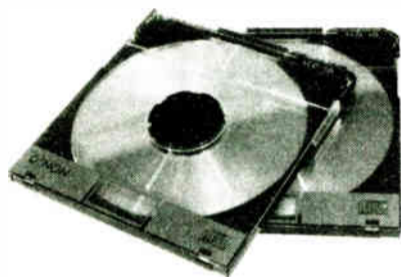
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If you're not taking CDs direct to air, you're losing an audio edge your competition is probably using.

CDs have delivered the promise of faultless audio. They've also delivered a maintenance nightmare.

With any other CD player, consumer or pro, everyone who plays CDs at your station also has to touch the CDs. *If* everybody wears white gloves, there's less chance for a disc to be contaminated with body oils, chewing gum, peanut butter and cigarette smoke.

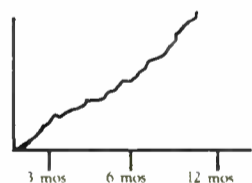
Let's eliminate the contaminants completely. Let's keep the disc in its *original* condition.



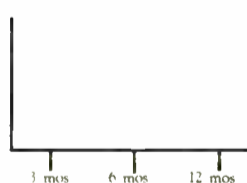
Unlike every other CD player, the Denon DN950 uses cartridges which permanently secure discs to their pristine, original condition.

Your CD library is no small investment. Since music is such an important part of your operation, consider the cost of entire-library replacement. Although in reality, this would take place over a period of time, the expense would be a capital expenditure if all had to be replaced at once.

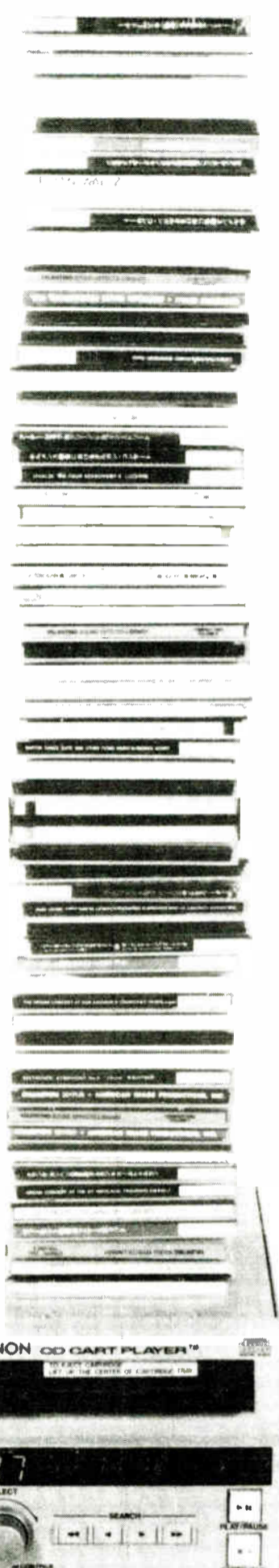
The Denon DN950F system totally eliminates the risk of handling. NO wear, NO tear, NO skipping, NO on-air glitches, NO embarrassment.



Simulated number of on-air embarrassments without CD cartridge protection against contaminants



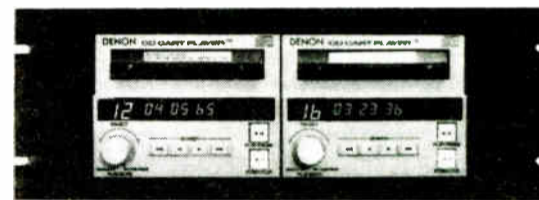
Simulated number of on-air embarrassments WITH DENON CD Cart Player CD protection against contaminants



Mono-stereo selector, easy access, simple interface of remote functions and professional levels and impedances are indicative of the attention to professional detail.

Denon's CD Cart Player is easy to interface, that's because it's built to the needs of your radio station. Remote control, end-of-message warning (which may be remotod to the alarm of your choice), quick cue and review, 3-pin XLRs... does this sound like a *broadcast* device?

What about quality? A 3-beam pickup and meticulously designed D to A filters provide sonic accuracy which has resulted in Denon's replacing other pro machines throughout the industry. *Thousands* of DN950s are in studios around the world. Working and playing day and night.



Two units can be easily mounted in the optional rack mount assembly. The total Denon approach is "professional."

You can *win* with the Denon DN950F system. CDs are surpassing black vinyl in consumer sales. CDs *will* be a part of your musical programming, if not already. This system will please the P.D., the G.M., the C.E., and the C.P.A.

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CD on the Air

If you think the Compact Disc has changed the way music is played at home, imagine what it has meant to radio. With more and more recordings released on CD, most stations now play the little discs more than 75% of the time. And they sound great on the air: no clicks, no pops, no hiss—no surface noise, other than what was on the master.

Then again, when something goes wrong, there is hell to pay. With CD, there's no such thing as pushing the needle ahead. The only solution is to get a record up, fast! When such glitches occur, they usually do so because of the less-than-lab conditions at a typical radio station, which includes not only ambient dust but whatever the DJ has managed to get on his fingers—grease, ink, coffee, soda, tobacco, etc. In short, all the enemies of the CD.

Last year, a new sort of Compact Disc player burst into the studio of WMMR in Philadelphia, where I spin rock'n'roll on weeknights, and it forever changed the way this station plays CDs.

It is a Denon DN-950 "CD Cart Player," so called because it plays CDs only after they have been put into plastic cartridge housings. Instead of putting the bare disc into the machine, you insert a cartridge, which resembles a very skinny 8-track, into a slot. A spring-action door on the bottom of the housing slides open as the disc begins to spin, so the laser can scan the disc.

The DN-950 has several controls and features specifically for studio use. You can select one track while another's playing, and have the machine either play that track next or cue the new track up and await

manual starting. You can also audition a disc through the studio's cue channel while another signal goes over the air.

The display reads to 1/75 S, so you can cue with amazing precision, if you take the time. The player's precise cueing capability allows, for the first time, the CD equivalent of a slip cue. While a CD is sitting cued, the display shows the full time of the selection. During play, it counts down the time remaining. This is a marvelous feature, since it tells the DJ exactly how much time he has to prepare the next cut. And the DN-950 can also flash a light and trigger an ex-



Photo by Neil Benson

ternal signal, a studio automation system to start the next selection when the track is finished.

The Denon DN-950 thus is simple and easy to use. It's child's play to take out a disc cartridge, insert another "cart," and cue the desired selection. I've done it lots of times while talking on the air, without missing a beat.

The Denon has proved much more suitable for on-the-air use than any of the fine home-use decks that previously paraded through WMMR's studio. Those units were just not designed for 24-hour, 365-day use, and they

simply wore out. Reports Phil Harris, chief engineer and director of engineering at our station, "The only bugaboo that surfaced in our six original Denon machines, as it had in every other CD machine on the market, was skipping. And Denon has recently replaced our old machines with new decks that don't have this problem. Even with skips, the failure rate for our original six players (two of which were in continuous use) was very small, especially on CDs that had been cleaned well before being put into the cartridge."

According to Harris, the DN-950's ability to interface with the studio's console is another huge plus. "The deck will connect easily with any broadcast automation system because the necessary jacks are on the back panel. The Denon can be remote startable from a button somewhere else, like on a console. Many home or consumer machines didn't have that capability, so engineers like me had to go inside and tear apart the machine to make it work properly with broadcast

equipment. The Denon also has balanced-line outputs; that won't be of interest to most consumers, but for us it means there's no interface amplifier necessary between the machine and the console."

At present, the plastic cartridges cost about \$4.00 each. For home use, this could quickly get into serious money. However, as Harris says, "To a broadcast station, it is a very small price to pay for increasing reliability and keeping dirt off the disc."

Thanks to machines like Denon's CD Cart Player, the era of industrial-strength Compact Disc players is finally upon us.

Michael Tearson

ALLIED

Using AM Sync on the Big Island

by Alan Roycroft

Honolulu HI ... The state of Hawaii consists of about 12 islands, islets and shoals with seven islands inhabited.

The capital is Honolulu on the island of Oahu and about 200 miles to the southeast is the island of Hawaii, a very confusing situation to visitors.

This island is larger than all the others combined and with its 4000 square miles in area it is called, with Hawaiian simplicity, the Big Island.

Only the narrow coastal plain is inhabited and the central areas consist of volcanic mountains between 6000' and 14,000' which effectively shields all radio communication south to north and east to west.

The county seat is Hilo on the central eastern coast while on the western coast the very popular resorts are centered around the town of Kona. These are the two main centers of population.

Limited coverage

KIPA in Hilo operated on 620 kHz with 5 kW and although it covered all the eastern coastal areas it could not reach the northern, southern and western areas.

Being the CPCS-1 for the county, KIPA applied for a CP for two additional transmitters to operate synchronously with the Hilo transmitter on 620 kHz.

The idea was to cover all the county including that area in the southwest where no radio service whatsoever was available to the growing population.

A permit was issued for three 5 kW transmitters located at strategic sites around the island: Hilo, Keahole Airport near Kona and South Point.

Technical information for the design of the system was obtained from papers published in Europe over the past 52 years and discussions with the Italian PTT, the French TDF, the BBC and various manufacturers in the UK.

It was obvious that early attempts to closely synchronize transmitter frequencies introduced additional problems in practical operation of a group of stations

and added to the cost of construction.

Use of such external synchronization had been abandoned in Europe over 30 years ago.

Individual stable crystal-controlled generators had been developed with stability in the order of 1×10^{-8} and were equipped with Vernier frequency control.

This type of drive is universally used with perhaps one exception in the UK. Droitwich has an atomic drive upon which all the BBC long and medium wave transmitters are frequency calibrated instead.

Although the frequency of such drivers is most stable, it is the difference between them that is the important factor for group sync operation.

Since all the effects of aging of the components of these units will be the same, any drift will be in the same frequency direction.

A long beat

Three of these drivers were obtained and once the Hilo and Kona sites were operating, careful listening tests showed that a small frequency difference between transmitters was preferable to one that gave shorter periods between "beats."

We chose a beat that occurs every 7.8 minutes which is a frequency difference of approximately .0002 Hz and this has remained stable for approximately eight months of operation.

Two effects occur in the "mush" areas where two transmitters are heard at one time. First is the "add" half cycle when both transmitters are in phase and the signal strength adds together.

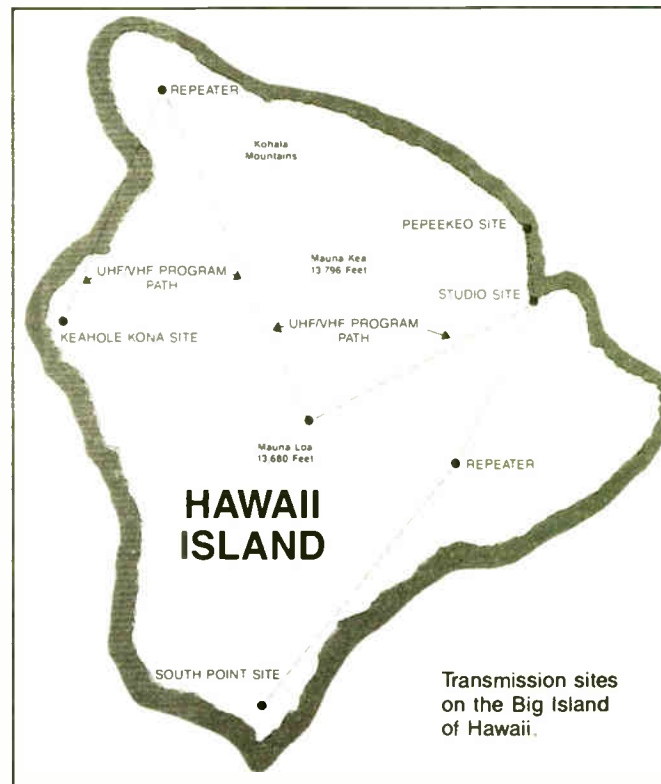
This is when the listener hears the modulation of both transmitters and therefore it is most important that both modulation envelopes match each other in phase, timing, response and harmonic content.

To achieve this we first looked at timing in that the signal path from the studio to the Hilo transmitter was only six miles long while the Kona program feed required a 154 mile path to avoid three

major mountains.

A digital delay unit having equal delay at all audio frequencies was installed in the Hilo feed and by careful listening in several mush areas, it was possible to phase transmitter inputs and adjust the delay time so that distortion during the in-phase beats was negligible.

Use of the same make and model



These areas are not black and white. If one drives along a highway observing field intensities, it is soon evident that signal strengths vary greatly over a short period and therefore listening tests within an expected mush area do not materialize.

For example a car is driven along a highway where transmitter A produces a 4 mV/m field and transmitter B produces only 0.7 mV/m. No mush occurs until the car enters a long cutting or valley where transmitter A's signal drops to 1 mV/m but transmitter B's signal remains at 0.7 mV/m and condi-

tions for mush occur.

Out of phase

During the negative beat half cycle when the carrier levels subtract from each other, it is possible to have a weak carrier equipped with the sidebands of a 5 kW signal. The resultant distortion is equal to a heavily overmodulated transmission.

There are several papers published on this effect and results of exhaustive tests

transmitters also greatly helped in producing this effect since every transmitter exhibits different response, phase delays, attack times and so forth.

If, during the period of almost equal signal strengths, the add half cycle occurs and someone has matched the two transmitter outputs, the AGC in the receiver will handle the increased signal and no effect will be noticed.

If the transmitter frequency difference is small enough, the time between beats will be long enough to allow the car to come out of the cutting before a subtract half cycle occurs.

This is the best scenario. If a subtract half cycle occurs in the cutting tolerable distortion is heard and a period of serious distortion occurs for about 30 seconds followed by a clear signal for 7.3 minutes.

Distortion tolerance
In all the technical papers written on synchronous operations, the measurement of distortion or tolerability of program material is listed on a scale from one to ten based upon an opinion of a group of listeners from technical, musical and average listener backgrounds. Such acceptance of the distortion periods has been made by the KIPA listeners and over a period of eight months and from hundreds of reports received, not one has mentioned or been critical of the technical aspects of

(continued on page 29)

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A "Miracle" in Audio Production

by Frank Beacham

Los Angeles CA ... As a radio producer or engineer, when was the last time you encountered a "miracle" in the course of producing audio for your station?

I mean a truly "magic" experience ... something that shook you at the very foundations of all you thought you knew about sound recording.

As a producer, I became involved in an ambitious project earlier this year to restore and digitally re-master about five hours of vintage radio programs from the 1930s and '40s by Orson Welles and The Mercury Theatre.

Since the programs had aired before the availability of audio recording tape, all had been recorded as live air checks on either five or 15 minute acetate discs.

The discs were in varying condition.

Since in some cases it took 12 discs to make up a one hour program, major sound changes often occurred at each disc change.

There was a minefield of problems: severe clicks, pops, ticks, surface noise, telephone line noise and crosstalk.

On some discs the grooves were worn almost completely away and a couple of discs were broken into parts.

Modern solution

Recognizing the enormity of my problem, music producer Paul Rothchild suggested I try a new digital process invented by Sonic Solutions, a San Francisco-based company. Called NoNOISE™, it claimed to remove tape hiss, surface noise and rumble, clicks and pops, camera whine and unwanted hum and buzz

without affecting the integrity of the original recording in any way.

Paul, who produced the legendary rock group, The Doors, had tried NoNOISE to save an otherwise unusable performance by the group at the Hollywood Bowl.

Lead singer Jim Morrison's microphone cable had broken, causing intermittent breakup throughout the performance.

Using a combination of NoNOISE and digital sampling of sounds from other performances, Paul was able to save the performance.

That show went on to become one of the year's most successful video concert films, *The Doors: Live at the Hollywood Bowl*.

Proceeding cautiously

NoNOISE seemed to be a solution to my problem but I was skeptical as we proceeded.

First engineer Glen Simonelli analyzed, cleaned and repaired the discs. He checked the depth and condition of the grooves and chose among seven styli to match the correct needle to the disc.

Then each disc was transferred to the Sony PCM-F1 digital format.

The F-1 tapes were transferred to Sony's 1630 digital format for editing at Digital Magnetics in Hollywood. Here we assembled the discs—warts and all—into complete programs.

Upon completion of editing, we listed and described all the audio problems by SMPTE time code numbers on a log sheet and sent the edited masters to San Francisco to be "NoNOISED."

A couple of weeks later, when the

tapes were returned, our reaction was stunned disbelief.

NoNOISE had peeled away a layer of old sound artifacts to reveal nuances we had never before heard.

Even the very loud clicks of broken discs had disappeared. Most problems were completely repaired or minimized to a negligible level.

Surprise and joy

My producing partner on the project, Richard Wilson, an actor with the old Mercury company, said it was like returning to the studio at the time of the live broadcast.

"Bernard Herrmann's music score suddenly comes to life. The sound effects are more vivid and the voices more natural," Dick said excitedly.

At one point, when listening to a beautiful Orson Welles reading which had come from a broken disc, Dick had tears in his eyes.

We felt we had witnessed a real audio miracle.

A lot of artists and companies are now using NoNOISE to re-master old recordings for compact disc.

New CDs of old recordings by The Beatles, Barbra Streisand, and The Grateful Dead have used the process.

A restored 1930s performance of Ravel conducting Bolero was recently released

by Phillips as part of its Legendary Classics series.

In film and video, NoNOISE has been used to save dialog improperly recorded on location.

The process also had been used to remove optical track noise and clicks from the soundtracks of great Walt Disney films.

How it works

The NoNOISE process is priced at \$104 per program minute, a cost that is high or low depending on the enormity of your problem and the length of the material.

The process utilizes high speed computer processing and all digital signal processing hardware and software.

The sound spectrum is divided into over 2000 frequency bands, allowing extreme precision in differentiating noise from signal and thus circumventing problems of traditional analog noise gates.

If the recording contains clicks or other impulsive noises, they are removed seamlessly.

The de-clicking program is based on signal reconstruction rather than editing. The exact duration of the original recording is preserved.

If the recording contains hiss or surface noise, the noise is sampled by the computer to distinguish between noise and signal.

After tests are run to determine the op-

(continued on page 30)



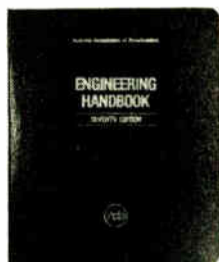
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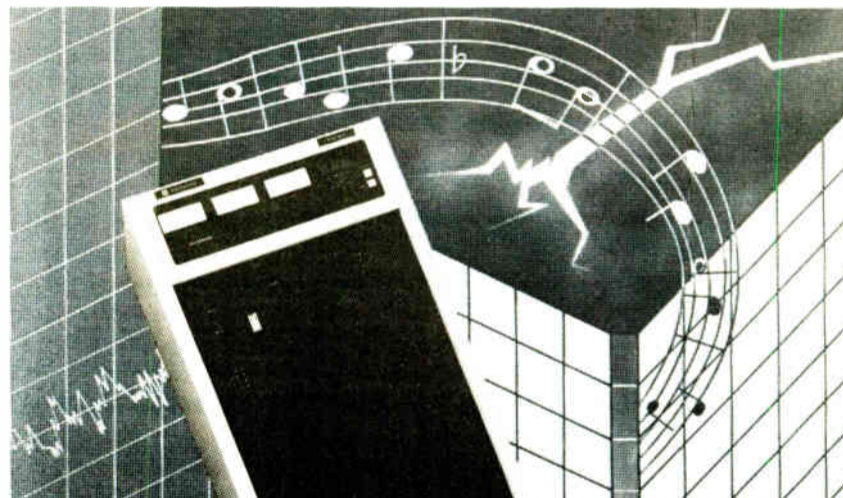
NAB 7th Edition Engineering Handbook is a must for everyone involved in the technical aspects of radio and television broadcasting. Allied is giving away 2 of these "standards." Enter your name in our drawing to be conducted January 8, 1989. To be eligible, simply put your name and title on your station's/company's letterhead and mail to: Dept db, P.O. Box 1487, Richmond, IN 47375. This drawing* is open to everyone who makes broadcasting a career. Please include your business card. Winners will be notified.

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"But let me tell you what surprised me most: WASG is located in a lightning belt—more strikes than anywhere in

America. Our 511-foot tower has been popping with static many times, but your solid-state SX-5A just sits there and keeps on playing! We haven't been off the air once. THANKS!"

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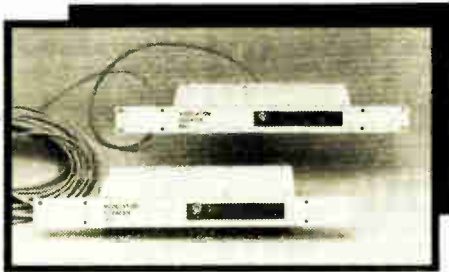
Any of these problems sound familiar?

Get to know Modulation Sciences' composite baseband solutions.

Problems

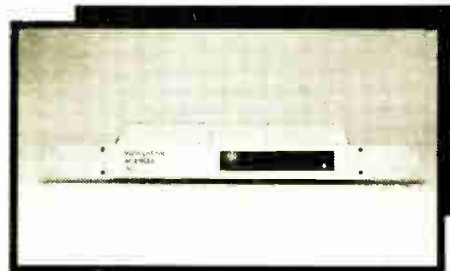
- Transmitter noise, heat, RF field interference and physical location make the transmitter room a poor place to locate the stereo generator and audio processing. Necessary and critical adjustments are inconvenient at best; nearly impossible at worst!
- Lossy, expensive, hard-to-install 950 mHz semi-rigid coax is often impractical to run from the studio to the STL antenna on the roof.
- Fire codes won't let you run PVC jacketed coax through the ceiling, except in very expensive metal conduits.
- Long composite runs at the transmitter or studio pick up ground loop hum.
- You need to drive multiple exciters without composite level changes and switching or relay hassles.
- The station has two stereo generators and two transmitters. You want a simple way to matrix-switch them without requiring complex backloading.
- It's a pain to use your spectrum analyzer and other test gear to make composite measurements because of the hassles of interrupting the air feed to connect them.
- The PD, the CE and the GM all want to monitor and measure the station's quality. But buying three modulation monitors is out of the question.
- Keeping tabs on the competition's signal quality is important, but it's inconvenient and expensive to do.
- Lots of boxes use composite baseband—the STL, stereo and SCA generators and more. You need an easy, economical way to test their performance, and directly measure composite baseband signals.
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A Look at the FCC's AM Technical Review

by Harold Hallikainen

San Luis Obispo CA . . . In a notice of proposed rule making known as Docket 88-376 the Commission proposes to improve the quality of AM service by eliminating restrictions pertaining to protected daytime contours and by reducing adjacent channel interference.

