Radio World®

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Canada Launches DAB Tests

by James Careless

Ottawa CANADA Canadian broadcasters have made history with what they believe is the future of radio with the launch of digital audio broadcasting (DAB) tests, set to run throughout summer.

The research, which began 11 June, is viewed by many Canadians as much more than water-testing for a possible "third service," as some US broadcasters believe DAB will be.

The event was momentous, for the simple reason that the Eureka 147-DAB worked perfectly during mobile testing. Installed in a minibus, the European prototype convincingly proved that the service can deliver CD-quality stereo off-air in a multipath environment that leaves its companion FM receiver gasping for breath.

In fact, such was the interference in downtown Hull, across the river from Ottawa, that someone there to evaluate FM might conclude it was a hopeless medium.

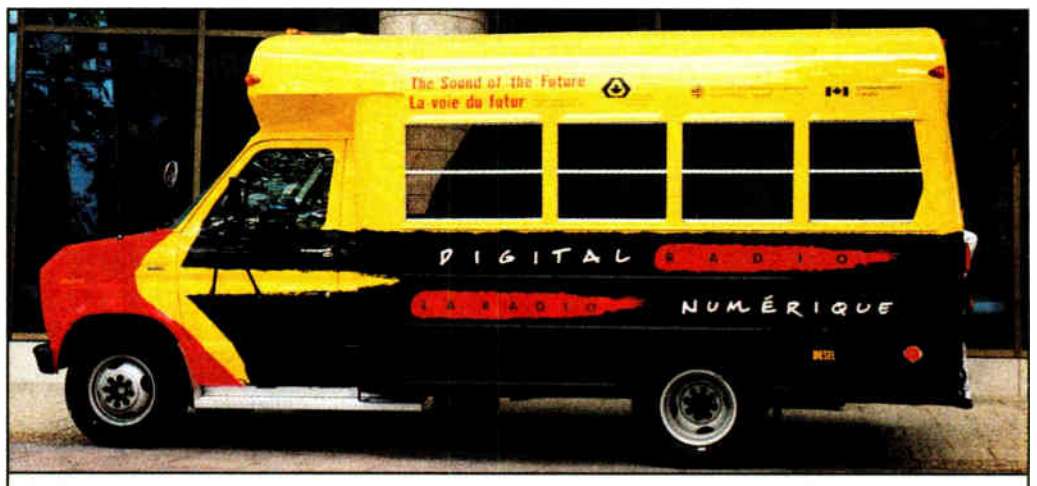
The launch was held at the new Museum of Civilization. Hosted jointly by the Canadian Association of Broadcasters (CAB), the Canadian Broadcasting Corp. (CBC) and the federal Department of Communications, it was a time for a few speeches, some champagne, and then, the moment for which all had been waiting.

The test involved the installation of the Eureka 147-DAB in a school minibus, along with a conventional FM receiver. During each tour, 12 people on board sat attentively, listening to the two sets of identical signals—a stereo music mix—switched manually by CHEZ-FM engineer Tom Young. A gray metal box installed inside over the bus' wide screen indicated which feed was heard. A red light indicated FM, and a green, DAB.

In an effort to heighten the comparison between the two sources, the minibus drove across metal bridges and through canyons of glass-and-steel buildings. In these conditions the FM signals buzzed, hissed and faded. In contrast, the DAB stayed constant, sounding so clean and pure that some people suspected that a CD player hidden on board was the real source of the signal.

The two DAB encoders and decoders used were lent to the Canadian government by Centre Commun d'etudes de telediffusion et telecommunications

(continued on page 14)



DAB testing takes to the streets in Canada, courtesy of a minibus equipped with the European technology.

Summer CES Focuses On DAT, RDS, NRSC

by John Gatski

Chicago IL Apparently satisfied that a new copy protection system will guard against litigation from pro-royalty tax groups, manufacturers introduced consumer DAT recorders at the Summer Consumer Electronics Show here in June.

Denon, JVC, Onkyo, Sony, and Technics were among the companies to announce consumer production DAT units equipped with the Serial Copy Management System (SCMS) copy limiting circuitry. The companies plan to market the SCMS DAT machines even though a law requiring the protective circuitry still is pending in Congress.

The Philips-developed SCMS allows direct-to-digital recording of CDs, other DAT tapes or digital broadcasts, but prohibits the copy from being copied digitally.

Price war looms

Sony launched the first major salvo of the consumer DAT war by announcing two consumer SCMS-equipped decks under $1000, which is up to $300 less than some of their competitor's decks.

Sony's DTC-75ES has a suggested re-

(continued on page 11)

AM Rules Not Ready

by Charles Taylor

Washington DC While the FCC's proposed rulemaking for massive AM reform has stirred a glut of discussion within the industry, the actual text containing the bulk of the Commission's recommendations has yet to hit the streets.

According to Bill Hassinger, assistant engineering chief for the FCC Mass Media Bureau, the 80-page document has endured a number of unavoidable administrative setbacks, but remains a department priority.

"With the draft will come a text of new AM rules. That's the part that's taking so long," Hassinger said. "It's 99% completed now."

He added, "It's quite a bit of work overall to say something precisely, unequivocally and unambiguously. We've got to make sure the pieces fit together."