The protected contour change is an allocation and new station matter, not particularly of interest in the day to day operation of an existing station. However, the NRSC and "RF Mask" portion of the proposed rule making would affect audio processing and required transmitter system performance.

Comments on the docket were due 22 November with the reply comment deadline set for 22 December.

On 6 November 1987, the NAB petitioned the FCC to formally adopt the audio standard developed by NRSC.

This audio standard limits the audio frequency at the transmitter input to 10 kHz or below and is designed to limit program caused interference to second adjacent channel stations.

It further limits high frequency audio preemphasis to a maximum of 75 μ s, which will hopefully limit program caused interference to first adjacent channel stations.

Guidelines for new receivers

Further, as the Commission points out, the standard preemphasis would allow receiver manufacturers to manufacture receivers with a complementary deemphasis, resulting in a flat frequency response through the "system" (studio audio input through receiver speaker output).

The receiver deemphasis could be accomplished using a receiver with a wide RF and IF and a deemphasis network in the audio or by having the RF and IF filters cause the desired high frequency rolloff.

The Commission has proposed using the NRSC RF mask proposal as the basis for new rules on emission limitations, although this was not part of the NAB petition.

This would reduce allowed emissions on each side of the carrier. The current rules (73.44) allows emissions to be 0 dB below carrier up to 15 kHz away from the carrier. The proposed rule would allow this only to 10 kHz.

The current rule allows emissions between 15 and 30 kHz from carrier to be down 25 dB. The proposed rule limits emissions between 10 and 20 kHz to be down 25 dB.

This portion of the proposal demonstrates the 10 kHz audio limitation. Further, the proposed rule requires emissions between 20 and 30 kHz to be down 35 dB, which is 10 dB below that currently authorized.

Natural incentives

The Commission points out that the NRSC audio standard proposed by NAB would tend to limit adjacent channel interference when used with a properly adjusted transmitter.

The interference reduction (possibly improving a station's coverage area) along with improved receiver audio (since the receiver manufacturers now have an ideal to "shoot for") should provide "natural incentives" to broadcast stations to adopt the standard voluntarily, limiting the need for an FCC rule in this regard.

In its "marketplace" approach to regulation, the Commission has tended to deal only with interference issues and not with interoperability (between transmitters and receivers).

The Commission uses this "natural incentive" argument to partially justify not adopting the proposed audio portion of the standard.

Further, the Commission appears to find that the audio standard alone would be difficult to enforce and would still allow excessive adjacent channel interference.

The actual sideband energy is dependent upon the original program audio, any preemphasis and harmonic distortion introduced by audio processing, the "NRSC box" (preemphasis and filter), and finally the transmitter and antenna system.

The Commission has asked for comments on the preemphasis portion of the audio standard. Is this a limit on overall preemphasis (microphone input through audio processor to transmitter)?

The preemphasis introduced by multiband audio processors can change based on program content.

Further, the high frequency content of program material varies, and the standard preemphasis may not place a limit on first adjacent interference but reduce it on those stations currently running more preemphasis.

Adjacent channel interference

As mentioned above, the NRSC audio preemphasis could reduce first adjacent interference on stations that were running more preemphasis.

Insight on Rules

The 10 kHz "brick wall" filter would reduce second adjacent interference, but not necessarily place an absolute limit on that interference, since it does not limit spurious radiation generated in the transmitter.

Audio containing no components above 10 kHz could still cause sidebands at 20 kHz and beyond due to harmonic distortion in the transmitter (whether that distortion is due to slight non-linearity of the audio to RF transfer function or due to a substantial non-linearity called overmodulation).

The Commission mentions that improper transmitter tuning may produce incidental phase modulation with excessive bandwidth, though I tend to think that the incidental phase modulation would not increase bandwidth.

The incidental phase modulation would be due to an amplitude and phase imbalance between the upper and lower AM sidebands. This does not appear to generate any new frequencies.

One may argue, however, that phase modulation has an infinite number of sidebands, increasing the bandwidth.

However, the imbalance between upper and lower sidebands also introduces distortion in the audio recovered in an AM demodulator (quadrature distortion).

So we might explain away the incidental phase modulation sidebands by saying that the audio distortion of the AM signal also causes sidebands on the same frequencies as those produced by the incidental phase modulation, cancelling them out.

FCC NPRM

The Commission proposes to modify Rule 73.44 to reduce the energy in the sidebands beyond 10 kHz from the carrier, no matter what the cause of those sidebands (program audio, preemphasis, distortion or overmodulation).

It appears that the Commission is also proposing to eliminate the provision allowing it to direct a station to reduce "out of band" emissions below that specified should the station cause harmful interference.

The Commission further details test procedures to determine compliance (with no specified interval between tests) based on the use of a swept-frequency RF spectrum analyzer.

The Commission is proposing to allow other instruments (receivers or "Splatter Monitors") to be used to determine compliance, but in case of dispute, the spectrum analyzer is to be used.

(continued on page 28)



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Perils of Processing

(continued from page 21)

i.e. the loudest, and that they will somehow be held there like a magnet no matter what the other choices are.

They tend to forget the obvious fact that listeners use the radio to find the programming they're most interested in at a given time.

A less obvious fact often overlooked is that the clipping and compression used to achieve more loudness breeds distortion in various forms which translates into psycho-acoustic irritations and listener fatigue causing eventual tune-out or turn-off.

But perhaps the most unfortunate side-effect of loudness wars is that they have tended to be contagious and per-

vasive.

Loudness begets loudness until an entire market is infected. This can only hurt radio in general as listeners jump ship to other more listenable forms of musical entertainment.

As programming people have become more involved with audio processing, we now have most PDs telling the CE what they want the station to sound like.

We also have PDs reading the processor manuals and setting the adjustments themselves, if the engineer has not done so, to deliver the desired sound.

In some cases the engineer is judged incapable of doing so or even refuses—if his sonic sensibilities differ radically from the PD's.

As technical deregulation has progressed, we now have the majority of all stations operating without a staff engineer.

A contract engineer occasionally comes in to fix things when they break and the PD is usually left to adjust the processing.

If the station can afford it, a consulting audio processing guru is brought in to deliver the knockout airsound merely with the proper twists of a small green screwdriver, although the purchase of another \$8000 worth of processing gear is usually also recommended.

Occasionally the engineer and the PD discover that the processor model or the adjustments alone cannot achieve the desired results.

Poor quality source material is often the culprit. This causes degradation and inconsistency, especially with formats

featuring a substantial number of oldies.

Here again, CDs have dramatized the difference in quality which has prompted their heavy use by stations, both via direct on air play and dubbing to high performance cartridge tapes.

Software availability has improved to the point where almost all stations are now using CDs in some capacity.

Other links within the audio chain which can degrade the air sound include: deficient playback equipment, tape alignment problems, marginal quality STL or program lines, outdated transmitter or exciter, or a narrow antenna system. Those are topics for future discussion.

In my next installment, I'm going to examine what the research suggests we should be doing to the audio to make our stations more appealing and successful.

Tom McGinley is Director of Engineering for Cook Inlet stations and serves as RW's technical advisor. He can be reached at 301-441-3500.

AM Review

(continued from page 27)

There is no proposal by the Commission to require the NRSC audio specifications, though they seek comments on a possible presumed compliance for stations using the NRSC audio specifications. That presumed compliance could be rebutted with evidence from a spectrum analyzer.

Marketplace approach

The Commission has once again taken the "marketplace" approach to regulation. They say that there are "natural incentives" for broadcast stations to adopt the NRSC audio standard and no need for the Commission to require it.

They are, however, interested in establishing standards (similar to those that already exist) to protect against interference, as measured by RF emissions into adjacent channels.

If, for the moment, we compare a broadcast allocation with real property, the Commission has "zoning" regulations permitting certain uses on certain frequencies (this frequency is to be used for aural broadcasting, etc.), while still allowing other services on a secondary basis (subcarrier use).

The Commission is not, however, going to tell you the quality of the signal you must build on that property, leaving that to the marketplace (the financial incentive of more listeners caused by higher quality).

The Commission is involved in determining where the property line between adjacent properties lies and what rights you have to your neighbor's property (you are allowed to radiate something past 5 kHz from carrier, onto your neighbor's property).

The Commission has set strict limits on how much of your neighbor's property you can use (and the proposal makes those limits more strict), even if you and your neighbor come to an agreement allowing for different limits.

The Commission is looking into such "negotiated interference rights" in another Notice of Inquiry (MM Docket 87267).

Harold Hallikainen is president of Hallikainen & Friends, a broadcast equipment design, manufacture, sales and installation firm. He can be reached at 805-541-0200.

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Digital Inroads in Studio Audio

by Mel Lambert

Studio City CA . . . As all of us are by now becoming very aware, the broadcast industry is rapidly coming to terms with the sonic and operational advantages offered by digital recording and production systems.

But not everything we use in the air and production studio involves bits and bytes; there are interesting developments being made in signal processors and other devices designed to improve the quality of broadcast signals.

At the input to all digital recording systems is an analog-to-digital (A/D) converter which, as the name suggests, converts the incoming analog signal or voltage levels to a series of on/off pulses known as binary pulses or bits, using a process referred to as linear Pulse Code Modulation.

(Although other encoding techniques are also available to the digital designer, linear PCM is used in the majority of modern recording and processing systems.)

The number of times per second that

the input signal is buffered into the A/D converter, measured and used to produce a 14- or 16-bit binary number is known as the *sampling frequency*.

Digital Domain

The higher the sampling frequency, the greater the bandwidth of the recorded signal. As explained below, the range of frequencies that can be recorded using, for example, a sampling frequency of "X" kHz, are zero Hz to "X/2" kHz; in other words a bandwidth of "X/2" kHz.

Compared to analog

In practical terms, a digital recorder featuring a sampling frequency of 48 kHz will record onto tape frequencies from around 5 Hz to just under 24 kHz.

By comparison, conventional analog recorders used in on-air and production studios are capable, at a tape speed of 7.5 ips, of recording signals from around 40 Hz to 15 kHz; at 15 ips the perfor-

mance may extend from 25 Hz to 19 kHz.

One drawback with analog recorders, however, is that these performances are only achieved at low to medium recording levels. At high record levels, analog recorders cannot handle signals containing a great deal of high-frequency material.

The resultant roll-off at the top end of the audio spectrum can be quite dramatic and, depending on the tape type in use, begin as low as 12-15 kHz.

Prevalent 44.1

Of the currently available sampling frequencies, 44.1 kHz is used in compact disc players; also in the majority of PCM systems that utilize companion video-decks.

It is also used in both DASH and PD-format reel-to-reel digital transports and for pre-recorded DAT cassettes. Many professional DAT recorders also offer a record sampling frequency of 44.1 kHz, to provide compatibility with digital consoles, random-access editing systems and CD mastering systems.

The ability to connect digital signals directly from one system to another—and thus do away with the need for additional D/A and A/D stages—will maintain the high quality of digital through the multiple mixing and processing stages possible in the all-digital studio of the near future.

Although it is possible to convert a digital signal recorded at a sampling frequency of, for example, 48 kHz, to one that is referenced to a sampling frequency of 44.1 kHz, such

sampling frequency converters are expensive.

(They also produce, some audio "golden-ears" have argued, a small but unnecessary signal degradation because of the additional stage of signal processing involved.)

Other sampling frequencies

The ability to record a DAT cassette at the CD mastering frequency of 44.1 kHz has obvious advantages to music producers, while broadcast and post-production facilities will be able to make use of a broad palette of digital recording, editing and processing hardware that operates at the same sampling frequency.

A sampling frequency of 32 kHz is offered on most DAT recorders to provide compatibility with Japanese DBS (Direct Broadcast Satellite) systems, which transmit 16-bit digital audio into the home.

This signal can then be connected directly to the digital port of an R-DAT recorder and so avoid an additional A/D stage. Its potential broadcast application in the US is still under consideration.

The majority of European broadcasters have adopted a "standard" sampling frequency of 32 kHz for relaying signals between studios and transmitter sites, for example, although the future of direct broadcasting of digital audio is still in a dormant stage.

Mel Lambert has been intimately involved with the production industries on both sides of the Atlantic for the past decade, and for seven years served as editor of Recording Engineer/Producer magazine. He is currently president of Media & Marketing, a consultancy service for the professional audio industry. He can be reached at 818-753-9510.

Big Island Broadcasting

(continued from page 24)

the operation.

From the preceding statements on mush occurring in unexpected areas it becomes obvious that the operating frequency of the synchronous group of transmitters is important in obtaining the best performance.

A low frequency of 620 kHz is much less affected by terrain surrounding the listening point than say, a frequency of 1420 kHz.

The chances of mush occurring in a hilly area where signal strengths vary more in the higher frequencies may detract from car reception.

Because the three synchronized transmitter sites on the Big Island had to be carefully chosen, it was unfortunate that

the Kona site had to be within one mile of the Keahole Airport runway.

The FAA gave a maximum height safety clearance of 100' so any regular top loaded antenna for 620 kHz was out of the question.

Theoretical designs of a "Paran" antenna were developed into practical plans and finally constructed as a group of four 90' towers in a square, 20° apart.

This antenna system has proved to be superior in efficiency to a regular quarter-wave vertical radiator with considerably reduced skywave signal.

Alan Roycroft is president of Broadcast Services, Inc. and a consultant to KIPA, Honolulu. He can be reached at 808-935-6858.



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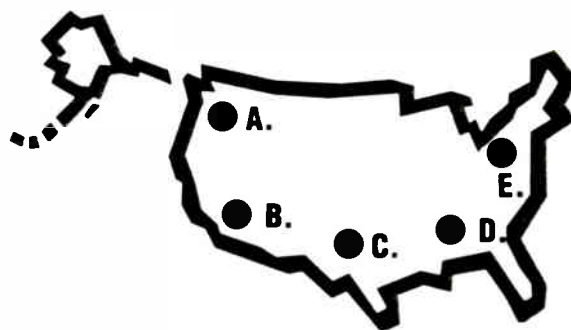
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Riding the Storm Out

(continued from page 20)

now holding. On top of the holding tank was a level switch.

Doc visualized the system in action. Normally, utility power provided current for a battery charger to keep the starter battery ready. When the system detected a power failure, it waited 10 seconds to be sure and then activated the starter.

The engine cranked and started on the fuel gravity-fed from the holding tank. As the engine drew fuel, the level in the small tank would drop, activating the level switch which turned on the pump.

The pump would then cycle on and off to keep the holding tank full. When the generator stopped, the holding tank would contain enough fuel for the next start.

Dennis watched as Doc took a wrench and opened the top of the holding tank. He stepped up on a wooden box to peek inside.

"Ah ha! Dennis, take a look at this."

Curious, Dennis climbed up to confirm what they both already suspected. The tank was empty. Dennis poked the level switch with a screwdriver and watched as the float fell down several inches and the motor switch clicked into the ON position.

Dennis looked up at Doc.

"Goey switch assembly."

"Yup. Now, how do we get that pump running again?"

There was the dilemma. The pump ran on AC. Normally, the generator would provide the power for the pump,

but it was dead. If there was utility power . . . but there wasn't.

"What's the problem, guys?" Wally piped up.

"We need some AC," Dennis answered. "Got any?"

"Nope. Gotta have a generator. Only generator we've got is that little one in the remote van, but that's not gonna power more than a couple of cart machines."

"Or a pump, maybe?" added Dennis, a plan hatching in his mind. "Wally, back that truck over here."

Makeshift solution

Wally went to the station garage and disconnected the door from the electric opener. He backed the remote van as close to the building door as possible. Then he crawled in the back and fired up the 2400 W gasoline generator they used for powering remote broadcast equipment.

"Good thing the old man got this on trade-out, huh?"

"I heard that, Wally."

The surprised announcer looked up to see Conrad Michaelson, the station manager, watching him. He gave Wally a disapproving look and then turned to the engineers.

"Any hope we'll be on tonight?"

Doc looked to Dennis, who was splicing together two lamp cords as fast as he could. He twisted together the wires from the two male plugs and wrapped them with some masking tape.

"We're almost there, Mr. Michaelson.

Five minutes!"

"OK, this is our jumper cable—just like a car. I'm going to plug one end into this AC socket which is on the same line as the pump. I'll open the line switch so only the pump will be powered. Oops, let's get that fuel line reconnected. OK. Now, stand back and we'll activate it."

With that, Dennis took the other male AC plug and inserted it into the socket of the running generator in the van. Immediately, the fuel pump started running.

Silent vigil

Everybody watched for a few minutes without saying anything. Then Doc primed the engine and pushed the starter button. It turned over for about five seconds and then . . . it started.

The big engine sputtered for a few seconds and then smoothed out to its usual roar. Lights came on in the building. The normally reserved Conrad Michaelson started cheering and then everybody cheered!

Dennis carefully unplugged the umbilical to the van generator and unplugged the other end from the AC outlet in the building. He grabbed the lever on the pump switch box and pushed it back to the on position. The pump immediately restarted and ran until the float switch said the holding tank was full.

"Good job, men," said Michaelson.

The station manager was relieved to be back on the air.

"Oh, you probably haven't heard. It wasn't ice on the lines that knocked the power out. A car skidded into a utility pole a few blocks from here and knocked it over. Good thing we've got this generator."

Doc and Dennis exchanged glances but didn't comment. After the manager left, Doc gave Dennis a strong pat on the back.

"Good show, Chief. Let's see how fast we can get my report done tomorrow and then we'll take a couple of days off for Christmas. Oh, and speaking of Christmas, drive me back to the hotel and we'll see if that experimental DAT system you're so interested in is still in the suitcase."

John Shepler is an engineering manager, broadcast consultant, writer and regular RW columnist. He can be reached at 815-654-0145.

Audio Miracle

(continued from page 25)

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For information on NoNOISE, contact Sonic Solutions at 415-751-8666. Frank Beacham is RW's West Coast correspondent.

Splatter matters.

Splatter is a form of radio interference that can drive listeners away from AM radio. It creates distortion in your signal, wastes transmitter power on undesired sidebands and interferes with other stations. Even with an NRSC audio filter, misadjustment of the transmitter or audio processing equipment can still produce an RF spectrum that can exceed NRSC or FCC limitations.

That's why routine monitoring of your station's RF spectrum is a must. But it doesn't mean you'll have to bust your budget on a spectrum analyzer. It just means you need the rugged SM-1 AM Splatter Monitor from Delta Electronics.

For just \$2,150 you can now accurately measure your transmitter's spectral output, monitor transmitter IPM levels and make adjustments to improve clarity. An external audio input helps identify splatter sources.

The Splatter Monitor's unique offset feature tunes spectral segments for closer examination 10 kHz to

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In this day and age where splatter matters, monitoring it doesn't have to cost you a fortune.

To find out more about the new Delta Splatter Monitor, call (703) 354-3350, or write Delta Electronics, Inc., 5730 General Washington Drive, P.O. Box 11268, Alexandria, VA 22312.

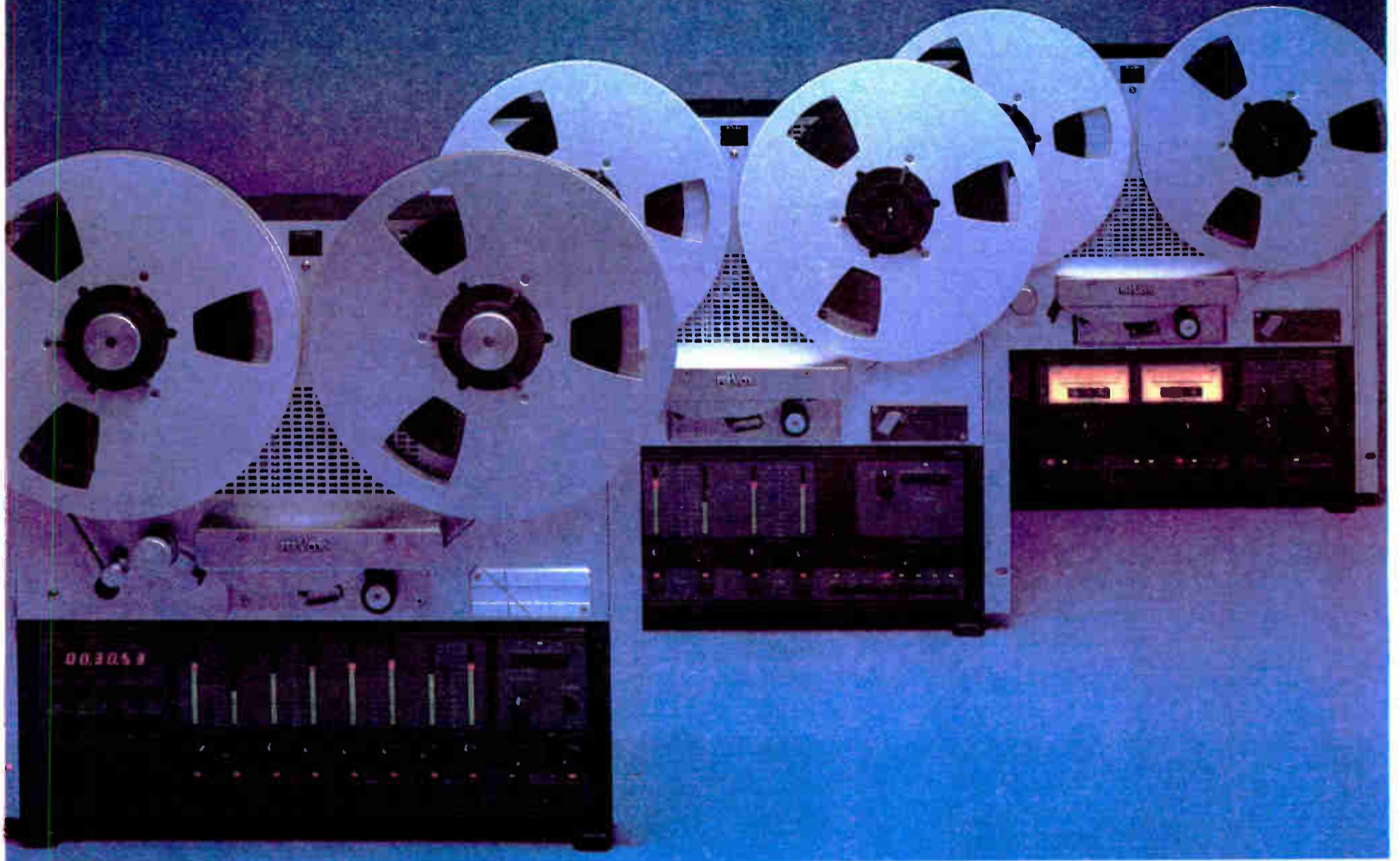
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STUDER REVOX

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AMPLIFIERS

Want to Sell

Crown IC150 stereo preamp, rack mntng, rugged, gd cond, \$100; Phase Linear 400, 200 plus 200, stereo, excel, \$325. B Laughlin, 816-361-0548.

Crown D-75 power amp, great cond, barely used, rack mountable XLR & 1/4 connectors, banana plugouts, 1 RU high, great monitor amp, \$350. W Feinberg, Totalltape Publ, 9417 Princess Palm, Tampa FL 33619. 813-621-6200.

Crest 1001 power amp, 1 RU high, 100 w/chan, excel cond, XLR & 1/4 input connections, banana plug & 1/4" out connections. W Feinberg, Totalltape Publ, 9417 Princess Palm, Tampa FL 33619. 813-621-6200.

Shure M64 phono preamp, BO. P Cibley, 138 E 38th, NY NY 10016. 212-966-2219.

PR&E SDA-8 2x16 stereo audio DA, rack mt, XLR connectors & metering, new, BO. B Royster, KQM Bldg, 1019 Cordova, San Diego CA 92107. 619-223-3413.

Shure M64 phono preamp, BO. P Cibley, Cibley Music, 138 E 38th St, NY NY 10016. 212-966-2219.

Ramko DA's, 6RVE (2), \$100 ea; (2) Excalibur DA1-5, \$50 ea. M Legner, 703-971-7069.

Vital AA-1A (11) audio dist amps w/rack mount main frame 1 in 6 out. G Mundkowsky, 12918 Smalley, Grandview MO 64030. 816-966-0731.

Bogen TA-100, MX30 & Challenger, audio PA amps, \$100 or \$40 ea; Newcomb custom audio amp, built EQ, \$75; Dynakit preamp, stereo, vgc, \$40. J Dexter, 1604 Missouri Ave, Artesia NM 88210. 505-746-6590.

Betar RFA-1FM RF amp, 92.7 MHz, never used, BO. M Strong, KKBS, POB 1756, Guyton OK 73942. 405-338-5493.

Want to Buy

Altec-Lansing 1569-A 600 ohm audio xmrs, need pair #15095. A Bobidosh, Bobidosh AV, 1197 High Ave Ste 7, Oshkosh WI 54901.

Gates M-5576. B Bartoli, New World Bldg, POB 5607, Montecito CA 93108. 916-926-3273.

QRK/Alpha I or II preamps, for parts, any cond, advise cond & price. C Keith, ALI Bldg, Box 313, Keene NH 03431.

RCA amps old or new, monitor booster, etc. B Davies, Virgo Prod, 5548 Elmer, N Hollywood CA 91601. 818-761-9831.

Marantz #9 or 7 tube amp & preamp. Y Chung, 1129 S Robertson Blvd, LA CA 90036. 213-274-1921.

Elect by Marantz, McIntosh, Altec, WE, Westrex, Century, IPC, etc. C Driggs, 4337 Maxson Rd, El Monte CA 91732. 818-444-7079 (Fax) or 818-444-6863.

McIntosh MI350, MC3500, 275, MI200, MI75, C-20, C-22, etc, tube type amps or preamps. Y Chung, 1129 S Robertson Blvd, LA CA 90036. 213-274-1921.

ANTENNAS & TOWERS

Want to Sell

AM antenna tuning unit, all new components, ready to use, gd to 5 kW, \$300 plus you ship. J Cunningham, KEOR, Rt 2 Box 113B, Stonewall OK 74871. 405-265-4496.

Reconditioned

American 50-B Two Drum Hoists. Specially set up for tower erection... \$8500 each, FOB: Suffolk, VA. We buy, sell and lease erection equipment.

Call Southern Tower Service Co., Inc. 804-539-8365.

Heavy duty 150' self-supporting microwave tower; will support 10' dish, \$6000. Call Southern Tower Service at 804-539-8365.

Phelps Dodge CFM LP-2 tuned to 103.9 MHz, 2 bay, \$1000. D Nixon, WOCA, POB 1850, Ocean City MD 21842. 301-641-0001.

Phelps Dodge CFM LP-3 tuned to 92.1 MHz, \$800. S McCloskey, WBHH, POB B, Beaufort SC 29903. 803-524-9210.

Gates ERI FMC-4A 4 bay CP FM at 88.5, gd cond, \$2000. J Sims, KLJC, 15800 Calvary Rd, Kansas City MO 64147. 816-331-8700.

RCA TPU-24DM UHF TV antenna on chnl 41, prefer to donate to non-profit organization. C Haynes, POB 31235, Jackson MS 39206. 601-948-1515.

Mark P21A72F-2 2.1 GHz antenna w/radome, almost new, BO; Andrew GP8F-890 8' diameter STL antenna, almost new, BO. K Schipper, KOKS, 9191 Sheridan Blvd, Westminster CO 80030. 303-427-7700.

S-A 8005, 4.6 m sat antenna, \$2500; broadcast quality receivers, S-A 414, \$1975. Megastar, 702-386-2844.

Shively 4-bay FM antenna w/radomes tuned to 103.1, 2 yrs old, \$3500/BO. P Martin, 414-482-2638.

Self supporting 180' tower, \$3500. G Gunter, KMAB, 650 N Bolton, Jacksonville TX 75766. 214-586-2162.

RCA BFA-8A 8 bay HP medium power FM antenna, gd cond, tuned to 102.5 w/heaters, \$1500/BO. D Woodcock, WNWV, 5606 Medical Circle, Madison WI 53719. 608-271-1025.

Harris (ERI) FM antenna, 10 bay FM HA series, excel cond, \$13,000; Phelps Dodge 3-1/8" rigid transmission line, 21 sections, 20' long, w/spring hangers hardware, excel cond. B Umberger, WNLT, 51 S Main Ave, Clearwater FL 34625. 813-446-0957.

Stainless G24/25 200' black iron tower, 20' sections, tapered base, new sandblasted, prime & paint, on ground, \$2000. J Blodgett, WGTG, 308 Westgate Pkwy, Dothan AL 36303. 205-794-4770.

ERI GS-CPS-10, excel cond, BO. B Howard, KOFO, US S9 Highway & Radio Rd, Ottawa KS 66067. 913-242-1220.

Rigid line, 380' of 3-1/8" in 20' sections, \$100 per section or all for \$1800. C Haynes, POB 31235, Jackson MS 39206. 601-948-1515.

Andrew 47N-3 1-5/8" to female N, \$60; 47W-3 1-5/8" to N male, \$35; 47L-3 1-5/8" to LC female, \$70; 3-1/8" to 7/8" reducers (3), \$40. J Cunningham, KEOR, Rt 2 Box 113B, Stonewall OK 74871. 405-265-4496.

Andrew Hellax, 140' of 5/8" cable, new, \$100. D Loucks, KTKL, 2132 W 42nd, Casper WY 82604. 307-265-6700.

FM tower, 600'; 450' of 3" rigid transmission line; 40,000' #10 copper wire. J Stevens, WLAU, Rt 10 Box 420, Long MS 39440. 601-425-5145.

Utility tower, 340', on ground, ready to move, gd cond, \$12,000/BO. DF Dixon, 142 David, Lugoff SC 29078. 803-438-5788.

ERI 10 bay CP FM at 95.7 MHz, excel cond, BO. B Howard, KOFO, Box 16, Ottawa KS 44067. 913-242-1220.

Jampro JLCP-7 FM antenna, 7 bay for 12" face or leg mount, 106.3 MHz, 195' 1-5/8" coax air dielectric w/IEA connector each end, \$5000/all. B Dickerson, WEAG, POB 520, Starke FL 32091. 904-964-5001.

CCA (Shively) FM 6 bay low power CP FM, 97.7 MHz, rebuilt 8/87, 1 spare bay, avail now. D Walker, WOXY, 513-868-3842.

Andrew HJ7-50A xmsn line 130', 1-5/8" line w/GP 87R, GB 87G connectors w/riftings, gd cond. D Walker, WOXY, 513-868-3842.

Jampro JSCP-2 FM antenna system, will tune to your freq w/factory warranty, also 10 radomes, excel cond, BO. D Loucks, KTKL, 2132 W 42nd, Casper WY 82604. 307-265-6700.

Phelps-Dodge 4 bay HP antennas, \$1200. W Carnes, K11RT, POB 8234, Jacksonville TX 75766. 214-586-2162.

Rohn 25G guyed, insulated, 180' AM tower, w/guys, on ground, ready to ship, \$1300. D Kelly, KWPN, Box 84, West Point NE 68788. 402-372-5423.

Want to Buy

Towers, 1000', gd cond, prefer on ground, immed cash. L Magnuson, Flagship Comm, 2000 Indian Hills Dr, Sioux City IA. 712-239-2100.

Guyed towers, (2) 500'. G Gilbert, CSRG, POB 50539, Denton TX 76206. 817-383-1357.

Self-supporting tower, 200-300'. D Van Zandt, Cornerstone Radio, 2596 State Rd 44, New Smyrna Beach FL 32069. 904-427-9000.

Guyed tower w/24" tapered top, at least 100', 700-800' overall height. D Furr, POB 707, Columbus MS 39701. 601-328-1420.

Towers 220' +, self-supporting to hold dish, AACT Inc, 156 Lazelle Rd, Worthington OH 43085. 614-846-9234.

AUDIO PRODUCTION EQUIPMENT

Want to Sell

Mod Sciences composite clipper, like new, \$350; late model 8000A Optimod, \$2000 firm. John 315-488-1269.

Audio Design & Recording scamp signal processing rack. Includes wooden case, rack frame w/power supply, 2 compressor/limiters, 2 parametric EQs, 1 octave EQ, 1 ADT, 5 dual noise gates, 1 auto panner, & 1 blank panel. All inputs & outputs on TT patchbay, \$2500 for all. Claude Hill, 820 Redwood Dr, Nashville TN 37220. 615-331-4743.

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Orban 245F stereo synthesizers (2), brand new, unused, current model, \$250 ea. Steve, 303-499-5533 alt 6PM MST.

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Seacom SM-1A, SM-3 deluxe direct boxes, two passive, one active, BO. D Johnson, KAWL, POB 544, York NE 68467. 402-362-4433.

Henry Matchbox, \$100; Opamp A45 dist amp, 4 chnl, \$150. J Wesley, Diversified Software, 1800 N Highland Ste 700, LA CA 20028. 213-465-0787.

Allison Kepex 500 w/LX100 power supply, \$150/BO. K Smith, RRR Box 483A Carl Rd, Gorham ME 04038. 207-929-6129.

Orban 516EC 3 ch de-esser, vgc, \$395; Orban 106C 4-spring reverb, \$145; Allison RM-160 rack w/2 Kepex, 2 Gain Brain, \$495 pkg. R Miller, Filmaker Inc, 606 W Broad, Bethlehem PA 18018. 215-691-0900.

KLH Burwen TNE-7000A transient noise eliminator, 3.5" rack mount, EC, \$295. S Hoffmann, Cameron Univ Theatre, 2800 W Gore, Lawton OK 73505. 405-581-2428.

Burwen DNF-1201A dynamic NR, \$200; Altec 1650 1/3 octave mono EQ, \$150. B Laughlin, 816-361-0548.

dbx 222 NR, excel cond, RCA inputs & outputs, perfect for cassette or R-R recording, rackmountable, \$100. W Feinberg, Totalltape Publ, 9417 Princess Palm, Tampa FL 33619. 813-621-6200.

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SAE 1800 parametric EQ, stereo rack mount w/cue chan, gd cond, \$125. G Ernst, Bayside Sound, POB 166, Lincoln City OR 97367. 503-996-6020.

WDVT off air, selling equip, all under 3 yrs old & very gd cond, call for list/prices. B Gellhaus, WMRG, POB 73, Cheltenham PA 19012. 215-635-4815.

Burwen TNE 7000A impulse NR, unsurpassed for dubbing LP's, \$285. B Laughlin, L-Pad Elect, 615 E 70th St, Kansas City MO 64131. 816-361-0548.

Orban 9100B1 AM NRSC standards processor, only 3 mos old, excel cond, w/manuals, \$3500. M Taylor, WXRC, 357 1st Ave NW, Hickory NC 28601. 704-322-1713.

Big Band & Easy Listening format prod music library, custom made, all on 7" reels, 25 Hz stop tones & cue sheets, \$5000/BO. S Coston, 2109 Stalham, Chesapeake VA 23324. 804-397-9206.

Comrex TCB-1 telco coupler, new, BO; Burwen DNF-1100A dual chnl dynamic noise filter, gd cond, \$400; Switchcraft 17QD17, new patch cords, also new ADC 4 & 6" type PJ-14, BO. B Royster, KQM Bldg, 1019 Cordova, San Diego CA 92107. 619-223-3413.

dbx 903 Comp-Limit compressor limiter module, for dbx 900 Series rack, \$230. E O'Brien, Imperial Snd Stos, RR31 Box 405, Terre Haute IN 47803. 812-877-2663.

KSTT/WXLP has loads of equip to dispose of, call for list. L Timmons/M Loos, WXLP, 1229 Brady, Davenport IA 52803. 319-326-2541.

API 550A stereo EQs, \$550. F Chambers, 813 Putnam Ave, Brooklyn NY 11221. 718-453-6499.

dbx 900 series, rack mount card cages (3), \$400 ea; 942 decoder modules (8), \$125 ea; 941 encoder module, \$125; de-esser module, \$275; model 140A encode/decode unit, \$325, will deal on whole package. M Bostic, WKLX, 259 Monroe Ave, Rochester NY 14607. 716-454-3040.

Audio Tech System, audio exciter (2), \$125 ea; Ed Cor stereo HA400 headphone amp. M Legner, 703-971-7069.

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Tascam PB-32H (2), \$75 ea; Tascam PB-32-P, \$75; Teac PB-64 (2), \$75 ea. M Legner, 703-971-7069.

Orban 111B reverb unit, \$300. M Legner, 703-971-7069.

dbx 905M & 902M parametric EQ & de-esser, like new, \$500. B Weiss, KLSI, 3101 Broadway Ste 460, Kansas City MO 64111. 816-753-0933.

Orban 8100A Optimod w/8100AST studio chassis, mint cond, \$3500. P Christensen, WIVY, 3101 Univ S, Jacksonville FL 32216. 904-721-9111.

Want to Buy

Booklet for Fairchild 658 reverb. ETS Record, POB 932, Honolulu HI 96808. 808-847-4300.

Bulk tape eraser, gd cond, reasonable price. D Norlin, KVCO, POB 1002, Concordia KS 66901. 913-242-1435.

AUTOMATION EQUIP.

Want to Sell

Harris 90 Brain & cart Carousel, \$800/BO. L Wilkins, Montgomery Ed Radio, 361 Mendel Pkwy, Mtgy AL 36117. 205-271-8900.

SMC 250 random select Carousels (2); (6) Schafer equip racks; (3) Scully 270 R-R PB units. D Jackson, WPRN, POB 566, Butler AL 36904. 205-459-3222.

SMC TS-25 dual 25 Hz tone detectors w/spare cards, \$300 ea; SMC 250 Carousel, completely refurbished, jewel when removed, will sell as pkg or separately, \$1200 ea. D Purscell, Payne Prescott Bldg, Box 151, Prescott AZ 86302. 602-445-6880.

IGM 48 PBM, mono Instacart, just out of service, \$4000; IGM 740 System, 12 chnl, DEC computer, just out of service, excel for parts, \$300/BO. W Nystrom, KRDU, 597 N Alta, Dinuba CA 93618. 209-591-1130.

Cetec 7000GLS, (4) ITC 770 R-R, (2) Schafer 24 tray Carousel, 48-tray Instacart, Hazeltine controller w/clock, vgc, in use, \$13,500. T Hite, WAUC, Box 908, Wauchula FL 33873. 813-773-5008.

SMC Automation System, DP-1 brain. AS-16 switcher w/remote control, (2) 250RS Carousels, (2) 250 sequential Carousels, 521 twin PB, 510 single PB, 590 desk record ctr, w/CCU, LA-246 AGC, PA-A supply, AC panel & monitor amp in 3 racks, currently in service, avail 12/88, you ship, \$5000/BO. P Craddock, KWBC, 116 Railroad, Navasota TX 77868. 409-825-6484.

SMC 250 (4) monaural Carousels w/Harris SC-90 type interface, interface hardware to 1 unit, other 3 plug in, w/pick up only, \$200 ea or \$700/all. C Lewis, WMFD, POB 5307, Wilmington NC 28403. 919-763-6363.

IGM dual chnl 25 Hz rack mount tone detectors (2), excel cond, \$65 ea; SMC plug-in cards for 250 Series Carousels & Revax A-77, 350 Carousel spare parts, BO. B Royster, WQM Bldg, 1019 Cordova, San Diego CA 92107. 619-223-3413.

Schafer 903 system (2), w/R-R deck & Audiodiole, BO. M Golchert, WBVR, POB 298, Russellville KY 42276. 502-726-3555.

Systemation on-air & prod controllers for automation system, gd cond, \$3000/BO. B Eifron, KJLA, 3435 Broadway, Kansas City MO 64111. 816-753-7707.

MEI Microprobe 3 control brain for satellite operation, \$1200. T Bigby, KXLA, POB 900, Rayville LA 71269. 318-728-6990.

SMC automation unit, great cond, includes DP-2 Brain, 5 ITC 750 PB units, 2 48-cart Insta-Carts, DS-20 switcher, PDC-4 clock, 2 CRT's Sanyo & Motorola, automatic logger, dual tone sensors, program backup cassette, used 1 yr, \$10,000. L James, BEST Prod, 611 N Greer, Pittsburg TX 75666. 214-856-2892.

Broadcast Product CL24 AS10 automation controller, does not random select; Sonomag 250, unknown cond, 24 slot Carousel, BO. G Vogel, KHIH, 7900 E Berry Pl, Englewood CO 80111. 303-779-8797.

IGM 504 3 chan x 20 wide, \$700/BO. S Weber, KGRV, POB 1598, Winston OR 97496. 503-679-8185.

Want to Buy

Carousels for Harris 9002, also need non-working units for parts. B Williams, WDOC, POB 309, University Dr, Prestonsburg KY 41653. 606-886-2338.

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CAMERAS (VIDEO)

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CEI 280 complete functional color camera, w/camera head w/replacement cards, CCU w/replacement cards, lens (10-1 zoom, f2), spare yokes, remote control panel, 100' camera cable, range extender for lens, zoom & focus controls; spare view finder, power supply, lens, sell or trade for character gen suitable for television use. S Chism, Moody Bible Institute, #20 N LaSalle, Chicago IL 60610. 312-329-4068.

Panasonic HV3500 color camera, \$995; Sony HVC200, \$250; Sony HVC220, \$300. W Carnes KIIRT, POB 8234, Jacksonville TX 75786. 214-586-2162.

JVC KY200 w/full studio pkg, incl viewfinder, remote zoom & focus controls, com choke control unit, 100' camera cable & more, \$2700. R Peterson, Pacific Comm, 1801 E 4th Ave, Olympia WA 98506. 206-754-7081.

Panasonic WJ4600B special FX gen/switcher, \$1095. G Gunter, KMAB, 650 N Bolton, Jacksonville TX 75766. 214-586-2162.

Fujinon 414X98 14 x 1 zoom, removed from Sharp XZ-800, excel 2 3/4" tubes, \$1000 or trade. W Ellis, KOZK, MPO Box 21, Springfield MO 65801. 417-865-2100.

Ikegami 730-A & 730-AP video cameras, gd cond, \$6,000 & \$7,000 respectively. D Gerisch, WMTV, 615 Forward Dr, Madison WI 53711. 608-274-1515.

Norelco PC70, (11) need some work, \$1750/all. Technichrome, 702-386-2844.

Ikegami 630AP studio plumbicon cameras (3) w/CCU, 15' m cable, 5" viewfinder, finder info CG, Canon 15:1 lens, lens rear controls, extender, manual, case, as new. BO over \$10,000 ea; (2) Sachtler 14 head, ped/pod & dolly, \$1,250 ea; like 730 ENG pkg: 1.5" finder, 2 charger, 2 batt, AC PS, VTR cable, rain cover, \$1395; (2) like 25 m camera/CCU cable, \$350 ea. R Miller, Filmmaker Inc, 606 W Broad, Bethlehem PA 18018. 215-691-0900.

Sony DXC-1650 single-tube color camera, w/CCU & manual, \$150; C-mount zoom lens for same, \$50. G Odell, The Film Group, Box 9, Wethersfield CT 06109. 203-527-2972.

Panasonic WV 200CLE 3-CCD cameras (3), new, less than 30 hrs, 12:1 lens, Mill, case, \$5000 ea. H Larson, Matrix Mobile TV, POB 536, San Luis Obispo CA 93406. 805-544-5457.

Thomson MC301 camera, excel cond, 14:1 Fuji lens, shipping case, w/RS2000 CCU & 330' cable, \$3000 pkg. H Larson, Matrix Mobile TV, POB 536, San Luis Obispo CA 93406. 805-544-5657.