Knowing some but not all

The proposal, presented to the public at a 12 April FCC meeting, contains numerous measures aimed at reducing interference, establishing the AM expanded band, AM stereo and simulcasting. A number of suggested changes were discussed at the meeting, however, more specific amendments, in large part, remain anybody's guess.

Other elements adding to the docu-

(continued on page 3)

NEWS BRIEFS

NAB Gears Up for Radio 1990

Boston MA Twenty-nine sessions and an engineering conference will highlight NAB's Radio 1990, slated 12 to 15 September in Boston.

Sessions will begin on a Wednesday—a change from their usual start-up on Thursday—and include "Localization vs. National Radio," "How to Use A Consultant" and "How to React to A Disaster."

ABC Radio personality and nationally known commentator Paul Harvey will be the keynote programming speaker. He also will speak at a session, "How to Relate to Your Audience."

To register, call NAB at 800-342-2460.

Broadcast Electronics Completes Sale

Quincy IL The sale of Broadcast Electronics (BE) to investment group Cirrus Technologies was completed at the end of May.

According to BE President and CEO Larry Cervon, the transaction will have no effect on management structure, on the company's product line or name, or on its location. BE's radio equipment is manufactured in a 70,000-square-foot plant in Quincy.

"I see an opportunity for some new financial resources of a much greater magnitude," Cervon told **Radio World** in March.

Cirrus, headed by Howard Crow, Jr., was formed to acquire and invest in the electronics manufacturing field, according to Cervon. Crow was a VP of Dynatech, though there is no connection between Cirrus and Dynatech.

For information, contact BE at 217-224-9600.

Japan Conducts AM Stereo Field Tests on C-QUAM, ISB

Tokyo JAPAN The Broadcast Technology Association (BTA) of Japan has finished initial AM stereo testing and has moved into indoor "field testing" that will run through the summer.

The BTA experiments will focus on Motorola C-QUAM and Kahn ISB, as part of the Japanese government's program to select a standard. Earlier tests involved a theoretical evaluation on five systems, also including those from Magnavox, Harris and Belar.

BTA Executive Managing Director Tamotsu Ohmura said testing will take place during daytime and nighttime with compatible receivers to make a good appraisal of both systems in actual use.

Barrett Awarded Full FCC Term

Washington DC FCC Commissioner Andrew Barrett was confirmed by the Senate for a full five-year term in mid-May.

Barrett joined the Commission last September, for what was slated a one-year term.

His new term will run through 30 June, 1995. Barrett said he could be sworn in as soon as the beginning of July.

Cablewave Systems Acquires Specific Bogner Assets

North Haven CN Cablewave Systems, a division of Radio Frequency Systems Inc., announces the acquisition of certain assets of Bogner Broadcast Equipment Co.

Bogner designs and manufactures low, medium and high power UHF/VHF TV antennas, MMDS and ITFS products.

Cablewave Systems President George Gigas said, "This acquisition is a perfect fit to Cablewave's expansion strategy, since it allows us to offer complete broadcast RF-subsystems, incorporating other products our company already engineers and manufactures."

Manufacturing will be relocated to the Connecticut facilities with key personnel from Bogner Antenna transferring to Cablewave Systems.

For information, contact Cablewave Systems at 203-239-3311.

INDEX

Denon To Make "Super" Radio

by Alan Carter

Washington DC Denon America and the NAB have reach an agreement for the electronic consumer manufacturer to make and sell the NAB "super" AM/FM radio.

The receiver is expected to be on store shelves by early 1991 and retail for $495.

Among the features the receiver will include are NRSC audio circuits, C-QUAM AM stereo, FMX stereo extension, expanded AM band reception and an intermix AM/FM preset memory.

The "super" radio has been in development by NAB since 1987 and turned into a long and tedious process with setbacks in design.

But NAB Science and Technology Senior VP Michael Rau wasn't thinking about the problems the association had in getting the receiver into production.

The Denon/NAB radio, marks the first time broadcasters have influenced the development of a radio, Rau said.

"It's never happened before," he said. "It's a start, but it's not the be-all to end-all."

Rau described it as the receiver for the audiophile who wants "to feed their hi-fi systems with the best quality audio signal from AM and FM broadcasts."

The idea for the super radio grew out of AM committee work within the National Radio Systems Committee (NRSC), when broadcasters took the position that receiver manufacturers needed to build radios to complement changes broadcasters were making in transmission standards.

In a prepared statement, NAB President & CEO Eddie Fritts suggested the receiver would "unlock" the new sound of AM and FM for consumers in the 1990s. "It will show consumers that the state of the art, particularly on AM, is much better than they hear on virtually all existing receivers."

Certification Mark Hits a Roadblock

by Alan Carter

Washington DC Some days, NAB executives probably wonder who puts a curse on their good intentions.

The latest setback is with the NAB/Electronic Industries Association "IQ" certification mark for improved AM radios. It can't be used.

Bell Atlantic owns the "IQ" designation for the company's telephone credit cards and was not too pleased that the NAB and EIA wanted to label improved radios with the identification.

The NAB has submitted two alternatives to the EIA for consideration, according to NAB Science and Technology VP Michael Rau. He declined to identify them because they have not been researched.

The problem with "IQ" was discussed at recent AM committee meetings. Rau said that while NAB was not sure of the legal grounds on which Bell Atlantic holds the "IQ" designation, the association decided it would be more productive to find an alternative than fight the telephone company, possibly in court.

When "IQ" was selected, alternatives at that time included Excel, HDR and SupeRadio.

The certification mark is intended to be used to identify high-fidelity improved AM radios incorporating the NRSC standard.

AM Reform Text Pending

(continued from page 1)

ment's delay, Hassinger said, include the great number of cross references to other proceedings contained in the text. "We've got to go through and make sure they all track," he said.

Also, because of cutbacks in Commission staffing, other projects have at times taken precedence.

"It comes down to the people doing this also having other responsibilities. This is a very high priority but occasionally, something else comes along and slows it down," Hassinger said. "It's not like the good old days when we had more people and could dedicate people to a specific project. Now, everyone has a series of responsibilities."

Computers were down

Hassinger also noted that computer failure prolonged the process by at least 10 days. At one point, the staff had to substitute one computer for another because of consistent lags.

To be safe, however, he declined to predict when the text might be released.

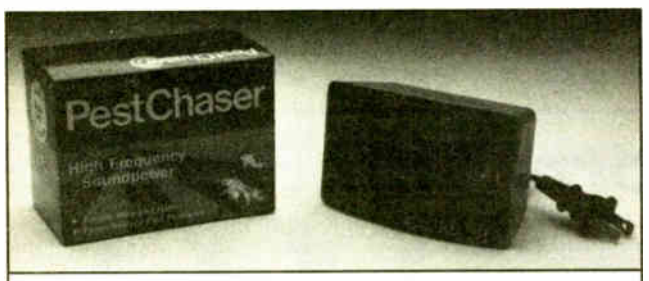
"This is definitely a difficult task. We're aware of the concern and would like nothing more ourselves than to get it out," Hassinger said.

By Land Or Sky: It's Out There

by Judith Gross

Falls Church VA Try as you might, it's kind of hard to get away from the topic of digital radio—**DAB**—which seems to be cropping up everywhere.

Even in the long crawl of hot summer days, there's no escaping it. To recap, there have been **three filings** on it at the **FCC** to date—two of them making use of satellites, one using existing TV channels.



Station bugged? Blast 'em with sound.

DAB was heavily discussed at the **NAB's board meeting** in mid-June. As expected, the board **nixed** any idea of a satellite system in favor of "localism."

The board also appointed a **task force** to study DAB, exploring **terrestrial methods**, which may be do-able with UHF channels.

But remember that the European system, **Eureka**, is a **combo** satellite and terrestrial. Plus the **Canadians**, who have just about come out and said they *want* to obsolete AM and FM, are in the midst of the vast hoopla of a **four-city demo/test**.

'Course, as the NAB's **Eddie Fritts** pointed out, there are a lot fewer stations in Canada.

Now comes word that the **US Commerce Department** has also been holding meetings on DAB—on the Q.T.—so our country won't get **left behind in the dust** on this one.

It's on the agenda for the **World Administrative Radio Conference** (WARC) set for 1992 but originally that conference was only going to address **satellite systems** until the slate was changed to include **terrestrial**.

So the question is: **competitve threat or opportunity**? Guess it depends on how NAB and others set the policy over the next few months and years. One thing for sure, it's all happening **a lot faster** than anyone imagined.

The NAB board also had something to say about **AM stereo**, believe it or not. They looked at the bill currently before Congress which would require **receiver manufacturers** to include AM stereo, and figured fair is fair.

The board said that if the bill goes through, broadcasters will petition the FCC to make stereo **a mandatory requirement** for AM stations. Now, I hear there'll be a **hardship provision** for AMers who are especially strapped by the cost of going stereo, but, hey, if we're going to make them give us the **radios** . . .

☆☆☆

Meanwhile the world of radio is just brimming with **new technology** these days. You say you can't rid your station of those **pesky varmints**?

Well, **Sonic Technology Products Inc.**, based out of Grass Valley (yes, you guessed it) CA, showed up at the **CES show** with the new Super Pest Chaser™ an **ultrasonic repeller** it says has been a hit with stations, especially those with transmitter sites out in the boonies.

There are several models, all of which use **ultrasound** to keep those critters away from the equipment and the company says it meets **FCC standards** and all. Not exactly something you think of when they start talking about **new tech** at SBE chapter meetings. But hey, does it work on bill collectors?

Meanwhile, closer to home, the **NRSC** is going to get in on the **RDS** (Radio Data System) ground floor by helping write the standard for programming codes for the US.

RDS, you remember, will let a **station's format** and other ID info be displayed on RDS receivers. OK, so say you're on a trip out west, in unfamiliar territory, and that big blue **expanse of sky** and those **longhorns** by the side of the road get you to thinking you'd like a bit of, oh, maybe **Conway Twitty** or **Merle Haggard**.

No problem. You punch up the code for a country format, or scan for one or whatever, and *voila*: Conway crooning at you as easy as you please.