Norelco PC72 cameras (3), 15:1 Angenieux lens, gd cond, fair tubes, spare CCU, lots of parts. Sr video remote controls, \$2000 ea; various Norelco PC70, PCP70, PCP90 modules, yokes, parts. H Larson, Matrix Mobile TV, POB 536, San Luis Obispo CA 93406. 805-544-5657.

Telecine lens & mounting flange for Philips LDH-1/20 cameras, \$135. G Odell, The Film Group, Box 9, Wethersfield CT 06109. 203-527-2972.

QuickSet 6245 head; QXD-1 5602 full size dolly, 4" wheels; QXT-7 6312 tripod, 3/4 size w/elevator, \$1100. Larry, 412-763-8359.

CEI 310 (2) cameras complete & gd cond, \$3000 ea/trade. H Henson, Henson Prod, 3796 Bethania Sta Rd, Winston-Salem NC 27106. 919-924-8717.

Canon Z9 pistol grip zoom/VTR control w/mounting bracket for pan handle, \$175; Fujinon MCA-1A panhandle mount bracket for Fuji pistol grip, \$50; power cable, coiled, from belt to camera XLR-4F(L) to XLR-4M, \$30; Peter Lisand quick release, \$60. P Dowie, Gd Snd, 171 Drexel, Lansdown PA 19050. 215-626-9322.

Want to Buy

Panasonic PK 957/958, G Pfeiffer, WNUJU, Ste 11033, One World Trade Cr, NY NY 10048. 212-775-1706.

Philips LDH-1/20 service manual for telecine equipped cameras inc any updates or mods for same; service manual/descriptive lit/catalog of Telecine equip. G Odell, The Film Group, Box 9, Wethersfield CT 06109. 203-527-2972.

Dumont or RCA TV camera, want old TV equip. A Wiener, Briton Rd, Monticello ME 04760. 207-538-9538.

CART MACHINES

Want to Sell

BE 3200 & 3100 R/P stereo units, ultra-mint cond, original heads, w/manuals, BO. R Kaufman, Pams Prods, POB 462247, Garland TX 75046. 214-271-7625.

Audi-Cord Moducart model 100 R/P; (2) A series PB, all in gd shape, \$100 ea. W Nystrom, KRDU, 597 N Alta, Dinuba CA 93618. 209-591-1130.

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BE-2000 Mono R/P w/150 Hz	425.00

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ITC RP Series stereo, tones, excel heads & motors, \$1400. R Thomson, KDKB, 1167 W Javelina, Mesa AZ 85202. 602-897-9300.

Ramko automatic cart winder w/cassette wind adapter, \$150. B Umberger, WNLT, 51 S Main Ave, Clearwater FL 34625. 813-446-0957.

Tepecaster 700-P, \$50; Spotmaster 505-B (2), \$50. D Gerisch, WMTV, 615 Forward Dr, Madison WI 53711. 608-274-1515.

Tepecaster 700 RP w/extra motor, \$375; Altus AM 500 8 chnl console, \$175, brand new. J Klauck, 118 Bay St, Glens Falls NY 12801. 518-792-9290.

Tepecaster 700P mono play only cart machines (2), gd cond, \$200 ea. C Zalenski, Eds Comm Svcs, 9 River Terr, Johnson City NY 13790. 607-798-7111.

ATC mono R/P; Gates Criterion, mono PB only, clean. M Phelps, WLTT, 20300 Civic Cr Dr, Southfield MI 48076. 313-354-9300.

ITC R/P stereo in rack mount case or desk top, Q-tones, manual, \$1100. S Ciaruzo, Infobridge, POB 879, Cardiff CA 92007. 619-268-3000.

Mastercart II (875), loaded w/Dynamax tape, vgc, new or reloaded, can send samples 3-5 min, must buy entire quantity, BO. M Bowman, KFMM, 301 E Hwy 70, Safford AZ 85546. 602-428-0916.

Sparta Sparta Matic mono R-P, record amp bad, fair cond w/manual, BO. Sparta 4515 Century Series (3), one needs motor, fair cond w/manuals, BO; Tepecaster 700-P (2), one needs motor, fair cond, BO. B Stuart, KSUE, 3015 Johnstonville, Susanville CA 96130. 916-257-2121.

ITC Premium Series R/P w/3 tones, gd cond w/manuals, \$550. M Taylor, WXRK, 357 1st Ave NW, Hickory NC 28601. 704-322-1713.

SMC 250 & 252, 3 Carousels, operating when removed from service, \$550 ea. K Bagdasar, KCMN, 2880 E Fountain #200, Colorado Springs CO 80910. 719-636-5266.

Audi-Cord Mod-Cart 100 stereo R/P, gd cond, w/manual (3), \$700. M Taylor, WXRK, 357 1st Ave NW, Hickory NC 28601. 704-322-1713.

BE 5500 5 play cart machine, manual, \$2000. S Karwin, KCMJ, 490 S Ferrell, Palm Springs CA 92262. 619-320-6818.

PR&E Tomcats, (3) PB units in 19" rack mount, \$3775. M Bailey, Word Bdcg, 3565 Timberglen Ste 1607, Dallas TX 75287. 214-306-7716.

Spotmaster 500AR, \$25 & you ship. C Haynes, POB 31235, Jackson MS 39206. 601-948-1515.

Harris Criterion 80 mono R/P, fair cond, no manual, \$350. B Henry, KLLK, POB 1520, Willits CA 95490. 707-459-1250.

Tepecaster 600RP R/P unit, mono, works; (2) Spotmaster 370 mono players, desk mount, one works, one doesn't, BO. P Craddock, KWBC, 116 Railroad, Navasota TX 77868. 409-825-6707.

Tepecaster RP-700 stereo R/P, \$150/BO. M Black, WEOS, Hogart William Smith College, Geneva NY 14456. 315-789-8970.

Parts mostly Fidelipac 300 Series, some Scotchcart, misc, sold by pound, \$2/lb plus shpg. M Ring, WTNV, 134 Mullin St, Water-town NY 13601. 315-788-0790.

PR&E Tomcat, new stereo recorder & (2) stereo PBs, rack mount, Maxtrax heads, spare parts, BO; ITC SP rack mount kit, motors, cards, semiconductors, pinch rollers, xtndr cards, switches, rack ears for 3D, SP, WP, RD, Series 99 & 750 Series R-R, BO. B Royster, WOM Bdcg, 1019 Cordova, San Diego CA 92107. 619-223-3413.

Gates Criterion 80 mono play w/record amp, \$235; (3) mono play units, \$185 ea. G Wachter, KFYI, 631 N 1st Ave, Phoenix AZ 85003. 602-258-6161.

ITC Series 99 mono R/P, excel cond, meets full factory spec, all auto features, will guarantee for 90 days, \$1195. E O'Donnell, WIBW, POB 119, Topeka KS 66601. 913-272-3456.

Harris Criterion w/record amps (2), gd cond, extra parts, working, w/inst manual, BO. R Colaner, WRCW, 4601 Hills & Dales Rd NW, Canton OH 44708. 216-477-8585.

Sparta 600 stereo R/P & stereo PB, both excel cond, w/manuals, \$450/both. B Henry, KLLK, POB 1520, Willits CA 95490. 707-459-1250.

ITC stereo Premium R/P w/all tones, excel cond, also mono R/P w/all tones, stereo unit, \$1500 & mono unit, \$1000; BE 5301 mono triple deck, \$1000. B Mountjoy, WIDD, POB 1240, Elizabethton TN 37644. 615-543-5849.

ITC SW Series play, mono, all 3 tones, \$795; Harris Stereo R/P CCII, \$1195; Spotmaster 610 bx R/P, 8 slots, \$150. P Willey, H&W Bdcg, 372 Reservoir Rd, N Adams MA 01247. 413-663-3419.

Harris Criterion 80, new 150 Hz & 8 kHz, detector cards, rack ears & 150 Hz gen cards, BO. B Royster, WOM Bdcg, 1019 Cordova, San Diego CA 92107. 619-223-3413.

PR&E Tomcat, R/P, Maxtrax format, top of the line, \$3850. M Bailey, Word Bdcg, 3565 Timberglen Ste 1607, Dallas TX 75287. 214-306-7716.

BE 3200 7276 mono triple tone, \$1300. B Weiner, KNYO, 210 Allen, Glendale CA 91201. 818-409-0185.

Tepecaster 700 R/P, \$200; (2) Tepecaster 700P, \$100 ea; Spotmaster 70-Ten stereo, \$300; Spotmaster 505 BRS stereo PB, rack-mount, \$50; Sparta 800 R/P, \$75. M Legner, 703-971-7069.

Harris mono PB older, w/desk top & rack mount bracket, missing power cord, pinch roller & manual, although similar manual avail, worked fine when removed w/exception of noisy motor, \$100/BO. D Slentz, Gemini/Dover, Box 1678, APO NY 09283.

Nortronics, 1 record, 2 play heads, 3 chan fits stereo cart machines ITC, never used, \$20 ea. T Duffy, POB 521, W Haven CT 06516. 203-934-6992.

Collins mono cart, great cond, plus lots more, \$150. L James, BEST Prod, 611 N Greer, Pittsburg TX 75686. 214-856-2892.

ITC RP mono (3), not new but very little use, excel cond, \$900 ea. F Lauerman, WMAM, Roosevelt Rd, Marinette WI 54143. 715-735-6631, aft 2PM CT.

QRK & Tepecaster mono PB, need some work, \$50 both. B Cain, WFPG, 2707 Atlantic Ave, Atlantic City NJ 08401. 609-348-4646.

Ampro CT2500B PB machine, \$100; Spotmaster 500B (1) R/P, \$150 & (2) 505B PBs, \$100 ea. D Loucks, KTKL, 2132 W 42nd, Casper WY 82604. 307-265-6700.

Want to Buy

Rack mount adapter for Gates Criterion 33C triple deck; also audio card & 8 kHz cue tone detector & stereo audio cards for Gates Criterion. F Morton, KEYB, POB 1077, Altus OK 73522. 405-482-1555.

BE 3000 & 2100 cart machines wanted. Exporter needs 90 used machines, working cond, not more than 6 yrs old, reasonable price avail. Send particulars to: RW, POB 1214, Falls Church VA 22041. Attn: Box 1-1.

Spotmaster 1000 or 2000 mdls, any cond, any style, for parts, advise cond & cost. C Keith, ALI Bdcg, Box 313, Keene NH 03431.

ITC WP Series PB. G Stonebraker, KMVO, POB 1360, Aztec NM 87410. 505-632-3402.

ITC 3D PCBs, mono/stereo, advise cond & cost. C Keith, ALI Bdcg, Box 313, Keene NH 03431.

Any non-working cart machines in decent shape, must be stereo. R Hines, Hines Eng Svcs, 265 Emming St, Cincinnati OH 45219. 513-721-7625.

CASSETTE & REEL-TO-REEL RECORDERS

Want to Sell

Amplex 350 tube elect, most converted. M Phelps, WLTT, 20300 Civic Cr Dr, Southfield MI 48076. 313-354-9300.

Revox A77, runs gd, BO; Teac 32-2B, gd shape except for switch problem, \$100/BO; Amplex ATR-700, excel shape except for one PB switch, \$500. W Nystrom, KRDU, 597 N Alta, Dinuba CA 93618. 209-591-1130.

Studer A80/A810/B67; Technics SP10 MK II TT; Audiotronics 342-17/224-11 consoles; Aphex Compellor & exciter, call for details & price. K Harrison, WRAL, Box 10100, Raleigh NC 27605. 919-890-6101.

Ampro/Scully 280B-FT series, 1/4", 7.5 & 15 ips, mono w/FT heads, w/Rustang roll around cabinet, gd cond, \$750. J Wilk, 312-237-2283.

Amplex 350 (4), mono, cheap. T Hill, WBUC, 2901 Liberty Hgts, Baltimore MD 21215. 301-396-0404.

Teac EM-1542 reel motor, for Tascam 30 series tape decks (32, 34, 38), brand new, \$50. J Roper, Imperial Snd Sids, RR 31 Box 405, Terre Haute IN 47803. 812-877-2663.

Otari ARS1000DC stereo reproducer, vgc, \$1975 incl shpg. J Shephard, Globe Prod, POB 20465, Roanoke VA 24018. 703-344-3283.

Amplex 351 w/Novonics 380 elect, mono, w/rack mount, NAB hubs, \$450/BO. K Smith, RR3 Box 483A Carl Rd, Gosham ME 04038. 207-929-6129.

Pentagon 1100 high speed duplicator, RR & cassette, (2) cassette master units, model CM 1140; (2) dual position slave units, model CS 1140; RR master unit, model RM 1140; RR slave unit, model RS 1140, manuals & spare parts, \$2500/BO. M Gellos, Pensacola Christian College, 904-478-8480 X5041.

Revox 77A, gd cond, \$200. B Howard, KO-FO, Box 16, Ottawa KS 66047. 913-242-1220.

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Amplex AG-440B, 1" 8 trk, multitrack, test tape, manual, gd cond, BO. R Kaufman, Pams Prods, POB 462247, Garland TX 75046. 214-271-7625.

Tandberg TCD320 cassette deck, immaculate, mic inputs, headphone inputs, one touch recording RCA inputs & outputs, \$350. W Feinberg, Totaltape Publ, 9417 Princess Palm, Tampa FL 33619. 813-621-6200.

Roberts 192, works, needs help, \$35; Wollensak 1500, needs work, \$25. D Stebbins, KZZN, Box 192, Littlefield TX 79339. 806-385-4474.

Scully 280B, 1/2" 4 trk, \$500. V Friedberg, Synesthetics, 58 Walker St, NY NY 10013. 212-431-4112.

ITC 750 PB only, excel cond, BO. R Thomson, KDKB, 1167 W Javelina, Mesa AZ 85202. 602-897-9300.

Metrotech 500A reproducers (7), \$200 ea/BO. M Gellos, Pensacola Christian College, 904-478-8480 X5041.

Teac X-10R 1/2 trk (2), dual capstan drive, \$175 ea. K Bagdasar, KCMN, POB 17444, Colorado Springs CO 80935. 719-636-5266.

Amplex AG500 stereo, case, gd heads, new belt & idler, vg working, \$595/BO; Amplex 602 FT, case, gd working cond, \$195; Amplex 351 elect, pair in case, gd cond, \$295 pr. R Miller, Filmmaker Inc, 606 W Broad, Bethlehem PA 18018. 215-691-0900.

MCI JH-110 8 trk 1", gd cond, in Lang cabinet w/RTZ-1, used for video sync, radio prod, \$4750. J Rose, 20 Marion St, Brookline MA 02146. 617-277-0041.

Amplex AG-600B FT, 3.75-7.5, gd cond, no case, \$300/BO. P Craddock, KWBC, 116 Railroad St, Navasota TX 77868. 409-825-6484.

Crown 700, clean, working, BO. C Keith, ALI Bdcg, Box 313, Keene NH 03431.

JVC CD-1636 port new prof ster R/P cassette deck, Sen-Alloy heads, super ANRS, BO; Ampex 351-2, ster PB only w/Schafer elect, excel cond; Scully 270-2, new stereo repro only 14" decks, mint cond, also PR&E Multi-sync motor drv amp for Amplex/Scully decks, BO. B Royster, WOM Bdcg, 1019 Cordova, San Diego CA 92107. 619-223-3413.

Pentagon 8 position cassette duplicator, \$475. H Casteel, Megastar, 701 Desert Ln Ste 4, Las Vegas NV 89106. 702-386-2844.

Sony TC850 1/2 trk stereo, w/remote control, \$325. G McCoy, KZEN, 1608 18th St, Central City NE 68826. 308-946-3816.

Otari ARS1000DC mono PB decks (2) excel cond, \$1000 ea. M Rollings, WRTL, POB 115, Rtoral IL 61866. 217-893-1460.

Scully 280 excel elect & mech w/cond, heads worn, needs edit button & assembly, \$400. B Straghan, Straghan Prod, 7517 Monroe NW, Wash DC 20010. 202-232-0636.

Scully 280 1/2" 4 trk head stack & hardware, \$300. J Dickson, WMMU, 920 Wade Hampton Blvd, Greenville SC 29609. 803-242-6240.

Teac 40-4 chan 4 trk, mint cond, built in mic mixer, \$800. B Mountjoy, WIDD, POB 1240, Elizabethton TN 37644. 615-543-5849.

Otari ARS1000DC, BO. T Driggers, 818 Quail Ct, Healdsburg CA 95448. 707-433-9370.

Teac X300R 1/2 trk stereo w/auto reverse (2), gd working cond, \$300 ea or \$500 for two. B Pitts, Studio One Prod, POB 251, Winfield IL 62594. 205-487-6400.

Amplex AG44C mono in console w/servo motor, like new cond, \$1500; Amplex AG44B 2 trk w/varispeed & ctrl trk lockup, xtra PB head for 1/4 trk stereo, in console, like new cond, \$2000; Amplex AG44B 4 trk 1/2" in console w/varispeed & ctrl trk lockup, i ke new cond, \$3200. K Nordine Jr, 6106 N Kenmore, Chicago IL 60660. 312-262-8500.

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Stancil-Hoffman R-70 R-R (2), both \$50. C Haynes, POB 31235, Jackson MS 39206. 601-948-1515.

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Ampex 440 in use, 1/2 trk, 1 chan elect, \$1300. K Reising, WRZQ, POB 690, Columbus IN 47202. 812-379-1077.

Ampex 440C 2 trk in roll around, excel cond, \$1295; Ampex 354, vgc, as is, \$395; Dokorder 4 trk, multisync, echo, \$395. P Willey, H&W Bldg, 372 Reservoir Rd, N Adams MA 01247. 413-663-3419.

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Wollensak 1520AV portable FT, just record, 7.5 & 3.75 ips w/manuals, \$275. J Ellingson, 913 Warwick Dr, Cedar Falls IA 50613. 319-277-8535.

Revox PR99 play only, 2 trk stereo w/25 Hz sensor, high speed, mint cond, \$1000/BO. K Harnack, 1385 Lamar, Memphis TN 38104. 901-278-1306.

Ampex 350-351 model remotes (2), \$150 ea; Ampex 2 trk (2), in Russ Lang type cabinets, \$365 ea.; Ampex FT in cases (350), \$325. Mr. Oliver, 212-874-7660.

Ampex 4 trk, 350 elect, 300 dk, w/sel sync, very cheap, working fine; Ampex 3 trk in console, same as above. Mr. Oliver, 212-874-7660.

Ampex 4 trk, 350 elects, 300 deck w/Sel Sync, \$525; Ampex 3 trk in console, \$425; Ampex 2 trk (2), \$375 ea; Ampex FT in cases, \$325. Mr. Oliver, 212-874-2074.

Ampex 600, Ampex 601, Ampex 601-2, Ampex 970, may need some alignment & overhaul but basically in sound cond, BO. G Kristiansson, Villa Skansen Inc, 122 Fairmount St, S Burlington VT 05401. 802-864-9779.

Ampex 354 2 trk, gd cond, \$100. C Washington, WFRK, 1725 Mt Vernon Rd, Leesburg FL 32748. 904-365-0659.

Revox A77 2 trk 7.5-15, gd cond w/remote, \$495. B Borrelli, Media Group, 462 Merrimac, Methuen MA 01844. 508-688-5573.

Otari MX5050 2 chan R/P, vgc, \$850; Mag-record 1022 2 chan R/P, gd cond, \$200; Teac A-2340 4 chan simul-sync R/P, vgc, \$450. D Loucks, KTKL, 2132 W 42nd, Casper WY 82604. 307-265-6700.

Teac A-3300 SX 2T w/remote control, \$500; Teac A-3440 4 trk w/dbx RX-9, bridge meter & remote control, \$800. M Legner, 703-971-7069.

Ampex AG440 1" 8 trk, gd cond w/roll about stand, sel-sync, test tape & manuals, \$2500. C White, 35 Osborne Ave, Kenner LA 70065. 504-443-5611.

Tascam 34-B, as new cond, \$1500/BO. B Leslie, Pro Recdg Svc, 13709 Maple Leaf Dr, Cleveland OH 44125. 216-662-1435

Otari ARS1000 less than 6 mos use, excel cond, \$1000. G Vogel, KHII, 7900 E Berry Pl, Englewood CO 80111. 303-779-8797.

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Ampex PR-10 gd cond, BO. W Borneman, WBYO, Box 177, Boyertown PA 19512. 215-369-1075.

Scully 280B stereo (2), needs work; MCI JH-110 stereo, w/remote, needs work, all three in roll around cabinets, \$700 ea, cash & carry only. T Devine, WVLC, POB 1559, Lexington KY 40592. 606-253-5900.

Ampex 700 remote control, new; Editall 1/4" (S-3) splice block, like new; Nagra preamps (2) XOYO, unused; Jensen 206 synchronizer. P Dowie, Gd Snd, 171 Drexel, Lansdown PA 19050. 215-626-9322.

Otari MX-5050 capstan motor, rebuilt by Otari w/PC board, \$135; Ampex 440 4 trk pwr supply, BO. R Rhodes, Rhodes Music, POB 1550, Radio City Sta, NY NY 10101. 212-245-5045.

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MCI/Sony capstan & reel motors, any cond, recdg heads, most mfgs, machines, new, used. Relapped then sold. Amp Services, 224 Datura St No 614, W Palm Beach FL 33401. 800-826-0601, in FL 305-659-4805.

Ampex PR-10 or AG-500, must be FT mono & 7.5 & 15 ips speeds. B Leslie, Pro Recording Svc, 13709 Mapleleaf, Cleveland OH 44125. 216-662-1435.

Revox A-77 rack mount assembly, consider tape carts in trade. D Peluso, KFMS, 101 Convention Cir Dr #P-120, Las Vegas NV 89109. 702-732-7753.

Pioneer RT707, 1/4 trk only (2). J Vukelich, Bdot Svcs, 4551 Flag Ave N, Minneapolis MN 554288. 612-537-1431.

Sony TC-510R pre-ent auto-reverse cassette recorder w/real-time readout. Roy or Jim, Liberty Audio, 824 W Broad, Richmond VA 23220. 804-788-7008.

Otari MX5050B-11 & ARS-1000. R Hendryx, KALP, Box 9650, Alpine TX 79831. 915-837-2144.