RDS is already being used in **Europe** (hmmm, I thought we were supposed to be the broadcast leaders, what gives?) and it uses the **57 kHz subcarrier**.

Now my old pal **Gerry Lebow**, whose **Sage Alerting Systems** brought the RDS demo to the NAB show in Atlanta, says the emergency alerting and even **EBS potential** of the technology is too important to ignore, especially with the flaws in the current EBS system.

Gerry's preparing a petition to the FCC to look into the possibility of using RDS for an **automated EBS system** plus other emergency uses. One envisioned benefit, Gerry says, is the elimination of the need for an **on-air** EBS test. Should cut down the tune-out factor.

And another new technology whose time is definitely overdue, **DAT**, has apparently hit more snags in Congressional hearings on the latest **anti-copying system**. Yes, the recording groups are still crying "foul." Stay tuned, we'll keep you posted.

☆☆☆

The Emerson Radio folks had their annual **Hall of Fame** awards ceremony in the big Apple again, in June. For the third year running a full slate of **radio greats** in every category were honored.

Dick Clark, Paul Harvey, Charles Osgood and Bob Hope were among those who walked off with the nifty old-time radio miniatures.

Emerson Hall of Fame: Clark, Osgood, et al

And the Father of FM, the late **Major Edwin Armstrong**, was awarded the distinction in the technological category. What would he say if he could see the way his **infant technology** has grown? Better still, just imagine how he'd be reacting to the current fuss over DAB.

Come to think of it, he'd probably be **leading the parade**.

Heard a juicy tidbit? Spill your guts to **Earwaves** *by faxing JG at 703-998-2966, writing to PO Box 1214, Falls Church VA 22041, or calling 703-998-7600. Who knows, you could win a coveted* **RW** *mug.*

READERS FORUM

Orban replies

Dear RW:

I would like to comment on your coverage (in your 13 June issue) of my proposed NRSC protection ratio and occupied bandwidth tests, as well as Eric Small's article on occupied FM bandwidth measurements in the same issue.

Small and Bill Loveless were concerned that my proposed procedure differs from CCIR Recommendation 641. The RW story failed to point out this recommendation states that: "the results obtained with this method and this deviation (±32 kHz) are *only valid for sound broadcasting programmers without compression*" (emphasis added). Indeed, a careful reading of the standard shows that it only applies to systems using 50μsec (European standard) pre-emphasis.

Because of the increasing use of audio processing internationally, the CCIR is extremely interested in the effects of audio processing upon FM interference, and this is very much an open issue within the group. The CCIR study programme 46N-2/10 (15 December 1989) specifies that, among other factors, the effects of "increasing the average deviation without exceeding the maximum deviation" (i.e., audio processing) shall be studied. I hope that the proposed NRSC research will contribute to knowledge in this area.

The RF protection ratio test, despite its dependency upon the receiver used (as well as many other factors), *directly measures* the amount of interference induced into a given receiver by a given undesired signal. Conceptually, you create two radio stations on first-adjacent frequencies, one with modulation and one without. You tune a radio to the station without modulation and listen to the interference caused by the first-adjacent station with modulation. You then adjust the ratio between the two carrier powers such that the received interference is a certain number of dB (typically 50 dB) below the 100% modulation level of the currently un-modulated carrier. This procedure exactly models how interference is received in the real world. Small and Loveless believe that an occupied bandwidth measurement is more "precise" than a protection ratio test, and is adequate to determine how much interference a given signal is likely to cause. It is certainly more "precise" in the sense that you can make measurements that give you numbers that are repeatable to several decimal places. However, I believe that it is yet unknown if these precise numbers correlate well to the loudness of the received interference *as perceived by the ear*.

The occupied bandwidth measurement is a long-term average power measurement. Research into perceived loudness measurements by Zwicker (Switzerland), Stevens (Harvard University), and Jones and Torick (CBS Technology Center) have all revealed that a long-term average power measurement is worthless as a predictor of perceived loudness. It ignores crucial factors in loudness measurement: the sensitivity of the ear as a function of frequency of sound and its duration, and it disregards the more subtle aspects of loudness measurement as well. Occupied bandwidth, although measurable with great accuracy, may turn out to have poor correlation to perceived interference because it ignores psychoacoustic factors. We do not know; I hope the proposed tests will shed some light on this. In any event, it is a classic engineering error to use a measurement (such as occupied bandwidth) to predict a psychoacoustic effect (the loudness of the received interference) simply because the measurement is convenient to make with high accuracy, resolution, and repeatability. First, the measurement must be qualified as correlating well to the subjective effect being predicted, and this is one thing that my proposed tests will help to do. For example, the time is long past when anyone was naive enough to believe that an amplifier with 0.003% harmonic distortion must sound better than an amplifier with 0.005% THD, despite the ease and accuracy with which harmonic distortion measurements can be made!

With regard to the concern that the proposed NRSC research will provide ammunition for those who might want to shoehorn more stations into the FM band, I can only state that my proposed test does not propose any absolute criteria for whether a given protection ratio provides "acceptable" reception. Instead, the experiment is *comparative*: how much does the amount of interference change as audio processing techniques and techniques of measuring the peak modulation are varied? The goal is discovering if there appear to be problems that should be researched in more detail in the future. It would thus be difficult for anyone to abuse the results according to Small and Loveless' concerns.