ITC 750 or 850 in gd cond. G Stonebraker, KMYO, POB 1360, Aztec NM 87410. 505-632-3402.

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DOD R855 mike mixer, 4 chnl w/effects buss, 1 RU high, perf for talk shows or sub-mixer for instruments, \$250. W Feinberg, Totaltape Publ, 9417 Princess Palm, Tampa FL 33619. 813-621-6200.

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RCA mono 8 input, 2 ch, very clean; GE mono, 11 input 2 ch, very clean. M Phelps, WLTT, 20300 Civic Cir Dr, Southfield MI 48076. 313-354-9300.

Audiotronics 110 prod console, EQ on all 8 mic/line inputs, 5534 ICs, cue/solo, CR & studio monitoring, 4/2 assigns, multi-track mon, reverb return, studio TB, osc/slate, 8 VUs, 48 V mic power, excel, BO over \$4000. R Miller, Filmaker Inc, 606 W Broad, Bethlehem PA 18018. 215-691-0900.

Harris Micromack, BO. B VanProoyen, WWJQ, 5658 143rd, Holland MI 49423. 616-243-2026.

Fostex 3060 meter bridge for Fostex 350 8 chnl mixer, \$50. J Roper, Imperial Snd Sids, RR 31 Box 405, Terre Haute IN 47803. 812-877-2663.

Harris M-5133B Gateway 8 chnl mono tube type, met specs when removed, BO. D Johnson, KAWL, POB 544, York NE 68467. 402-362-4433.

RCA BC-18AD dual chan, monaural, gd cond, \$500 plus shpg or trade. W Ellis, KOZK, MPO Box 21, Springfield MO 65801. 417-865-2100.

Altec 1592A 5 chnl mic mixer, \$100. D Sis, St John's Univ, Collegeville MN 56321. 612-363-3378.

RCA BC-7A in excel cond, \$1500. P Martin, 414-482-2638.

Gates M-5236A only, works, \$100. B Howard, KOFO, Box 16, Ottawa KS 66047. 913-242-1220.

Ramko DC-8M dual mono console, original & gd cond w/normal wear, in service, avail 12/88, \$1000/BO. P Craddock, KWBC, 116 Railroad St, Navasota TX 77868. 409-825-6484.

Sparta remote prod console w/(2) TTs, 5 chan mono board, \$300. B Kittler, KKL, Rapid City SD 57701. 605-343-6161.

Altec Lansing antique audio console, cond unknown, w/manual. M Black, WEOS, Hogart William Smith College, Geneva NY 14456. 315-789-8970.

Micro-Trak Sport III portable prod package w/4 inputs/2 chan, 3 headphone outputs & telco dial pad in case, \$285. G Wachter, KFYI, 631 N 1st Ave, Phoenix AZ 85003. 602-258-6161.

Micro-Trak 6618, 6 chan 18 input stereo, excel cond, \$800; Gates Statesman 5 chan stereo, gd cond, \$600. Don, 2003 Brewster Rd, Bellevue NE 68005. 402-733-4747.

BE 150S 5 chnl stereo upgraded to BE 260S model, \$2150. M Bailey, Word Bdotg, 3565 Timberglen Ste 1607, Dallas TX 75287. 214-306-7716.

Numark MX3000, excel cond, 6 mic input mixer, \$125. R Branske, 5347 S Sapaulding, Chicago IL 60632. 312-737-3303.

Shure SE-30 gated compressor/mixer, excel cond, \$300. E Reihl, 1715 Illinois Rd, Northbrook IL 60062. 312-866-5727.

Peavy 601R 6 chnl mixer, 3 band EQ, brand new, excel cond, XLR & phono & 1/4 inputs, LED VU's rack mountable, \$350; DOD 4 chnl mike mixer, 1 rack space high, EQ & effects on each chnl, \$300. B Feinberg, Total Tape Publ, 9417 Princess Palm, Tampa FL 33619. 800-874-7599.

Collins 212 G-1, gd cond, BO. W Borneman, WBYO, Box 177, Boyertown PA 19512. 215-369-1075.

Harris Mono 5 vgc, w/manual, \$400. B Cain, WFPQ, 2707 Atlantic Ave, Atlantic City NJ 08401. 609-348-4646.

Quantum QM12P 12 chan stereo, 22 inputs, in service, \$3000. K Thomas, POB 207, Atlantic Beach FL 32233. 904-388-7711.

Ampex MX35 mixers (2), \$250 ea; xformers, \$25 ea; mic & line inputs, switchable; Sigma mixers mic inputs (3), \$125 ea & echo bleeds, \$15 ea; Altec mixers 1567, \$250 ea w/VU meters, xformers, \$25 ea, treble-bass att, Harmon-Kardon mixers, \$80 ea, DPR7's. Mr. Oliver, 212-874-2074.

McCurdy SS-8600, 13 in, 2 out, 2 EQs, tone osc, excel cond, \$2500. E Dausman, 55 Columbia Ave, Berkeley Hts NJ 07922. 201-665-2550.

Ampex-Sigma 3761 (2) 4 chan mike mixers, excel cond, \$75 ea or \$125/both. B Leslie, Pro Recdg Svc, 13709 Maple Leaf Dr, Cleveland OH 44125. 216-662-1435.

Tangent Series 4 20 input by 4 by 2, price inc road case & comm module, \$2500 firm. T Evans, Reel Prods, POB 427, Allston MA 02134. 508-343-0673.

Wheatstone SP5, great prod console, \$12000. S McCloskey, WBHH, 916 Bay St, Beaufort SC 29902. 803-524-9210.

Ampro AC-105 10 chan, \$2500; Sparta Centurion II 12 chan slider, \$3000. D Loucks, KTKL, 2132 W 42nd, Casper WY 82604. 307-265-6700.

The Maricopa City Comm College dist is accepting sealed bids for a 16 channel on-air-console. Written, sealed bids will be received at the Office of the Purchasing Agent, 3910 E Wash St, Phoenix AZ 85034 until 11.00 MST 01/16/89. For information, call 602-392-2333.

Want to Buy

Gates Stereo Yard; Gates Studioette M-5381A. B Bartoli, New World Bdotg, POB 5607, Montecito CA 93108. 916-926-3273.

PR&E BMX line modules, any cond, need at least 3 immed, will need more in future. P Mitchell, KPOI, 741 Bishop, Honolulu HI 96813. 808-524-7100.

Tascam MX-80 8x2 mixer w/rack ears. G Steadman, WBUR, 630 Commonwealth Ave, Boston MA 02215. 617-353-2790.

DISCO & SOUND EQUIP

Want to Sell

Auratone 5C, near field mixing monitors, 1 born, \$50/pr. B Laughlin, 816-361-0548.

Puettec EQP 1-A & EQP 1-R (2), gd cond, w/manuals, BO. M Tait, Tait Recdg, 1347 S Capitol SW, Wash DC 20003. 202-488-3905.

JBL 4311 control monitors, no grills, excel cond, must unload, handle's lots of raw power, 3 way pro studio monitors, \$500 plus shpg. W Feinberg, Totaltape Publ, 9417 Princess Palm, Tampa FL 33619. 813-621-6200.

AKG R-25 rem. le control for AKG BX-25 reverb, \$50. J Roper, Imperial Snd Sids, RR 31 Box 405, Terre Haute IN 47803. 812-877-2663.

Altec Voice of the Theater speaker, 511B horn, 808-8A driver, 15" w/cabinet, BO. D Sis, St John's Univ, Collegeville MN 56321. 612-363-3378.

Yamaha MS10 powered speaker amp, \$75. P Cibley, 138 E 38th, NY NY 10016. 212-986-2219.

JBL L-19 new 2 way system-matched pair, BO; Technics SL-1200MK II, new lid in box, also used SP-10 MKII lid, BO. B Royster, WQM Bdotg, 1019 Cordova, San Diego CA 92107. 619-223-3413.

JBL 4311 studio monitor speakers, excel cond, no grills, \$400/pr. B Feinberg, Total Tape Publ, 9417 Princess Palm, Tampa FL 33619. 800-874-7599.

Jensen C3781ST 600 ohm 15" duplex, 4 pos HF atten switch from radio station client room, closest to \$150. P Dowie, Gd Snd, 171 Drexel, Lansdown PA 19050. 215-626-9322.

Scott Tuner FM 311-C, \$100; lead screws for disc cutting, Presto 6N, 224/104/160/120 lines per inch, \$50 ea; C apps disc cutting needles w/hot stylus, needles new, \$7 ea, boxes \$25 ea. Mr. Oliver, 212-874-2074.

Ampex 620 speaker-amp in portable tan case, \$100; Altec speaker & small cab 604B, \$225; EV 12TRX (2) in cabs EV, \$225 ea. Mr. Oliver, 212-874-2074.

dbx 157 Pro NR, 2 chan, total 8, simultaneous play/record units, \$600 ea; McIntosh 2100 power amp, \$300. H Fenster, Univ Rehearsal & Recdg, 17 W 20 St, NY NY 10011. 212-929-3277.

Patch Bays Limiters Etc. For Sale Condition New "In Box" "at cost or below for quick sale"

Urban 412A Limiters (2) \$283; ADC PPA 1-14 Pro Patch (3) \$450; ADC UP3 Ultra Patch Panels (12) \$55; ADC UP3N Ultra Patch Panels (11) \$65; ADC PUF 103 5 N Termination \$490; ADC PUF 107 5 N.O. Termination \$346; AT DP100 Disc Patcher \$150; ESE ES207 Video Distribution Amp \$178;

Call Michael Dennis
(804) 358-3852

Pultec MEQ5 mid-range EQ's (2), \$1000 ea. R Rhodes, Rhodes Music, POB 1550, Radio City Sta, NY NY 10101. 212-245-5045.

Yamaha MS10 powered speaker, \$75. P Cibley, Cibley Music, 138 E 38th St, NY NY 10016. 212-986-2219.

EMT 140 tube reverb, \$1400. T Papa, Santa Monica Snd, 2114 Pico Blvd, Santa Monica CA 90404. 213-450-2119.

Want to Buy

KLH TNE 7000A transient noise filter; Burwin Research DNF-1100A dynamic noise filter; Burwin Research DNF 1201A dynamic noise filter. R Nelson, LGH Recording Std, Box 1, Flatton ND 58737. 701-596-3565.

Old systems & components by Altec, JBL, Jensen, Tannoy, UREI, WE, etc. C Drripps, 4337 Maxson Rd, El Monte CA 91732. 818-444-7079 (Fax) or 818-444-6863.

JBL speaker w/150-4C woofers, N-500, N-400 x-overs. Y Chung, 1129 S Robertson Blvd, LA CA 90035. 213-274-1921.

LIMITERS

Want to Sell

Urban Optimod 8100A/1 with 0 card, SCA/overshoot filter, upgrade, excel cond, \$3500. H Ginsberg, WXXX, 45 Roosevelt Hwy, Colchester VT 05446. 802-878-8796.

Thomson-CSF 4450-A Audimax, never used, \$1695; Thomson-CSF 4500 Presence EQ, never used, \$795; CBS-Labs 400 Volumax, good buy, \$100. H.M. Dyer Electronics, 2982 Wixom Rd, Milford MI 48042. 313-685-2560.

Burwin Research DNF-1201A dynamic noise filter useful for reducing tape hiss, \$175 plus shpg. L Dupree, Cenla Bdotg, 1115 Texas Ave, Alexandria LA 71301. 318-445-1234.

CBS 4110 Volumax, gd cond, BO. K Schipper, KOKS, 9191 Sheridan Blvd, Westminster CO 80030. 303-427-7700.

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Mart CL4-40A (2), gd cond w/manuals, BO. B Stuart, KSUE, 3015 Johnstonville, Susanville CA 96130. 916-257-2121.

Orban Optimod 9000A (2), both in operation in excel cond, \$1900 ea or both for \$3600. J Kimel, WWSR, St Albans VT 05478. 802-524-2133.

Socetra-Sonics 610 compressor/limiter system (2), checked out & clean, \$75 ea; Shure M62V level-loc audio level controller, \$65. D Johnson, KAWL, POB 544, York NE 68467. 402-362-4433.

Orban Optimod 8000A stereo gen., recently factory aligned & proofed, \$1925. D Kelly, KWPN, Box 84, W Point NE 68788. 402-372-5423.

CBS Labs FM Volumax 410, needs work, \$50; CBS Labs Audiomax level controller, needs work, \$50. B Howard, KOFO, Box 16, Ottawa KS 66047. 913-242-1220.

Orban 8100ST for 8100 Optimod, excel cond, \$500; Orban XT2 upgraded chassis for Optimod 8100A/1, excel cond, \$1100; CRL SPP-800 stereo AGC, excel cond, \$1200. H Ginsberg, WXXX, 45 Roosevelt Hwy, Colchester VT 05446. 802-878-8795.

CBS 4110 stereo Volumax w/manual, excel cond, BO; CBS 4550A stereo Audiomax w/manual, excel cond, BO. B Stuart, KSUE, 3015 Johnstonville, Susanville CA 96130. 916-257-2121.

Modulation Science composite clipper, \$350; Optimod 8000A, excel, \$2000 firm. J Cramden, 315-487-2393.

Dorough DAP 310, \$350. K Bagdasar, KCMN, 2880 E Fountain #200, Colorado Springs CO 80910. 719-636-5266.

CBS Labs 4450A, 4110, 4111, 410, 411, 4500, BO. B Royster, KOM Broadcasting, 1019 Cordova, San Diego CA 92107. 619-223-3413.

PR&E ML-FM, MX-FM (5) matched prs, Multimiters, 1 matched pr 3 band Multimax compressors, all new, \$900/ea pr of Multimiters, \$1100/pr for Multimaxes; Dorough 310; several AM & FM limiter boards, pink noise gen cards, many spare parts; UREI BL-40 AM comp/limiter; new Harris ME-1 mod enhancer. B Royster, WOM Bdcg, 1019 Cordova, San Diego CA 92107. 619-223-3413.

Gates FM Top Level comp/limiter, gd cond, \$125. G McCoy, KZEN, 1608 16th St, Central City NE 68826. 308-946-3816.

Moseley PFL280 audio limiter, excel cond, (2), \$200 ea. S Fox, KKIQ, 1603 Barcelona St, Livermore CA 94550. 415-838-3063.

Orban 8000A just back from factory, all updates, like new, \$1800. R Lark, WXCE, Box 1260, Amery WI 54001. 715-268-7185.

Dorough 310 DAP, FM single chan w/FM limiter card, gd cond, manual, \$250 firm. C Lewis, WMFD, POB 5307, Wilmington NC 28403. 919-763-6363.

CRL SPP-800, SEP-800, SMP-900 w/NRSC filter, manuals & original perf measurements, \$4500. C Hahn, WNNZ, 249 Union St, Westfield MA 01086. 413-562-7666.

Orban Optimod 9000A/1 AM audio processor, factory recond & updated, vgc, w/manual, \$2200/BO. D Willey, Life Bdcg, POB 96, John Day OR 97845. 503-575-1840.

Orban 424A compressor, limiter, de-esser, stereo, like new w/manuals, \$600. R Nimitz, Univ of Notre Dame, Box 1088, Notre Dame IN 46556. 219-239-6423.

Volumax FM limiter, great cond, plus many others & stereo gens, \$150; Orban Optimod 800A, great cond, FM Optimod still in service, \$2000. L James, BEST Prod, 611 N Greer, Pittsburg TX 75686. 214-856-2892.

Inovonics MAP II 8 band AM audio processor, \$600. D Kelly, KWPN, Box 84, West Point NE 68788. 402-372-5423.

Limpenders-Broadcast Audio limiters (2), 35-B & 350-B, \$50 ea or \$75/both. B Leslie, Pro Recdg Svc, 13709 Maple Leaf Dr, Cleveland OH 44125. 216-662-1435.

CBS Labs 4110 FM Volumax, \$200. D Loucks, KTKL, 2132 W 42nd, Casper WY 82604. 307-265-6700.

Gates M51567 Stay-level limiter, Conax (Fairchild) limiter for disc cutting, \$165. Mr. Oliver, 212-874-7660.

DAP 310; CRL APP 300, UREI BL-40, all very gd cond; also CBS Audiomax's Volumax 400 & other gear. S Williams, POB 10853, Springfield MO 65808. 417-886-7327.

Fairchild Conax 600 for disc-cutting, \$175; Gates Stay Level limiter & amp, \$200. Mr. Oliver, 212-874-2074.

Harris Solid Statesman limiter, gd cond, \$300. B Efron, KJLA, 3435 Broadway, Kansas City MO 64111. 816-753-7707.

Orban XT2 all factory upgrades, excel cond, \$1300. J Hartmeyer, WCLT, POB 880, Newark OH 43055. 614-345-4004.

Want to Buy

Orban 8000 Series, Belar FMM-1 & FMS-1 or comparable RCA models. JA Rew Jr, C&R Comm, 4499 Sir Johns Ln, Virginia Beach VA 23455. 804-499-0551.

MICROPHONES

Want to Sell

E-V PL20, \$250/BO. Cary, KSQY, POB D, Deadwood SD 57732. 605-578-3533.

E-V 666, BO or will trade for lavalier. P Cibley, Cibley Music, 138 E 38th, NY NY 10016. 212-986-2219.

E-V RE45N/D dynamic shotgun, like new, in box complete, \$225. J Ellingson, 913 Warwick Dr, Cedar Falls IA 50613. 319-277-8535.

E-V 644 shotgun mic w/cable, vgc, \$75 ea or 3/\$195. S Hofmann, Cameron Univ Theatre, 2800 W Gore, Lawton OK 73505. 405-581-2428.

E-V RE37, electret mic/line level mic, great for telco remotes, used once, 2 yr warranty, \$150. T Mac Donald, WWDB, 3930 Conshohocken Ave, Phila PA 19134. 215-686-3687.

Sony ECM-30, BO; EV 513A, BO; Sennheiser MZW-421, BO. B Royster, KOM Bdcg, 1019 Cordova, San Diego CA 92107. 619-223-3413.

AKG C-80 mics w/pwr supplies & 60' cables in excel cond (2), \$300 ea. B Castner, We Three Castners Ltd, 1618 Birmingham Blvd, Birmingham MI 48009. 313-433-3630.

AKG D224E, excel cond w/case & (2) windcreens, \$175. P Combs, Only Son Prod, 2316 Forrest Home Ave, Dayton OH 45404. 513-236-2340.

RCA 44 mic & stand, vgc, \$150. J Dexter, 1604 Missouri Ave, Artesia NM 88210. 505-746-6590.

Neumann U47 w/power supply, \$1750. Mr. Oliver, 212-874-2074.

Vega Pro 63 diversity rcvr, 154.600 MHz, no mic power cord or manual, vgc, \$500/BO. B Hawkins, 403 Harrell Dr, Edinburgh IN 46124. 317-266-9700.

RCA BK-6B; EV lav; Auricon E-7; Sennheiser MZA6, MZA15UP, MZP, KAT 11, MZF 4, 5, cases; EV 600E, UA-3-11s, RCA 77 shock mt, EV CO-90 phantom mods, Cannon P-3 cones, agreeable prices. P Dowie, Gd Snd, 171 Drexel, Lansdown PA 19050. 215-626-9322.

RCA 74B ribbon mics, just rebuilt, \$215; 1935 Western Air Patrol AM radio w/2 short-wave bands, completely restored in & out, very nice, \$125. R Button, R&R Recdg, 418 Shattuck Sq #6, Berkeley CA 94704. 415-843-6733.

Want to Buy

Atlas DS-10 desk mic holder. ETS Record, Box 932, Honolulu HI 96808. 808-847-4300.

RCA 44, 77DX original, gd cond. W Cox, WCGA, Rt 9 Box 280E, St Simons Is GA 31522. 912-638-1176.

Old RCA & WE mics, esp RCA skunk mic M13043, BK-4A, BK-10, 50A or SK-50; WE 394, 640, 618A & AKG D-20. J Webb, 15117 Hamlin St, Van Nuys CA 91411. 818-769-6738.

RCA or WE 44BX 77's, 639s, etc, working or not. B Davies, Virgo Prod, 5548 Elmer, N Hollywood CA 91601. 818-761-9831.

Shure SM5B. S Johnson, WGH, 281 Independence Blvd Ste 101, Virginia Bch VA 23462. 804-826-1310.

MISCELLANEOUS

Want to Sell

Enterprise Elect 7900 color weather radar system for use w/data from Natl Weather Svcs, BO. L Dupree, Cenla Bdcg, 1115 Texas Ave, Alexandria LA 71301. 318-445-1234.

Radio Shack TRS-80 Model 3 computer, 2 disk drive, keyboard & monitor, complete unit, excel cond, \$325 incl shpg. J Shephard, Globe Prod, POB 20465, Roanoke VA 24018. 703-344-3283.

Tab Books & others, call for list/prices. D Fong, Fong Prod, POB 886, Franklin Pk IL 60131. 312-671-4615.

ITT ASR 33T send & receive teletype w/ribbons, punch rolls & printer rolls, BO; Record-A-Call Auto 560, no remote, \$50/BO; Cobra AN-8300 telephone answering unit, no remote, \$50/BO. J Emmel, WWAX, POB 750, Olyphant PA 18447. 717-489-0005.

Boxer WS2107F fans (2), \$25 ea. W Feinberg, Totaltape Publ, 9417 Princess Palm, Tampa FL 33619. 813-621-6200.

Custom studio furniture, several pieces, never used. M Phelps, WLTT, 20300 Civic Cir Dr, Southfield MI 48076. 313-354-9300.

Sony DT3 Discman AM/FM displayer, portable, lightweight, w/shoulder strap & Sennheiser HD410, \$300. W Feinberg, Totaltape Publ, 9417 Princess Palm, Tampa FL 33619. 813-621-6200.

Radio Shack 100 laptop computer, virtually unused, mint cond, 24K RAM, \$300. B Umberger, WNL, 51 S Main Ave, Clearwater FL 34625. 813-446-0957.

Andrew 1920A auto dehydrator, gd cond, w/manuals, \$1000/BO; Extel AH11R, 141R printers (2), dot matrix, gd cond, both work, w/2 ribbons, \$500/BO. D Woodcock, WNWV, 5606 Medical Circle, Madison WI 53719. 608-271-1025.