On another issue entirely, I would prefer to explain overshoot and ringing in a square wave a bit differently than John Shepler did in the same issue. John says that circuits "add ringing to the pure square wave." But ringing is really a *subtractive*, not an additive mechanism.

A square wave consists of an infinite number of odd-order harmonics. It turns out that amplitudes and phases are all precisely correct to *reduce* the peak level of the wave by the maximum amount possible. If you remove some of these harmonics by filtering, the harmonics that are left can't reduce the peak amplitude of the wave as effectively. Lo and behold, you get "ringing."

If the filter also delays the remaining harmonics by different amounts of time, it will cause further mischief. Because this non-constant delay messes up the phase relationship between the harmonics, they can't correctly subtract from the peak amplitude of the wave anymore. In fact, if the time error is within a certain window, the time-shifted harmonics can even *add* to the peak amplitude instead of subtracting from it. This "time dispersion" can make the overshoot about twice as large as it would be if the filter only removed harmonics but left their time relationships intact.

John says that "the change in the ideal waveform shape means new frequency components have been added to the signal." This is only true if the filter or other component causing the ringing contains a non-linear element, like a diode. Otherwise, ringing introduces no new frequency components—ringing is caused by removing components that are *already there*.

Every square wave has ringing "hidden " within it, masked by the higher harmonics that cancel the ringing. Remove these harmonics and ringing is revealed. Mess up the time relationships between the remaining harmonics and the ringing gets worse.

Robert Orban, CE
Orban, a division of AKG Acoustics Inc.
San Francisco CA

Don't Get Left Out

A rash of FCC petitions and recent testing by other countries should be sending a clear message to American broadcasters that the race toward digital audio broadcasting (DAB) has begun.

Since it is moving along faster than anticipated it isn't a race this country's stations can afford to sit on the sidelines and watch.

As AM stations are painfully aware and FM stations are starting to realize, consumers' taste for quality audio plays a key role in radio's future.

New generations of listeners who are becoming used to digital quality sound will not be as eager to settle for less than a CD-quality signal from stations which purport to serve them.

In addition, the fact that DAB has gained a foothold in Europe and is now being tested in Canada should convince US stations—especially as we move toward the WARC '92 gathering—that this new technology holds too much potential to be suppressed.

It's time for American broadcasters to get in on the ground floor of discussions so if there is a transition to digital broadcasting it can be implemented in a way that will benefit all.

It's important that representatives of US radio take an active role in tests and demonstrations going on just beyond our borders and work with Canadian and European broadcasters to learn as much as possible.

Having NAB take the initiative by allocating resources for research and organizing industry concerns—including those which relate to satellite vs. terrestrial delivery—is a step in the right direction.

The discussion that ensues must be an open forum, with all industry factions participating, and should allow US broadcasters to live up to the leadership role afforded our country by broadcasters the world over.

We can't afford to be left behind by new technology.

—RW

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Next Issue
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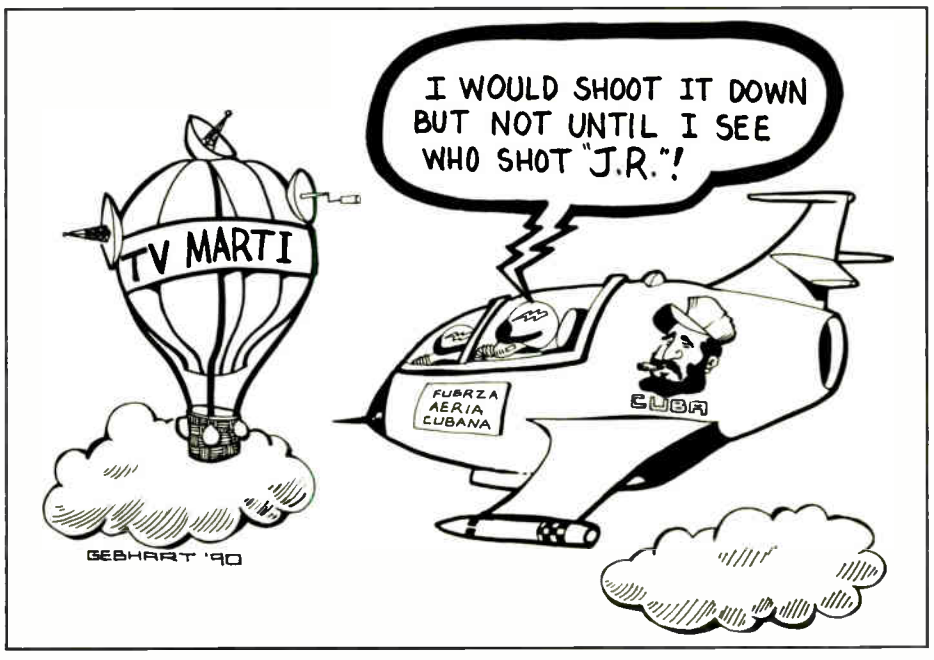
July 25, 1990



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Circle 30 On Reader Service Card

MAB Coordinates PCB Pickup

by Charles Taylor

Lansing MI The Michigan Association of Broadcasters (MAB) has coordinated a pickup campaign which may result in cost savings for stations desiring to rid themselves of hazardous PCBs, found in many older broadcast transformers and capacitors.

PCBs, or polychlorinated biphenyls, generally have been outlawed in equipment manufactured after 1979, but remain prominent in electrical components made during the 40 years previous.

While non-leaking PCB-filled equipment can still be used if stations label the equipment and follow other guidelines set by the Environmental Protection Agency (EPA), the dangers of leakage from fumes if equipment catches fire have prompted an industry-wide crusade to dispose of PCBs.

Steep fines, embarrassment or jail

Stations found in non-compliance of EPA rules can face fines as high as $25,000 a day, in addition to mandatory cleanup costs, which can run into six figures. Other options include jail sentences and public apologies in full-page newspaper ads.

"As soon as they can, stations should go through the procedures so they won't have to worry about the hazard anymore," said Ralph Justus with NAB's Science and Technology department.

Stations found in non-compliance of EPA rules can face fines as high as $25,000 a day. . .

The MAB, in an effort to encourage responsible elimination of the chemicals, contacted companies that dispose of PCBs, plotted a statewide map and arranged for pickup for interested stations.

The program has drawn the interest of between 75 and 80 broadcasters, according to MAB Program Coordinator Mary Siders. As a result, she said, stations may save up to 40% of traditional costs, which usually range between $1500 and $5000.

Interest mounted

"Through our newsletter and a mid-winter conference in February, we alerted our members to the problem. We also had a guest speaker from General Electric who spoke to members about the dangers and the possibilities of what could happen," Siders said.

"Some of our members were discussing horror stories from the past, while some engineers weren't even aware of the dangers," she said. "With such interest and with the issue posing such a threat, we decided to take action and see how we could help."

"We're hoping to make it convenient for everyone to get rid of the PCBs," Siders said.

For information on MAB's PCB program, contact Siders at 517-484-7444.

Root Pleads Guilty To Five Felony Counts

by Charles Taylor

Washington DC Washington attorney Thomas Root has pleaded guilty to five federal felony counts regarding radio applicants he represented with the Columbus, GA-based Sonrise Management Services before the FCC.

Root is charged with forging and counterfeiting federal documents and of defrauding five clients seeking licenses.

The 5 June judgment came one day after a ruling by a North Carolina grand jury that indicted Root with a 455-count securities felony charge.

For the federal violations, Root faces a maximum of 35 years in prison and a $1.25 million fine. In addition, he faces a multitude of other charges which could extend those sentences.

FCC awaiting its turn

Root is also up for violations with the FCC. On 31 May, he was denied a request for reconsideration of a 25 May Commission order that he be temporarily suspended from practicing law before the Commission.

He was suspended pending a Commission order that he show cause why he should not be permanently disbarred from practicing law before the FCC.

Root's suspension was consistent with common practice as reflected in the District of Columbia Bar rules and is not inconsistent with any Commission rules, the FCC said in defense of its stance.

Commission rules state a person may represent others before the FCC so long as he is not under an order disbarring him from the practice of law. The FCC pointed out that "it is an undisputed fact" that Root is under a disbarment order from the United States Court of Appeals for the District of Columbia Circuit, ordered 12 April.

Irreparable harm to clients

Root had argued that the temporary suspension would cause irreparable harm to his clients and deprive him of his right to earn a living, however, the Commission said that any clients affected could seek relief through a request for an extension of time.

"The Commission's suspension of Root was not intended to prohibit him from requesting reasonable continuances of pending cases on behalf of clients who are seeking other counsel," the FCC noted. "(And) although there may be some loss of income if Root's clients seek other counsel, they could also seek a postponement of pending proceedings."

For information, contact the FCC at 202-632-5050.

NAB Shuffles Show Dates

by Alan Carter

Washington DC If you *have* to fly into Las Vegas on Saturday for the 1991 NAB convention: fine. But otherwise avoid it.

The NAB has shifted the days of next year's show to Monday through Thursday from Saturday through Tuesday to avoid a run-in with hotels there that do not want to turn over rooms during a weekend to convention travel, keeping them for the more lucrative gambling trade.

But the change, with the show scheduled 15-18 April, still leaves the engineering conference beginning on Sunday, 14 April and the need for some weekend rooms.

NAB Exhibits and Associate Membership VP Rick Dobson said some rooms will be available for people who need to arrive on Saturday, but otherwise he suggested that arrivals should be scheduled for Sunday or Friday.

"I think those who truly need a room will get it," he said. "I don't want to encourage people for Saturday arrivals."

But Dobson maintained that housing should not be the problem it was in past years in Las Vegas because the bulk of those coming to the show will not request weekend housing. And he noted that Vegas hotels are much more cooperative this year because they like having guaranteed guests on Sunday through Wednesday, the nights used least by traditional travelers to the gambling mecca.

Midwest's Pete Rightmire, the new chairman of the Exhibitors Advisory Committee which met recently to reassess this year's Atlanta show and plan for '91, also noted a concern about Saturday arrivals.