Plastic record sleeves, 12", 8/pkg (40), BO; Orban MRF-1, BO; Heathkit GRF 1010 (2), \$55 ea; PR&E 2 & 4' tapped rack rails for wooden cabinets, 1-3/4" on up 19" blank rack filler panels & rack screws, all new, BO. B Royster, KOM Bdcg, 1019 Cordova, San Diego CA 92107. 619-223-3413.

Spotmaster (2) new 20 space rack mount cart rack, one used 40 space cart rack; (2) 300 space lazy susan round wooden cart racks & 200 space wooden wall mount racks, BO; CBS Labs BTR, STR, etc, BO. B Royster, KOM Bdcg, 1019 Cordova, San Diego CA 92107. 619-223-3413.

Large amount misc items, such as telco type relays, splicing blocks, quik-kits; composite clippers & more, call for details/prices. B Royster, KOM Bdcg, 1019 Cordova, San Diego CA 92107. 619-223-3413.

Bezels, (20) 3/4", fit 513 series Dialight switches; also (20) 3/4" buttons, red, green, white, sell all or part cheap. J Nickel, KJSK, Box 99, Columbus NE 68601. 402-564-2891.

The World Transcription Library, 16" disc w/catalog, mint cond, \$1500/BO. R Bellavia, WSBC, 4949 W Belmont, Chicago IL 60629. 312-282-WSBC.

Spantel voice pagers, \$22 ea, like new (100). Mudge, DataTel Comm, 8577 Sandy Crest Dr, Union Lake MI 48085. 313-698-2336.

Amp fans (2), \$20 ea. B Feinberg, Total Tape Publ, 9417 Princess Palm, Tampa FL 33619. 800-874-7599.

Metro Data K-100 keyboard w/phone coupler & D-100 xmtr unit, use for programming on cable channels or for low power TV, excel cond, \$800. K Crosthwait, Rt 5 Box 77, Kingston TN 37763. 615-376-5763.

Standard equip racks 70" (4), \$50 ea. C Washington, WFRK, 1725 Mt Vernon Rd, Leesburg FL 32748. 904-365-0659.

Half-cabinet, 19", gray, two locking doors, unused, ideal for repeater installations, (10), \$200 ea. Larry, 412-763-8358.

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Lambda LNS-P-24 24 V power supply, new; (3) Shalco mono 600 ohm step attenuators. R Simonson, KHAT, 4949 Yankee Hill Rd, Lincoln NE 68516. 402-423-1530.

NAB Eng book, like new, 6th ed, approx 30 volumes, misc elec books, BO for whole lot, \$35. J Dexter, 1604 Missouri Ave, Artesia NM 88210. 505-746-6590.

IBM displaywriter office word-processor, w/printer, DD disk drive, \$2500. Larry, 412-763-8359.

GE 30F1445, oil filled capacitor, 1.5 uF, 15 kV, non-PCB, 8W x 4L x 8H w/brackets, new. \$400/BO. W Shulz, WFFY, 130 E Randolph St, Chicago IL 60601. 312-861-8100.

Scott tuner FM 311-C, \$175; disc cutting lead screws 224/104/160/106/120, \$45 ea; Capps disc cutting units w/meters w/pigtails for hot stylus, \$6.50 ea; hot stylus units w/meters (2) heats needles for disc cutting, \$25. Mr. Oliver, 212-874-7660.

Ampex MX35 mixers (2), mic-line in, \$250; xformers for line input, \$30 ea, uses two, 4 inputs; Altec mixers portable also 1567A's, \$250 ea; xformers for Altecs, \$30 ea, uses five, if needed, 5 inputs; Sigma mixers, mic in 250 (3) mixers & echo bleeds, \$140 ea. Mr. Oliver, 212-874-7660.

Selenium rectifiers (2), new, HD current; RCA TK-45 color cam remote cont joystick; Varagon TV7 zoom lens complete innards; Canon 35mm 72 wide angle lens C mount for TK 11 B&W, BO. P Dowie, Gd Snd, 171 Drexel, Lansdown PA 19050. 215-626-9322.

Patch bays (4) single input, nearly new. \$60 ea. Mr. Oliver, 212-874-7660.

Lang model 36" high, 19" standard wide, wheels, \$55. Mr. Oliver, 212-874-7660.

Knobs from 1st generation RCA TV EQ; Jones plugs & sockets from old RCA TV; major sound effects discs; instruction manuals; 1st generation TV EQ from TK30s forward, BO. P Dowie, Gd Snd, 171 Drexel, Lansdown PA 19050. 215-626-9322.

Wegener FM cable modulator, mono at 103.9 for putting AM daytime on FM cable, \$800. D Kelly, KWPN, Box 84, West Point NE 68788. 402-372-5423.

Want to Buy

Instruction books for old AM & FM xmtrs, ITA or Westinghouse, GE, etc. J Glass, Northern IL Univ, De Kalb IL 60115. 815-784-2179.

New FM Class A radio station seeks tower, transmitter & studio equip. N Norris, 313-234-4335.

Equip needed to build new class A FM, from tower to mic. S Norris, 313-234-4335.

Broadcast plns, network, Olympic, station. M Black, WEOS, Hogart College, Geneva NY 14456. 315-789-8970.

Schematics, blue prints for consoles, studios, etc, books on bdc elect courses, cheap. K Meazes, PQB 71098, LA CA 90071. 213-666-9570.

Wire recorder that works. H Russell, Admix Bdc Svc, 960 Woodward Dr, Charleston WV 25312. 304-744-0022.

Manual for Narda 443 power meter. J Gerike, KWIX, 300 W Reed, Moberly MO 65270. 816-263-1500.

Old 'On the Air' sign, 50's or earlier, also old mics. B Hawkins, 6255 52nd NE, Seattle WA 98115.

MONITORS

Want to Sell

TFT 730A 92 kHz SCA monitor, \$1700/BO. I Epstein, KJAZ, 1131 Harbor Bay Pkwy # 200, Alameda CA 94501. 415-769-4800.

TFT 730A SCA mod monitor, new, in factory box, \$2000. L Gochenour, WRIS, 219 Luckett St, Roanoke VA 24017. 703-342-3131.

B&H D 35mm printer, BO. G Gunter, KMAB, 650 N Bolton, Jacksonville TX 75766. 214-586-2162.

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MONITORS . . . WTS
HP 335B FM mod monitor, gd cond, \$100. G Gunter, KMAB, 650 N Boulton, Jacksonville TX 75766. 214-586-2162.
TFT 760 FM receiver module for TFT EBS, currently at 94.5 MHz, \$200/BO. M Black, WEOS, Hogart William Smith College, Geneva NY 14456. 315-789-8970.
McMartin TBM2000A SCA monitor, \$500. G McCoy, KZEN, 1608 16th St, Central City NE 68826. 308-946-3816.
Belar RFA-1 RF amp; Belar SCM-1 SCA monitor; TFT EBSO EBS encoder/decoder/fixed freq rcvr; CBS Audimax 4450, all in gd working cond, BO. M Bostic, WKXL, 259 Monroe Ave, Rochester NY 14607. 716-454-3040.
Collins 900C-3 monaural or stereo mod monitor w/manual, \$875. D Hill, KXAL, POB 1393, Mt Pleasant TX. 214-572-6536.
Collins SCA monitor, working, also many others; McMartin 1969 model, stereo monitor turned to 97.3, \$600 & test equipment also, \$100. L James, BEST Prod, 611 N Greer, Pittsburg TX 75666. 214-856-2892.
Belar TVM1, TVM2, RF amp, TV aural mod monitor, \$2700. B Weiner, KNYO, 210 Allen, Glendale CA 91201. 818-409-0185.

Want to Buy
QE1 690 mod monitor. John 315-488-1269.

MOVIE PRODUCTION EQUIPMENT

Want to Sell
Kodak Pageant high intensity 16mm arc movie projector, w/power supply, near mint cond, \$1200. G Ormrod, GFO Prod, 432 E X St, Tumwater WA 98501. 206-352-8028.
Movie cameras: 16mm snd on film Pro 1200 Auricon in new cond, \$2000; 35mm w/2000' & several 400' magazines, Berthel zoom, all new, \$2500; also 35mm synchronizer 3 gang, \$125, 2 gang, \$110; proj Singer automatic threading in excel cond, \$165, JAN 16mm snd proj, mint working cond, \$200. L Meister, WBAI, 321 River Rd, Nutley NJ 07110. 201-667-2323.
16mm splicers, synchronizers, moviscopes, full cote, rewinds, Bach-Auricon sound system, B&H to DR, Frezzi 100D inverter; Siemens interlock projector, all well cared for. P Dowie, Gd Snd, 171 Drexel, Lansdown PA 19050. 215-626-9322.

RECEIVERS & TRANSCEIVERS

Want to Sell
Motorola trunked 800 MHz system, (2) Traxars, (2) Mostars, (2) MX360 talkies & chargers, \$2000/all. B King, KLBJ, 8309 N I-35, Austin TX 78753. 512-832-4061.
Motorola HT220 VHF handheld w/PL & charger (3), \$75 ea; Decibel Products 8253 4 cavity duplexer for 440 to 470 MHz, new, \$200. P Russell, Bowdoin College, Sills Hall, Brunswick ME 04011. 207-725-3066.
Microdyne 1100 CSR sat rcvr-C band, 80; Kenwood TH-41AT w/many acc, vgc, \$175; Tokyo Hy-power HL-120U, 430-350 MHz, 100 W amp w/GaAs FET preamp, excel cond, \$250. B Hoover, Box 39, Valier PA 15780. 814-938-7237.
Harris 6528 video receiver, rack mountable, analog tuning, fantastic cond, \$300. W Feinberg, Totaltape Publ, 9417 Princess Palm, Tampa FL 33619. 813-621-6200.
Sansul G-7700 stereo receiver, 120 W/chnl, digital tuner w/lots of inputs, \$300. B Feinberg, Total Tape Publ, 9417 Princess Palm, Tampa FL 33619. 800-874-7599.

WE'VE DONE THE HARD PART

Our new program computes TV & FM Field Strength for you. It used the FCC algorithm to determine distance to contour, field strength at distance, and bearings between coordinate pairs. It runs on any IBM-PC compatible and incorporates FCC Docket 88-56 rules. Only \$95.00
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Employment

To place ads in this section, use the Action-Gram form. To respond to box numbers, write Radio World, Box 1214, Falls Church VA 22041, Attn: ____.

POSITIONS WANTED

27 yr old w/hands on exp seeks opportunity for more experience in AM, FM eng, have FCC general phone, SBE certified & NARTE. Mark, 304-525-3981.
CE, NBN, CE NJ state radio station, CE HBO MDS, seeks FT/PT employment, contracted work also welcome. M Rakoff, 114-41 Queens Blvd Ste 148, Forest Hills NY 11375. 718-591-0002.
Programmer: turnaround/startup. Market: 20,000 +. Plan now, dominate by summer. Details: S Temoat, 211 Green, Pratt KS 67124-1604.
Former KFRC eng avail FT/PT in San Fran North Bay area, exp: digital, audio, RF. T Driggers, 818 Quail Ct, Healdsburg CA 95448. 707-433-9370.
DJ looking for work at medium/small market station, 14 yrs exp. Write: D Tucker, 407 S New Madrid St, Sikeston MO 63801.

HELP WANTED

Radio Engineer for AM/FM combo must have knowledge of directional antenna system, EOE, M/F encouraged to apply. Contact Radio World, POB 1214, Falls Church VA 22041. Attn: Box 12-1-88RW.
CE for maj mkt East coast AM/FM. Must be hands-on with excel admin & mgmt skills. Reply to James Loupas Assoc., Inc., 7311 Bellerive Ste 1001, Houston TX 77036. EOE.
Corporate CE for 1 kW daytime 1170 kHz, class A FM w/pending power increase to 50 kW & three tower directional 690 kHz. Moving to beautiful new facility. Excellent opportunity for the right person. Must have own tools. Call Jim at 414-324-4441.
CE for directional AM & satellite/automated 100kW FM in upper midwest. Slobs don't bother. 1001 E 9th St, Duluth MN 55805. 218-728-4484.
CE for KZIQ-AM/FM in Ridgecrest, CA, high desert area. Must be familiar with remote, studio & automation equip, transmitters, b1 FM installation w/microwave hops, & new studio installation. Exper & references a must. resume to Bel Air Bdctg, 10100 Santa Monica Blvd, Ste 2600, Los Angeles CA 90067.

HELP WANTED

Television Engineer Broadcasting

The National Association of Broadcasters Department of Science and Technology is seeking a Staff Engineer to help serve and improve the television industry. BSEE or equivalent is preferred. Background in television broadcast engineering is required. Knowledge of FCC technical rules helpful, and excellent writing and communication skills desired.
Please forward resume to Michael C. Rau, Vice President Science and Technology Department National Association of Broadcasters 1771 N St., NW Washington, D.C. 20036 or please call (202) 429-5346.
EOE M/F

Director, Special Projects

The National Association of Broadcasters Department of Science and Technology is seeking a Director of Special Projects. Responsibilities include editing and producing NAB's Engineering Handbook, organizing NAB's Spring Engineering Conference and Special Technical Exhibits, managing several key department projects and initiating new technical projects to better serve NAB's members. A technical background in the radio and television industry together with strong writing and communication skills is required.
Please forward resume to Michael C. Rau, Vice President Science and Technology Department National Association of Broadcasters 1771 N St., NW Washington, D.C. 20036 or please call (202) 429-5346.
EOE M/F

Can't Find It? Call 1-800-426-8434 For Immediate Action! Want To Sell It?



Broadcast Equipment Exchange

RECEIVERS ... WTS

Samsal G-7700 receiver, digital analog tuning, 120 W/chan, perf for production room or on-air monitor, lots of inputs, can handle 4 speakers on outputs, mike direction & 2 TT inputs, 2 tape inputs, 2 aux inputs, excel straps, \$300. W Feinberg, Totaltape Publ, 9417 Princess Palm, Tampa FL 33619. 813-621-6200.

Automation Techniques GLR500; GLR560 (3); GLR520 (2) sat receivers, all as is, \$100 ea/BO; Drake 324 (2) sat receivers, as is, \$100 ea/BO. Alan, Intl Bdcg Network, POB 36095, Denver CO 80236. 800-426-4272.

Hallcrafters SX-43, vg w/Sams Photofact schematic, \$75; Scott receiver, floor model, nickel plated chassis, Wunderlich tubes, multiband, \$100. J Dexter, 1604 Missouri Ave, Artesia NM 88210. 505-746-6590.

Beamcat BC-15 10 chan scanner, like new, \$106. B Weiss, KLSI, 3101 Broadway Ste 460, Kansas City MO 64111. 816-753-0933.

Want to Buy

McKay-Dymek AM-5 hi-fi AM tuner or equiv. G Labisch, WPTF, POB 29521, Raleigh NC 27626. 919-790-6315.

Motorola MOCAT CB radios. K Linden, 3605 Michael Ct, Annandale VA 22003. 301-953-9612.

REMOTE & MICROWAVE EQUIP

Want to Sell

PBR-15 remote control, \$1000; TRC15 remote w/subaudible subcarrier, \$1500. John 31-488-1269.

Wegener 1601 vertical sat rcvr mainframe w/1601 power supply, 1645 & 1646 circuit cards, space for 9 circuit cards, mounted vertically, \$400/BO. E Welch, WKCL, POB 809, Ladson SC 29456. 803-553-5420.

Pulse Dynamics 288 2 chnl remote bdcg w/dial & two Telex headsets, \$125. P Russell, Bowdoin College, Sills Hall, Brunswick ME #4011. 207-725-3066.

Moseley PBR-15 remote control, xmtr & rcvr, CCA SG-1D stereo gen, both for \$500/BO. # Gallos, Pensacola Christian College, 904-638-8480 X5041.

Comrex RTLX, 4 mos old, excel cond, going to satellite, \$3500; Comrex TCB 1A, 4 mos old, excel cond, going to satellite, \$125. R Hatch Ministries, 71 McMurray Rd, Ste 109, Pittsburg PA 15241. 800-327-2550.

Fairchild/Comtech Dart, complete digital satellite audio receiving system, FOB Dallas, \$5000. H Beavers, KFJZ, 2214 E 4th, Ft Worth TX 76101. 214-522-9898.

**** BAX ****
FOR SALE OR RENT
C.N. ROOD 5KHz Bandwidth Extension System turns Phone Lines into Music Lines
Exclusive No. Am. Reps
MARCOM
408-438-4273

Home satellite TV rcvr, \$125. K Bagdasar, KCMN, POB 17444, Colorado Springs CO 80935. 719-636-5266.

Marti M306B-T RPU xmtr, gd cond, \$100. G Gunter, KMAB, 650 N Boulton, Jacksonville TX 75766. 214-586-2162.

Moseley PCL-303/C composite STL rcvr, 951.5 MHz, \$850/BO; TFT 7700 composite STL xmtr, 2 yrs old, \$1900; Mod Sciences CDL-2500 composite line driver & rcvr, excel cond, \$800; Moseley SCM-1 subcarrier gen, perf condition, \$400. I Epstein, KJAZ, 1131 Harbor Bay Pkwy, Alameda CA 94501. 415-769-4800.

Anixter Mark P9A 180GN-2 15' aluminum grid parabolics (3), 890-960 MHz, \$5000 ea. D Schmidt, WSCD, 224 Holiday Ctr, Duluth MN 55802. 218-722-9411.

Dart-Fairchild 384 digital sat receiver, like new, 15 kHz & 7.5 kHz, downconverter, \$4695. D Ganske, WISM, 1819 Mitchell, Eau Claire WI 54701. 715-836-9476.

Marti STL-8 dual STL & Marti remote control; TRC-15A Moseley remote, all like new. J Cranden, 315-487-2393.

Gentner SPH-3 telco interface, great shape, \$300. B Feinberg, Total Tape Publ, 9417 Princess Palm, Tampa FL 33619. 800-874-7599.

Moseley DRS-1 20 chan expandable digital remote control system w/extra spare parts & boards, \$1950. G Wachter, KFYI, 631 N 1st Ave, Phoenix AZ 85003. 602-258-6161.

Satellite dishes, 8' fiberglass, 12' fiberglass, in sections, or 8' black mesh, w/mounts, \$250 ea, you pick up in Arkansas. L Fuss, Contemporary Comm, POB 4010, Opelika AL 36803. 205-749-3340.

Comrex PTLX & RTLX two line freq extension system w/extra receiver & automatic level set unit, \$10,000. J Stolz, WCVG, 813 Hwy 50, Millford OH 45150. 513-248-1072.

Fairchild Dart 384 digital satellite rcvr, like new, 15 kHz & 7.5 kHz, \$14,695. D Ganske, WISM, 1819 Mitchell Ave, Eau Claire WI 54701. 715-836-9476.

Moseley LVK, TSK-1, BO; also complete spare semiconductor kits for TRC-15AW, PCL-505/C, PCL-303/C, BO. B Royster, KQM Bdcg, 1019 Cordova, San Diego CA 92107. 619-223-3413.

Rust RC-2400/Mod 45 xmtr/rcvr system w/manual, mdl 45 remote control relay panel, \$200. D Loucks, KTKL, 2132 W 42nd, Casper WY 82604. 307-265-6700.

S-A 15 kHz dual digital decode card for ABC news feed, \$800. T Brandenburg, KGTS, College Place WA 98324. 509-527-2991.

Wegener sat receiver, 1601 mainframe, all cards for Transtar stereo country, Panda boards & demods, BO. T Bigby, KOLA, POB 990, Rayville LA 71269. 318-728-6990.

Laux rcvr for SMN country format. G Gilpin, WAGR, POB 2265, Luumberton NC 28359. 919-729-3394.

Marti RMC20 remote control complete studio transmitter set w/3 slaves, hand delivered or teleco, in working order, \$1700/BO. R Fyler, KWIC, 1690 N Major Dr, Beaumont TX 77706. 409-866-8899.

S-A 6650 satellite receiver, excel cond, BO. W Borneman, WBYO, Box 177, Boyertown PA 19512. 215-369-1075.

Marti receiver on 161.73 MHz, great cond, \$150. L James, BEST Prod, 611 N Greer, Pittsburg TX 75686. 214-856-2892.

Moseley TRC15A remote control w/Hallikainen TEL171 digital metering installed, \$1500. D Kelly, KWPN, Box 84, West Point NE 68788. 402-372-5423.

Moseley WRC-10T studio unit, gd cond, out of service \$788, \$400. B Frank, KANO, 100 East Main, Anoka MN 55303. 612-427-7550.

Want to Buy

Subcarrier gen & demod for Marti STL-8A 950 MHz microwave STL. C Smith, KREK, POB 1280, Bristow OK 74010. 918-367-5501.

S-A 7325 DPU 7.5 kHz Pgm Unit for the 7325 digital processing unit. G Urbiel, WWJWJOI, 16550 W Nine Mile Rd, Southfield MI 48086. 313-423-3366.

Marti STL 8, must be in gd working cond; also need hybrid combiner to combine two STL xmtrs. D Wiley, Life Bdcg, POB 96, John Day OR 97845. 503-575-1840.

Rusk RC1000 remote control unit in working cond. A Durham, WAKI, POB 31, Memminville TN 37110. 615-473-6575.

Microdyne 1100-PCDR (5) demod. B Rathman, KRVM, 200 N Monroe, Eugene OR 97402. 503-897-3370.

TFT 7700B or Moseley 505/C composite STL system. R Hixon, Trans World Radio, 700 Shunpike Rd, Box 98, Chatham NJ 07928. 201-966-2700.

TRC15 remote control unit. J Foley, KBOX, 110 W Laurel Ste H, Lompoc CA 93436. 805-541-2715.

SCPC receiver w/3:1 expanding w/block down converter. J Foley, KATY, POB 841, San Luis Obispo CA 93406. 805-541-2715.

Comrex single line freq ext system. L Houch, Rollin Recording, 210 Altgelt, San Antonio TX 78201. 512-736-5483.

STATIONS

Want to Sell

21 percent of our station available to financially qualified individual(s), located in Western WV. Write: Station, POB 2083, Ashland KY 41105. Attn: MD

Ohio, Md., PA., W.Va.

AM Stations For Sale

As little as \$25K down
Ray H. Rosenblum
Phone: (412) 963-6311

Cal AM, class IV, 1 kW, non-directional, FT. 415-652-9373.

Radio station, 1 kW daytime AM, FCC approval to increase to 2.5 kW, approx 4 acre tower site, recently renovated office bldg on approx 1/4 acre in business district, new bdcg & prod equip, \$420,000. J Brown, POB 958, Douglasville GA 30133. 404-920-2281 or 404-949-6385.

Class C 100 kW FM, 170,000 ADI, new facilities, no AC/AOR or CW-FM in market. D Loucks, KTKL, 2132 W 42nd, Casper WY 82604. 307-265-6700.

FM CP's Wanted
Clients seek CP's any size market. Small, medium, large. Will consider FM upgrades, too!
Don Nahley
1-404-323-1460

Want to Buy

FM CP wanted, any market, anywhere, exp broadcaster, total or partial buy-in, mgmt exp. 619-223-3413.

Looking for AM, FM or CP in east for right price/terms. H Kozlowski, 703-631-0197.

STEREO GENERATORS

Want to Sell

Texar RCF-1 replacement card 5 for 8100A, \$200/BO. W Shulz, WFYR, 130 E Randolph St, Chicago IL 60601. 312-861-8100.

Harris 992-5129-001, brand new output module of Harris MS-15R stereo gen, \$200/BO. R Fass, WLRB, 119 W Carroll, Macomb IL 61455. 309-833-5561.

Moseley SSG-3T, gd cond, \$85; Collins stereo gen card for Collins 310Z-1, 2 exciter, also spare semiconductors for 310Z-1 exciter, BO. B Royster, KQM Bdcg, 1019 Cordova, San Diego CA 92107. 619-223-3413.

Harris TE3 stereo gen, BO. T Driggers, 818 Quayle Ct, Healdsburg CA 95448. 707-433-9370.

Want to Buy

Gates M-6146 or similar unit that mates w/Gates M-6095 exciter. M Meyer, WWCK, 3217 Lapeer, Flint MI 48503. 313-744-1570.

SWITCHERS (VIDEO)

Want to Sell

Panasonic WJ4600B special effects gen, \$1095. W Carnes, KIIRT, POB 8234, Jack-sonville TX 75766. 214-586-2162.

GVG 1600-7J, 24 input, 3 M/E & PGM, PST & PVW, 6 RGB & shadow C-keyers, quad split & genl mdies, excel cond, \$34,000; Crosspoint Latch 6124 & 6403, 12 input, 2 M/E, DSK, ENC C-keyer, w/6403 programmable effects interface, \$4900. D Munford, Angelsea Prod, 55 Russ, Hartford CT 06106. 203-241-8111.

Vital VIX 114 video switcher, 1 M/E, etc, gd cond, \$2500/BO. B Yates, St Josephs College, Windham ME 04062. 207-892-6766.

ISI 902 switcher, 10 inputs, 2ME, 8 rotary wipes, positioner, pgm, preview outs, gd cond, \$1000. H Larson, Matrix Mobile TV, POB 536, San Luis Obispo CA 93406. 805-544-5657.

Vital 114-10X video switcher, RGB chromakeyer, flip flop mix, 1 ME & audio follow, \$5000. T Judge, TAG Comm, 75 Weaver Rd, W Milford NJ 07408. 201-697-8454.

Want to Buy

Large video prod switcher w/at least 20 inputs & 3 ME's. H Henson, Henson Prod, 3796 Bethania Station Rd, Winston-Salem NC 27106. 919-924-8717.

TAPES, CARTS & REELS

Want to Sell

Capitol HOLN (60) pancake 3600' hubs of HOLN A-3 cart recording tape, sold in any quantity, \$15/hub or BO. J Emmel, WWAX, POB 750, Olyphant PA 18447. 717-489-0005.

NAB reels, 10.5" metal 1/4", all in gd cond, 1-10, \$1.50 ea, 11-100, \$1.25 ea, 100+, \$1 ea. Falk Recd Svcs, 7914 Fegenbush Ln, Louisville KY 40228. 502-239-1010.

Reprocessed audio tape, 1/4", 1/2", 1" & 2". All brands, excellent condition, splice free guaranteed. New & used plastic & metal reels & boxes. All other related products. Call for free catalog and price quotes. 1-800-331-3191. In New York State 516-678-4414. Burlington Audio Tapes, Inc., 106 Mott St, Oceanside NY 11572.

Used carts, various lengths, 50" ea. T Hunt, KILA, 2201 S 6th St, Las Vegas NV 89104. 702-731-5452.

ACTION-GRAM

EMPLOYMENT SECTION:

Help Wanted: Any company or station can run "Help Wanted" ads at the flat rate of \$18 per listing per month (25 words max). Payment must accompany insert; there will be no invoicing. Blind box numbers will be provided at an extra charge of \$2. Responses will be forwarded to listee, unopened, upon receipt. Call 800-336-3045 for display rates.

Positions Wanted: Any individual can run a "Position Wanted" ad, FREE of charge (25 words max.), and it will appear in the following 3 issues of Radio World. Contact information will be provided, but if a box number is required, there is a \$2 fee which must be paid with the listing (there will be no invoicing). Responses will be forwarded to the listee, unopened.

Check as appropriate:

- Help Wanted
- With Box Number
- Positions Wanted
- Without Box Number

Text (25 words maximum): _____

Name _____ Title _____
Company/Station _____
Address _____
City _____ State _____ Zip _____
Telephone _____

Mail to:
BROADCAST EQUIPMENT EXCHANGE
PO Box 1214, Falls Church, VA 22041



FOR FREE LISTINGS IN
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CALL TOLL FREE
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15 LINES TO SERVE YOU

Free listings in Broadcast equipment exchange are offered to all United States Broadcasters AM/FM/TV and all Pro-Sound end users. BSW will accept up to three listings by telephone. For more than three listings BSW will send you an ad order sheet for your convenience. BSW will list each ad for a period of three full months.

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12 Hours Daily - In Your Time Zone



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Broadcast Equipment Exchange

TAPES . . . WTS

Aristocarta (1200), various lengths w/50's, 60's & 70's music classics, carts are vintage 78-80 & dbx encoded, \$1.50 ea or \$1500 for the lot (preferred). T Minnard, KOFY, 415-442-1800.

Country Gold Library, 1300 titles on Capitol A2 carts, \$2500; A/C Gold Library, 800 titles on Fidelipac carts, \$1500. P Martin, 414-482-2638.

A&D

Cartridge Rebuilding Service

We clean, load & pack. Serviced within 10 work days! Work guaranteed!

3380 Blakey Ave., Eau Claire, WI 54701
(715) 835-7347

Audio tape carts, (1000 plus), various lengths, AA-3's, some AA-2's & 4's, all in gd working order. BO. B Files, WKPE, 508-255-3220.

Sony P6-120MP 8mm video cassette, 120 min in Sp, never opened, 240 min in Lp, \$8/BO. D Fong, Fong Prod, POB 886, Franklin Pk IL 60131. 312-671-4615.

Plastic reels, hundreds of empty 7.5", BO; Ampex 641 tape, in boxes, \$1/reel. B Feinberg, Total Tape Publ, 9417 Princess Palm, Tampa FL 33619. 800-874-7599.

Pre-recorded music, 17 reels, some never used, from Music Director Series, \$20 ea. C McGinty, WEKC, 710 Croley Bend Rd, Williamsburg KY 40769. 606-864-7843.

Fidelipac carts (150) need rebuilding, \$50. B Cain, WFPG, 2707 Atlantic Ave, Atlantic City NJ 08401. 609-348-4646.

Scotchcarts, approx 1500, lengths from 2.0 to 7.5 min, mostly 3.5 to 5.5 min, all in gd cond, mix of black and brown shells, \$2 ea/BO on whole lot. M Bostic, WKIX, 259 Monroe Ave, Rochester NY 14607. 716-454-3040.

Want to Buy

Audio Devices tape boxes, 1950's, 10 & 7" in gd cond. ETS Record, Box 932, Honolulu HI 96808. 808-847-4300.

Records & tapes of music from '40s-'60s, music documentaries, etc. S Stevenson, POB 735, Blaine WA 98230. 604-531-4576.

Langworth Library, SFX, public domain music, TV programs, record libraries, cheap. K Meazes, POB 71098, LA CA 90071. 213-666-9570.

London Music Library 78s, complete library or part. D Eresy, WFCC, 1457 Main St, W Chatham MA 02669. 508-945-4855.

Audio tape, Fidelipac, 3M, mono & stereo, used bcdt carts. Herb, ATI Mark V Products, 1395 Manassero St, Anaheim CA 92807. 714-779-8833.

TAX DEDUCT. EQUIP

Donation of cart machines, 200' self supporting tower & medium power CP FM antenna, attractive tax deduction. M Rigney, WMCN, 1600 Grand, St Paul MN 55105. 612-696-6082.

Eng student desiring donation of old bcdt equip (anything in repairable cond, will pay all shipping charges, EE student at Purdue. C Gill, POB 371, Indianapolis IN 46206. 317-923-2800.

Need equip to start small educ station, have test gear to trade or will except donation of equip (tax exempt). B Dean, Down East Machine School, Rt 1 Box 388, Machias ME 04654. 207-255-4735.

Christian non-comm station seeks donated or low cost bcdt equip inc FM xmtr, tax write-off. T Barnes, House of Prayer, 1520 V Ave, Lagrange OR 97850. 503-963-9143.

Non-comm ed FM seeks donation of junk antenna or components to be used for parts in reworking standby antenna, ERI pref but any make acceptable, attractive tax write-off may be arranged, will pick up if distance not too great, write or call. A Nielsen, WDNX, Rt 2, Savannah TN 38372. 901-925-9236.

TEST EQUIP

Want to Sell

Potomac AT-51 audio test set, audio analyzer & audio gen, perf cond, \$2500. S Ciluzzo, Infovideo, POB 879, Cardiff CA 92007. 619-268-3000.

Amber 3501 portable audio measuring system, Balanced input, IMD, ANSI-A options. Extended battery, balanced output available, excel cond, 42200/BO. R Street, Box 6677, Ft Wayne IN 46896. 219-447-5635.

Tek IL30 spectrum analyzer plug-in, \$700. B Dickerson, WEAG, POB 520, Stanke FL 32091. 904-964-5001.

B&K 1260 NTSC video pattern/sync gen, 1 yrs old, mint cond, \$1200. B Hoover, Box 39, Valier PA 15780. 814-938-7237.

Potomac Instruments AG-51 2 chnl low distortion balanced output oscillator, \$1500; Leader Instruments LAV-190 AC millivolt meter & sine wave oscillator, \$500. P Lancaster, Howard Schwartz Recd, 420 Lexington Ave Ste 1934, NY NY 10170. 212-687-4180.

Dukane 99A600 audio spectrum analyzer, BO. D Sis, St John's Univ, Collegeville MN 56321. 612-363-3378.

RF ammeters 0-3 A, 0-8 A, \$12 ea. D Stebbins, KZZN, Box 192, Littlefield TX 79339. 806-385-4474.

Tek 453 scope, less probes & manuals, \$350 ea; also other test gear, will trade. B Dean, Down East Machine School, Rt 1 Box 388, Machias ME 04654. 207-255-4735.

Microwave Assoc MA7L188-S001 microwave filter & tee for 1/8" coax line, new, \$35. J Cunningham, KHKC, Rt 2 Box 113B, Stonewall OK 74871. 405-265-4496.

Surplus Electronic Equipment

H-P, Tektronix, and others.
Free Catalog

T&H Electronics

1636 E. Fry Blvd.
Sierra Vista AZ 85635
(602) 458-6656

Dielectric 1100-A directional wattmeter w/single element socket, 1-5/8" EIA flanged line section & 2117 5 kW 50-125 MHz element, like new, \$300 firm. C Lewis, WMFD, POB 5307, Wilmington NC 28403. 919-763-6363.

Potomac AG-51 audio freq gen, vgc w/manual, about 3 yrs old, \$1400 firm. C Lewis, WMFD, POB 5307, Wilmington NC 28403. 919-763-6363.

WOW, FLUTTER and DRIFT METERS

Manufactured by WOELKE in West Germany. Three models priced from \$595 to \$995. Precision test cassettes and Records available with purchase of a meter.

REDWOOD MARKETING

820 Redwood Drive
Nashville, TN 37220
(615) 331-4743

Anritsu ME453M microwave link analyzer, perfect cond, w/all options, \$14,100. H Casteel, Megastar, 701 Desert Ln Ste 4, Las Vegas NV 89106. 702-386-2844.

Sound Tech 1710A, 1000A, 1100A, 1200A, BO; Interstate Elect F-34, BO; Fidelipac wow & flutter meter, BO; Harris stereo gain set, portable, BO. B Royster, KQM Bdcg, 1019 Cordova, San Diego CA 92107. 619-223-3413.

Potomac FIM-71 FM/TV field strength meter, like new, \$2750. K Thomas, POB 207, Atlantic Beach FL 32233. 904-388-7711.

G-R primary freq standard, BO. J Keller, WKOK, RD#2, County Line Rd, Selingsgrove PA 17870. 717-286-5838.

EICO 950 capacitance resistance bridge, \$25; Bird 43 Thru-line wattmeter w/detectors, \$195; RCA Voltomyst electronic multimeter, \$45; HP 200C audio osc, \$75. J Dexter, 1604 Missouri Ave, Artesia NM 88210. 505-546-6590.

Precision LCR bridge, AN-URM-90, w/book, \$100. R Simonson, KHAT, 4949 Yankey Hill Rd, Lincoln NE 68516. 402-423-1530.

EICO 377 audio gen, \$50. S Weber, KGRV, POB 1598, Winston OR 97496. 503-679-8185.

HP audio signal gen for parts, missing power xmtr, BO. P Dowie, Gd Snd, 171 Drexel, Lansd. PA 19050. 215-626-9322.

dbx 10/20 computer EQ/analyzer, stereo 10-band EQ w/10 memories, digital SPL meter, pink noise gen, mic & manual, rackmt, EC, \$395. S Hofmann, Cameron Univ Theatre, 2800 W Gore Blvd, Lawton OK 73505. 405-581-2428.

Want to Buy

Telequipment D54, service manual. D Sis, St John's Univ, Collegeville MN 56321. 612-363-3378.

GR 1606A RF impedance bridge. J Glass, Northern IL Univ, De Kalb IL 60115. 815-784-2179.

GR 1606A or 1606B RF impedance bridge, must be in gd working cond w/manual & adapters to standard coaxial cable connectors. E Wilk, 312-237-2283.

Potomac AM field strength meter, gd cond. V Baker, POB 889, Blacksburg VA 24060. 703-552-4252.

TRANSMITTERS

Want to Sell

CSI T-25-F1 25 kW FM, tuned to 95.1 MHz, 1985 model, new final, relay panel & spare parts, gd cond, BO. J Clark, WRKU, 4531 Belmont Ave, Youngstown OH 44505. 216-759-0579.

Bauer 610 FM 5 kW, uses McMartin B-910 exciter & 4CX5000A final, tuned to 103.1, \$5000/BO. P Martin, 414-482-2638.

Gates 10 W xmtr; Gates Yard, mono, 8 ch board, BO. B Yates, St Josephs College, Windham ME 04062. 207-892-6766.

Gates/Harris BC-5E, 5 kW AM & BC-1F, 1 kW AM, excel cond, many spare parts, remote controllable, tested monthly since 5/85, \$10,000/BO. T Laffan, WDEV, 9 Stowe St, Waterbury VT 05676. 802-244-7321.

Transmitters, 1 kW AM, 5 kW AM, 5 kW FM, 25 kW FM replaced w/new ones. John 315-488-1269.

RCA BTA-1R 1 kW on 1490 kHz w/250 cut-back & spares, BO. E Monskie, Hall Comm, 24 S Queen, Lancaster PA 17603. 717-397-0333.

ITS 1615 ITFS xmtr & Andrew antenna, 10 W, \$10,000 or trade. W Ellis, KOZK, MPO Box 21, Springfield MO 65801. 417-865-2100.

RCA TTU-12 UHF TV xmtr, 12 kW, no exciter, prefer to donate to non-profit organization. C Haynes, POB 31235, Jackson MS 39206. 601-948-1515.

TTC/Wilkinson FM 5000E 5 kW FM, 3 yrs old, like new. S Larson, KWQA, Box 730, Worthington MN 56187. 507-376-6165.

Elcom Bauer 690 exciter, tuned to 91.7, \$500. M Rigney, WMCN, 1600 Grand, St Paul MN 55105. 612-696-6082.

TMC 6PT 4016 40 kW SSB xmtr, \$6500. M Murphy, 11621 Valle Vista, Lakeside CA 92040. 619-561-2726.

Kahn Power Side, exciter, monitor & processor, 1310 kHz, \$7500/BO. J Hoge, WYND, 316 E Taylor, Deland FL 32724. 904-734-1310.

Gates BC250G4, new tubes & plate transformer, \$1500. R Ness, WCSJ, POB 270, Morris IL 60450. 815-942-0022.

LPB 20 W solid state AM, \$500. K Bagdasar, KCMN, 2880 E Fountain #200, Colorado Springs CO 80910. 719-636-5286.



High performance at affordable prices.

15, 20, 30, 80 W exciters and translators /boosters.

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San Diego, CA 92101

619-239-8462

Telex 229882LJMUR

Collins 830 10 kW FM for parts, \$2000/BO. K Harnack, WPAD, POB 450, Paducah KY 42001. 502-442-8231.

Collins 21E AM, 5 kW, 1480 kHz, gd cond. K Kuenzie, KSLQ, 102 Elm St #203, Washington MO 63090. 314-239-6800.

RCA BTF1 parts, relays, caps, resistors, all new in original boxes. M Black, WEOS, Hogart William Smith College, Geneva NY 14456. 315-789-8970.

LPB carrier current transmitter, splitters & power interfaces, BO. M Black, WEOS, Hogart William Smith College, Geneva NY 14456. 315-789-8970.

Versa Count V-322 fully operational 10 W exciter, BO. J Grimes, WQNA, 2201 Toronto Rd, Springfield IL 62707. 217-529-5431.

RCA 20E-1 20 kW FM w/exciter & spare parts, 9 yrs old, perfect cond. Don, 2003 Brewster Rd, Bellevue NE 68005. 402-733-4747.

RCA BTF-5D FM at 94.9. M St Cyr, 517-487-5986.

Gates FM 1-C w/McMartin B-910 exciter, working cond, in use as standby. A Bowab, WDLT, 2402 Wolf Ridge Rd, Mobile AL 36618. 205-344-3698.

Harris TE-3, new rack mount, 15 W TE-3 FM exciter, new, BO; Harris FM01G/H parts, etc, BO. B Royster, KQM Bdcg, 1019 Cordova, San Diego CA 92107. 619-223-3413.

Emcee HTU/Adler UST 100 W UHF translators. S Hasskamp, KDLH, 425 W Superior, Duluth MN 55803. 218-727-8911.



PR Z-1A (2) & Z-1R crystals for LPB carrier current xmtrs, 522, 580, 590 kHz, all for \$20. M Pinhero, 1528 4 Delane Ave, Charlotte NC 28211. 704-365-4912.

Gates FM5B 5 kW FM. W Carnes, KIIRT, POB 8234, Jacksonville TX 75766. 214-586-2162.

Westinghouse FM-10, 20 yrs old w/manuals, you remove & haul, BO. G Liebisch, WPTF, POB 29521, Raleigh NC 27626. 919-876-0674.

SUPER-GEN

This high-performance FM Stereo Generator has selectable pre-emphasis, overshoot-controlled lowpass filters, digital pilot/subcarrier synthesis and built-in overmod protection. CBS/NAB's "FMX" system is available as a plug-in option.

Inovonics
SANTA CRUZ, CA (408) 458-0552

RCA 5000X AM xmtr. P Habecok, KACO, 238 W Main, Behlville TX 77418. 409-865-9448.

Collins 21-E 5 kW AM, very clean in top shape, \$8750 firm; also 1 kW FM Bauer 607, \$3800 w/exciter, very clean. J Cramden, 315-487-2393.

CCA FM1000D 1 kW, W/130 cable & antenna whips, tuned to 91.3 MHz, gd cond, \$5950. T Brandenburg, KGTS, College Place WA 98324. 509-527-2991.

Visual DFM-10K-B/DFM-10-A 10 kW FM xmtr w/harmonic filter & 10 W FM exciter, needs some work, \$2500. D Loucks, KTKL, 2132 W 42nd, Casper WY 82604. 307-265-6700.

LPB AM RC5A 640 kHz; (7) T-8 interfaces; T-2-4; (3) splitters, BO. M Black, WEOS, Hogart William Smith College, Geneva NY 14456. 315-789-8970.

Harris TP-10, excel working cond, stereo exciter, \$750. L James, BEST Prod, 611 N Greer, Pittsburg TX 75686. 214-856-2892.

Want to Buy

Any brand tuneable exciter, freq synthesized, like BE, Versa Count, etc. John 315-488-1269.

AEI AMSKD oscillator card 4A14 & Sanken audio amp plug-in module. R Jenkins, WAVL, POB 277, Apollo PA 15613. 412-468-4020.

FM xmtr, 1 or 3.5 kW for new 80/90 FM station at 102.5. P Martin, 414-482-2638.

AM 10 kW, gd cond; 3 or 4 tower phasor w/tuning unit T Gray, WSMU, POB 900, Graham NC 27253. 919-227-4254.

FM xmtr, 5 or 10 kW, w/ or w/o exciter; 0.001 MFD G3 or equiv transmitting capacitor; 500' of 3" or 1-5/8" foam or air transmission line; TV exciter on chnls 21-60, 3-5 chnl small video switcher; (4) 4-1000A tubes. R Wright, WLLX, 1208 N Locust, Lawrenceburg TN 38464. 615-762-6200.

ITA 1000A AM, RF thermocouple & RF choke. D Burns, KRSN, 400 N Mesa, Los Alamos NM 87544. 505-662-4342.

Harris or Continental 25 kW or better. M St Cyr, 517-487-5986.