"Vegas is just a city that refuses Saturday arrivals," he said. But Rightmire also did not expect it would be a problem for people who need Saturday arrival slots to obtain them.

Some concern has been expressed about the potential loss of airline discounts without a Saturday night stayover, but Rightmire and Dobson said that will not be the case. Airfares are cheaper into Vegas during midweek rather than on the weekend.

When the convention opens in Vegas, there will be some changes since the show was there in 1989.

First, with construction still ongoing at the convention center, guest registration and 100,000 square feet of exhibits will be in the West Hall, a section NAB has not used before. No exhibits will be in the Hilton Center.

Also, rather than the main entrance being near the Rotunda, it will be at the North Hall, with a similar set-up at the West Hall.

As for the radio exhibits, they have been expanded from the North Hall into one half of the South Hall.

NAB apparently plans to keep the show in Las Vegas through 1993 and is keeping a close eye on developments in Atlanta before making a decision on possibly returning there in 1994.

Dobson noted a lot depends on whether the city approves additional construction at the World Congress Center that would increase potential square footage to almost 1 million.

While reports on the Atlanta show were generally favorable, Rightmire said the biggest complaint was confusion over where exhibits were located.

"The Georgia World Congress Center is a beautiful place," Dobson added, "but it can be confusing."

Radio at NAB Alive and Well

by Alan Carter

Washington DC Radio at NAB—the convention, that is—is alive, well and growing.

That perspective is from NAB Executive Operations VP John Abel, who recently added overseeing the conventions and meetings department to his growing list of responsibilities.

The radio-audio exhibit at NAB 1990 in Atlanta was twice the exhibit area at the fall 1989 fall radio show in New Orleans, Abel said. The same space at the 1991 NAB show in Las Vegas will be 25% larger than Atlanta, he added.

When comparing the radio-audio exhibits at the annual spring convention to the exclusively radio fall show, Abel said each has its own special offerings.

"I think the NAB convention has, as far as radio is concerned, a couple of niches that are not going to be addressed immediately by the radio convention," he said. "One is small-market broadcasters who want to come to the NAB convention, and the other one is the radio equipment buyer, or the radio-audio equipment buyer. The radio engineer, I think, still wants to come to the NAB convention because there is an integration of audio and video, and the NAB convention is going to have the equipment.

"To be honest with you, the people that we had seen move from the NAB convention as exhibitors to the radio convention have not been equipment manufacturers. They are service providers, research companies and to some extent people who produce television commercials for the radio industry.

"It's not that there isn't any equipment at the radio convention, but we have not been as successful in getting radio equipment (exhibitors)."

Abel maintained that NAB is trying to encourage equipment exhibitors at the radio show by improving the engineering conference, under the direction of Science and Technology Senior VP Michael Rau.

However, Abel was not too optimistic that NAB could turn the fall convention into a rounded-out radio show: "It would be great if we could get it there, but I don't think we are going to be successful because we don't have all factions at the radio convention. We've got managers."

That is not to say, he continued, that the radio show will not grow. Abel also does not think radio will be overshadowed by broadcast and video at the spring convention. "Not at all," he said. "If that were true, why would the exhibitors want to expand the radio-audio exhibits? That's the biggest pressure we get. We have more people on the waiting list to exhibit in the radio-audio area."

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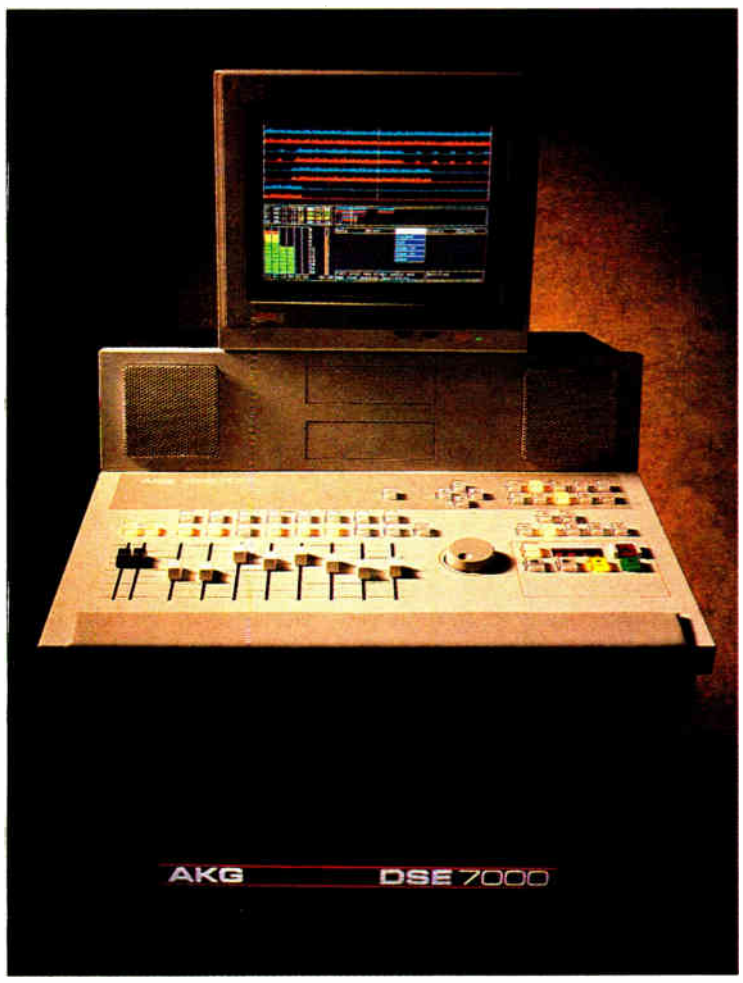