47.48 MHz crystal for RCA BTE-10C FM exciter MI-560302-34; parts for BTE-10C/BTE-10C xmtr. R Hixon, Trans World Radio, 700 Shunpike Rd, Box 98, Chatham NJ 07928. 201-966-2700.

Gates FM 5 kW pref, but will buy any gd 2.5-5 kW. J Hyden, WMFL, 1275 S Jefferson, Monticello FL 32344. 904-997-3536.

Low-band chan 4 + VHF xmtr, 10-30 kW w/VSB filter, harmonic filters; also low-band VHF xmtr, 10-30 kW, w/ VSB filter, harmonic filters retunable to chan 4+. J Fuehrer, NTV Network, POB 220, Kearney NE 68848. 308-743-2494.

FM, 5 kW. K Kuenzie, KSLQ, 102 Elm St #203, Washington MO 63090. 314-239-6800.

Johnson Desk Kilowatt & other related AM amateur transmitters. C Iannace, 283 Main St #A4, Farmington CT 06032. 203-677-1332.

LPTV transmitter, 1 kW, any make, used/demo. John, 1218 Pioneer Blvd, St Paul MN 55101. 612-222-5555.

FM exciter, 50 W. A Bowab, WDLT, 2402 Wolf Ridge Rd, Mobile AL 36618. 205-344-3698.

Panalis FM10S, used 10 W stereo FM exciter, or similar 10-20 W needed ASAP. J Smith, 516 Leedom St, Jenkintown PA 19046. 215-572-6953.

Carrier current xmtr; also want gd 5 kW AM xmtr. P Habecok, KACO, 238 W Main, Behlville TX 77418. 409-865-9448.

Exciter in gd cond, mono or stereo needed immed, will give payment & tax writeoff. D Alan, Jamestown Comm College, 525 Falconer St, Jamestown NY 14702. 716-483-0302.

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| 1978 | Collins 820E, 5 kW AM |
| 1966 | Collins 21E, 5 kW AM |
| 1970 | CCA AM 10,000D, 10 kW AM |
| 1966 | Gates BC-50C, 50 kW AM |
| 1976 | CCA AM 50,000D, 50 kW AM |

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Broadcast Equipment Exchange

TRANSMITTERS . . . WTB

Gates/Harris FM20H3 or FM20K, must be within 500 mile radius of St Louis MO. K Brooks, KREI, POB 461, Farmington MO 63640. 314-756-6476.

UHF 1 kW TV xmr. AACT Inc, 156 Lazelle Rd, Worthington OH 43085. 614-846-9234.

Continental 20 kW FM xmr, negotiable. L Blakeney, WBBN, Rt 2, Box 273B, Taylorsville MS 39168. 601-729-8100.

Harris FM2.5H3 in gd cond. A Stinnett, WPTN, 528 N Willow, Cookeville TN 38501. 615-526-7144.

TUBES

Want to Sell

Mechlett 6166A/7007, new (3), excel cond, \$2200 ea. M Murphy, 11621 Valle Vista, Lakeside CA 92040. 619-561-2726.

WHO SAYS Tubes don't sound great?? 10,000,000 tube-loving audiophiles can't be wrong! Our low cost resistors, capacitors, transformers, low-noise audio & small xmtg tubes make top-quality audio possible with your present tube equipment. Typical prices-807's, \$5.95; low-noise 12AX7/EC83S, \$3.95; 833A-Cath; 500 piece capacitor kit .001-1.0 uF up to 600V, 10-100 uF 50V, w/cab, \$59.95; 300 pc precision low-noise resistor kit, typical tube values, \$19.95. Dealers invited. Triode Electronics, 2010 W Roscoe, Chicago IL 60618. 312-871-7459.

We buy electron tubes.
Contact us if you any for sale.
PATH
507 Superior Ave.
Newport Beach CA 92663
714-722-6733

LM-Ericson 6761 (30), used in RCA video tape equip, BO. R Rickly, WVAB, 8443 Day Dr, Parma OH 44129. 216-845-6043.

EMAC 4CX300A transmitting tube, unknown cond. J Nickel, KJSK, Box 99, Columbus NE 68601. 402-564-2891.

EMAC 4CX-10,000 & (2) sockets; also 4CX2503 socket & RCA DR-2000 numitron tubes for ESE timers, BO. B Royster, KQM Bdcg, 1019 Cordova, San Diego CA 92107. 619-223-3413.

Saticons (6) from RCA TK-45; Vidicons (5) from RCA TK-27/28; Image Orthicon 5820A; RCA TK11; receiving tubes, spans 40 yrs from 0A2 to 50Z5, 750+ pieces. P Dowe, Gd Snd, 171 Drexel, Lansdown PA 19050. 215-626-9322.

Want to Buy

Ind & bdct triodes, TH-150, 6366, 6425F, 6696, 7237, 7804, 8132, 8670A, 5-4/5-6, 6-3, 3CX2500H3, 3CX5000H3, 3CX20,000H3. P Nemeth, 5901 W Hwy 22, Crestwood KY 40014. 502-241-1502.

TURNTABLES

Want to Sell

McCurdy TT; RCA TT w/cabinet & preamp. M Phelps, WLT, 20300 Civic Ctr Dr, Southfield MI 48076. 313-354-9300.

Presto 8GB disc cutting lathe, hot stylus, adjustable groove spacing 76-5001pi; Van Epps vacuum pump/chip collector; Ortofon stereo cutting amps, stereo cutting head needs replacing; CBS Audiomax III average level control; CBS FM Volumax 410 peak controller. mounted in metal rack cabinet w/rear door, all for \$2000, you pick up. F Badaux, The Musik Faktory, 1812 Procter, Pt Arthur TX 77640. 409-982-7121 aft 4 PM.

Stanton 500AL (2) on (2) Technics SLP-1200 MKII heads, one new, one used, 2-5 grams, great for back cueing. \$35 ea/BO, will ship. D Fong, Fong Prod, POB 886, Franklin Pk IL 60131. 312-671-4615.

QRK 12C (2), 3 speed, S20 tonearms, \$150 ea. B Spitzer, KKLS, Rapid City SD 57701. 605-343-6161.

Sparta/Gates GT12/CB1200, gd cond, \$50 ea or \$200 for 5. M Rollings, WRTL, POB 115, Rortola IL 61866. 217-893-1460.

Technics SL-1100A, BO; Stanton 310 preamp, Grado G-1 plus & Shure V-15III & more. BO; Discwasher DiscKit, D-4, SC-2, BO; Technics SP-10MKII. B Royster, KQM Bdcg, 1019 Cordova, San Diego CA 92107. 619-223-3413.

Technics SP10MKII, w/base & power supply, \$200. D Rowland, 7310 Corporate Dr # 104, Houston TX 77036. 713-541-1596.

Gray Research 108B viscous-damped 16" tonearm, w/extra slides, silicon fluid, like new; GE VRII phono cartridge w/stilus; PS audio II phono preamp stereo/mono switch, very high quality. P Dowe, Gd Snd, 171 Drexel, Lansdown PA 19050. 215-626-9322.

Sparta (2)/QRK12C (3) TTs, need work, \$200 or \$50 ea. D Loucks, KTKL, 2132 W 42nd, Casper WY 82604. 307-265-6700.

Micro-Trak 303 12" tonearm, as new cond, \$50. B Leslie, Pro Recdg Svc, 13709 Maple Leaf Dr, Cleveland OH 44125. 216-862-1435.

Rek-O-Kut CVS12 w/variable speeds, 25-100 rpms (2), \$110 ea; Rek-O-Kut B12H 3 speed, hysteresis motor, \$110. Mr. Oliver, 212-874-7660.

Want to Buy

Record cutting machine, must be pro grade, such as old Rek-O-Kut or Presto to cut 45's & 78's, working or not, but must be intact. M Zuccaro, Voice & Video, 5038 Ruffner, San Diego CA 92111. 619-560-1166.

EMT 927, 930 w/EQ or w/o. Y Chung, 1129 S Robertson Blvd, LA CA 90035. 213-274-1921.

RCA MI11895 16" tonearm; also MI11865 RCU universal pickup & MI11866 RCA styli & tip style any cond. RL McDonald, Mission Rodgs, 5231 Horton St, Mission KS 66202. 913-722-2677.

Vintage TTs for collection, '50s & '60s, any cond; components PBT, Pickering 800 first type, RCA 70 series 16" platter, Fisher Lincoln automatic turnover, Lafayette PK 400, Gray 33H, etc. G Garavelli, Via Buozzi 41, 27029 Vigevano (PU) Italy, 0381-72446.

Stereo tonearm, 16" w/head shell, mint cond, for Gates TT. F Luna, KAYN, 1550 Camino a la Posada, Nogales AZ 85621. 602-281-8488.

Any make/model, need one or two working used TT's, pref w/preamps & tone arms. J Smith, 516 Leedom, Jenkintown PA 19046. 215-572-6953.

TV FILM EQUIP

Want to Sell

B&H 614 EVMS 16mm telecine projector w/pedestal magnetic & optical sound, w/manuals, excel cond, \$1250; Telemation TM 203, full size multiplexer, w/manuals, gd cond, \$425. G Ormrod, GFO Prod, 432 E X St, Tumwater WA 98501. 206-352-8028.

RCA TK27 film chain w/TP66 16mm-35mm simplex & slide projector; Buhl biplex w/EI-mo 16mm-8mm & super 8 w/sound, \$2500; Vital 114-10X video switcher 1ME, RG chromakeyer & audio follow & DSX, \$5,000/BO. T Judge, Tag Comm, 74 Weaver Rd, W Millford NJ 07480. 201-208-0180.

RCA TK-27 camera only, \$500 plus shpg or trade. W Ellis, KOZK, MPO Box 21, Springfield MO 65801. 417-865-2100.

RCA film island, complete, online, \$4000; RCA TP66 film proj, BO. R Rickly, WVAB, 8443 Day Dr, Parma OH 44129. 216-845-6043.

RCA TK27 film chain w/RCA TP66 16mm proj & Simplex 35mm proj, \$3000/BO. T Judge, TAG Comm, 75 Weaver Rd, W Millford NJ 07480. 201-697-8454.

Laird Telemedia 5050 telecine auto light control, working when removed, no manual, BO. D Sientz, Gemini/Dover, Box 1678, APO NY 09283.

RCA TK27 w/TP66 16mm & Simplex 35mm & slide projector, complete, excel cond, \$2000; Buhl biplex w/JVC camera, 16mm & 8mm & Super 8mm projector, \$2000. T Judge, TAG Comm, 75 Weaver Rd, W Millford NJ 07480. 201-697-8454.

Want to Buy

LPTV equip, camera equip, recorders, etc. AACT Inc, 156 Lazelle Rd, Worthington OH 43085. 614-846-9234.

VIDEO PRODUCTION EQUIPMENT

Want to Sell

Laird 7000 char gen w/extra fonts, \$1500; JVC 1900 3 tube camera studio & ENG config, mint cond, low hrs, w/extras, \$2000. J Jones, RBY Recording, 920 N Main, Southbury CT 06488. 203-264-3666.

Sony VO-2860A (2), \$650 ea; Sony VO-4800 (2), \$1200 ea; Precision Echo video compression unit, \$2500; RCA TR-600 2" VTRs (2), \$2500 ea; Sony BVE-500-A editor, \$400; CVS-520 digital TBC, \$1000; Microtime Image Plus, signal processor, \$1500. D Genisch, WMTV, 615 Forward Dr, Madison WI 53711. 608-274-1515.

JVC RM 86U edit controller, new, \$900; For-A 440A TBC w/VEC-440, 8 mos old, \$6200; Prime Image Plus TBC, 8 mos old, \$2500. J Jones, RBY Recording, 920 N Main, Southbury CT 06488. 203-264-3666.

Conrac monitors (2), color 17" w/external sync & underscan 1 YCA 1 YCB, whole or parts; RCA tripod dolly & panhead for bdct studio, 250 lbs, \$550. R Falkenstein, Tri God Ministries, 3447 Arbor St, Phila PA 19134. 215-739-6599.

Knox K-128/K-32 char gen w/acc, gd cond, \$450. M Murphy, 11621 Valle Vista, Lakeside CA 92040. 619-561-2726.

3M DP100 proc amp, \$500; Ampex 1085 proc amp, \$250; Ampex VR1200 2" quad parts. J Krepol, RNDL, 6147 Walker St, Phila PA 19135. 215-624-1050.

Conrac CLD14 14" rack mount B/W monitors (5), gd cond, tube type, \$50 ea; DMI 20 sec slomo disk units (2), worked when last used, 2 more for parts, BO; GVG 731 color video insert keyer, BO; Conrac composite video to RGB decoder & scope driver (2), BO; CBS Labs 8000 composite video 2H enhancer, BO. H Larson, Matrix Mobile TV, POB 536, San Luis Obispo CA 93406. 805-544-5657.

Miac Items, inc Gates/Harris TE-201 color film camera; Athena 4000 film projector; Quanta character gen & RTI, Microtime, RCA, GVG, ESE, Sony, Orban equip, call for details. J Fuehrer, NTV Network, POB 220, Kearney NE 68848. 308-743-2494.

Mindset II character gen & animation system, 2 disk drives, graphics tablet, titler, lumina, PC paint, animator, Glyph software, \$3000. H Larson, Matrix Mobile TV, POB 536, San Luis Obispo CA 93406. 805-544-5657.

Dynasciences Image Enhancer 832, \$125; Ampex proc amp, \$125; studio lights (5) all for \$200; RCA TTs-1A delay EQ system, \$150. C Haynes, POB 31235, Jackson MS 39206. 801-948-1515.

Chyron IIB character gen, 1 keyboard, 1 disk drive, DSK unit, 10 fonts, various sizes, mounted in road cases, needs work, \$4000. H Larson, Matrix Mobile TV, POB 536, San Luis Obispo CA 93406. 805-544-5657.

Harris Video 6520 receiver, brand new, \$400 firm. B Feinberg, Total Tape Publ, 9417 Princess Palm, Tampa FL 33619. 800-874-7599.

Mindset 3000 character gen & animation system, 20 meg hard drive, all software, \$5000. H Larson, Matrix Mobile TV, POB 536, San Luis Obispo CA 93406. 805-544-5657.

Sony Betacam BVV1A w/component adapter & Porta-Brace case, \$3500/BO. M Glaser, MRG Productions, 516-489-1071.

Panasonic NV 8500 (2), w/SMPT time coding controller capability w/connectors; Panasonic NV-A500, gives SMPT time coding, 18 pin connectors; Panasonic C-110 (2) w/connectors, 8 pin; Panasonic WJ-530, will sell as whole package, \$4000. P Gorman, Gorman Video, 18 Brookdale Dr, San Rafael CA. 415-456-8362.

Microtime Digitrol, 4-VTR controller w/cables, \$675; Microtime Digitrol II, 8-VTR controller w/cables, \$975; Microtime 2121 Faroudja image processor, \$875; Microtime start/stop tone gens (4), \$75 ea. C May, Rural Route Video, 360 Browning, Ignacio CO 81137. 303-563-9533.

Switchcraft audio patch bays (2) w/ADC terminal block, \$75 ea; Trompeter JS1-40/J3W video patch bay, \$75; (4) rack mount VTR I/O patch panels, \$10 ea; lot cords, 50#, \$50. C May, Rural Route Video, 360 Browning, Ignacio CO 81137. 303-563-9593.

Rack mount 4 x 1 video/audio switchers (2), passive for monitors, \$25 ea; (2) 4 x 1 rack mount audio monitor/speaker, \$40 ea. C May, Rural Route Video, 360 Browning, Ignacio CO 81137. 303-563-9533.

JVC CR-6000U U-matic video recorder, \$200; JVC CP 5000U U-matic video player, \$150; Ikegami PM 171-T 17" B&W TVs (2), \$100; JVC KY 1900 TV camera, \$1500; Leitch SPG 120 N pulse gen, \$1000. R Ose, Am Comm Svc, 1 American Plaza Ste 310, Evanston IL 60201. 312-869-8001.

CVS 516 digital TBC, \$1500. A Denke, American Motion Pictures, 7023 15th Ave NW, Seattle WA 98117. 206-789-1011.

Systa-Matica RAIM-1000 TBC w/proc board & docs, trade/BO; Panasonic editing controller NV-A950 & NV-A820 interface adapters (2), works w/NV-9500A 3/4" or NV-8200 1/2" machines, trade/BO. M Dillay, Producers Studio, 86 E Broadway Ste 10, Eugene OR 97401. 503-683-1400.

Panasonic NV9200A 3/4" VCR, excel cond, \$495/BO. A Chaney, Video Eng, 1415 Oaknob Way, Sacramento CA 95833. 916-922-3456.

Datatek D4300 Series 6 x 2 switchers & remote keyboards (2), \$1650 ea; (2) Lenco proc amps w/5 cards, \$575 ea; (3) 10 x 1 bridging vertical interval switcher, (3M, 3M, IS), \$350 ea. C May, Rural Route Video, 360 Browning, Ignacio CO 81137. 303-563-9593.

Want to Buy

IVC 9000, 1 or 2 machines; standards conversion unit, must be in gd working cond. H Henson, Henson Prod, 3796 Bethania Station Rd, Winston Salem NC 27106. 919-924-8717.

GVG 906A video AGC module. J Fuehrer, NTV Network, POB 220, Kearney NE 68848. 308-743-2494.

DVS Phaser II frame sync & color osc module for RCA TG3. L Johnson, WGNX, POB 98087, Atlanta GA 30029. 404-375-4646.

VIDEO TAPE RECORDERS

Want to Sell

JVC editing system, CR-850, 6650, RM-86, excel cond, 250 hrs, manual, BO. R Hiett, WHSV, Rt 33 West, Harrisonburg VA 22801. 703-433-9191.

Hitachi HR-200 1" VTR, operational now, but needs repairs, w/TC-200 TBC in excel cond, \$3500 plus shpg. A Denke, American Motion Pictures, 206-789-1011.

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JVC CR6600U 3/4" VCR w/RM70U remote control, \$1295; Harris 690 frame sync TBC w/9 bit processing, corrects 1", 3/4" & 1/2", \$3295. D Brennan, Kustom Video, 3596 Lor-na Ridge Dr, Birmingham AL 35216. 205-823-0088.

TCR-100 2" video cart machine, gd cond, \$2500/BO. D Genisch, WMTV, 615 Forward Dr, Madison WI 53711. 608-274-1515.

Sony VP2000, \$200; VO2600, \$250; VO2610, \$275; VO2630, \$350; VO2900, \$375; VO2960, \$500; VO2960A, \$600. J Krepol, RNDL, 6147 Walker St, Phila PA 19135. 215-624-1050.

JVC CP5200, \$175. J Krepol, RNDL, 6147 Walker St, Phila PA 19135. 215-624-1050.

Panasonic NV 9400 portable 3/4" VCR, gd cond, \$995. W Camea, KIIRT, POB 8234, Jacksonville TX 75766. 214-586-2162.

JVC CR-4900U portable 3/4" U-matic VTR w/2 batt, charger/PS, case, excel cond, \$1850; Leader portable color monitor/waveform scope uses NP-1 batt, vgc, \$995. R Miller, Filmaker Inc, 606 W Broad, Bethlehem PA 18018. 215-691-0900.

Ampex VR1100 quad VTR w/highband head, proc amp, BO; Microtime 640 TBC, needs work, w/manual, BO. H Larson, Matrix Mobile TV, POB 536, San Luis Obispo CA 93406. 805-544-5657.

Panasonic NV9500, NV9200, NV950 3/4" edit system, gd cond, \$4000 set; (2) Panasonic NV9500, NV9200 3/4" VTR's heads OK, need belts, tune up, \$1000 ea. H Larson, Matrix Mobile TV, POB 536, San Luis Obispo

CA 93406. 805-544-5657.
Panasonic NV9200A 3/4" VCRs (three), excellent condition, \$495 or best offer. A Chaney, Video Engineering, 1415 Oak Knob Way, Sacramento CA 95833. 916-922-3456.

JVC CP-5000U 3/4" U-matic players, \$200; Panasonic NV-9400U portable 3/4" w/Portabrace, two battery chargers, service manual, good condition, \$2500. R Nimtz, University of Notre Dame, Box 1088, Notre Dame IN 46556. 219-239-6423.

RCA TR600A (2), full blown, excellent condition, never used in broadcast, \$8000 each or trade. H Henson, Henson Prod, 3796 Bethania Sta Rd, Winston-Salem NC 27106. 919-924-8717.

Want to Buy

Ampex/RCA VR 1000 & on, 2", 1", 1/2" etc, older especially. J Anthony, Video Parts Co, POB 25, Shenorock NY 10587. 212-713-5757.

High band RCA headwheels #5 MIL, need several; RCA TCR 100A's and parts, need several. H Henson, Henson Products, 3796 Bethania Station Road, Winston-Salem NC 27106. 919-924-8717.

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A SUCCESS STORY

THE OBJECTIVE was no small task: design a radio console that would become the new standard.

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THE RESULT: An unsurpassed console that exceeds prior broadcast standards. Its module/mainframe interface borrows from the computer industry, utilizing all-gold contact insulation displacement technology. The logic system is based on programming the module slot, allowing full module interchangeability. It also provides for separate programming of the module's "B" input selection, thus avoiding embarrassing false starts and mutes. Full console-to-machine control is supported without extensive use of interface boxes and cables. Three audio busses are provided to enhance talkshows and remote functions. There are separate processing loops for the speech and music paths, as well as individual channel insert points. A complete line of microphone and line inputs, remote selectors, and machine control modules is offered in virtually any combination, configuration or mainframe size you desire. The A-500a also features a full family of studio turret and turret components to ease facility design.

THE PERFORMANCE: Needless to say, it's a new age for audio, and the A-500a is a step ahead. While specifications don't say it all, ruler flat frequency response, .003% distortion, crisp square wave response and a noise spec that's unheard of deserve merit. Couple such performance, reliability and innovation together, and a new broadcast standard is set.

THE SUCCESS: WHEATSTONE broadcast consoles are installed in major markets all over the country, from frontline independents to national networks. They are in use right now at some of the world's largest institutions.

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