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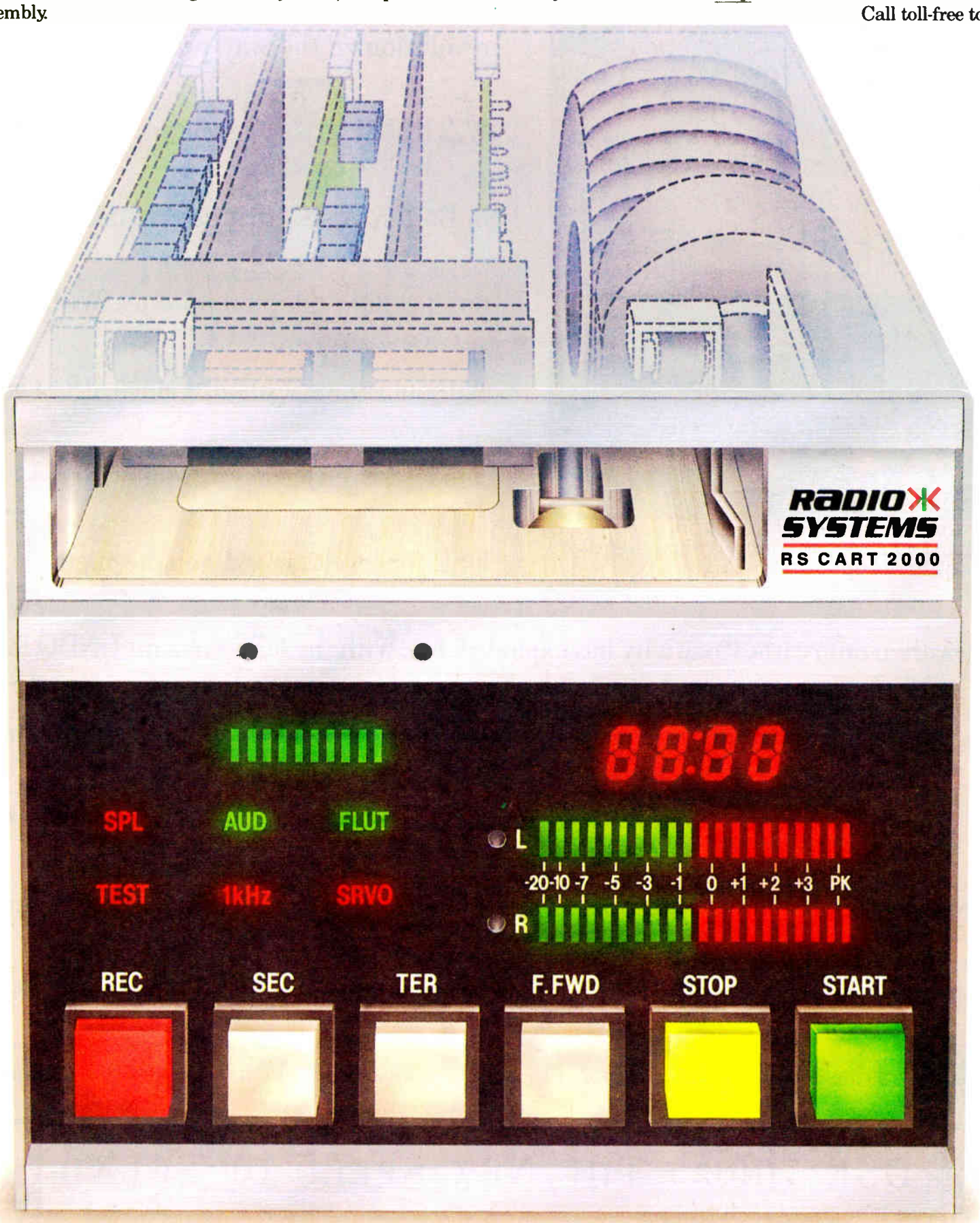

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Circle 36 On Reader Service Card

DAT, RDS in CES Spotlight

(continued from page 1)

tail price of $950 and the DTC-700ES was listed at $900. Street-selling prices could be as much as $100 less, market watchers predicted. Both units were to be shipped to retailers by 1 July, according to Sony.

Although not as cheap as the first CD players introduced in 1982, manufacturers are confident that DAT and associated software will finally come out of its slump and prices will fall as demand increases.

A successful consumer market also is likely to lower prices for professional equipment and software as well, according to professional marketing firms.

As manufacturers appear to be moving ahead with plans to produce SCMS-equipped DAT recorders, the controversy that slowed DAT growth still lingers.

Many recording artist groups remain opposed to DAT even with the proposed SCMS. The pending federal law requiring DAT recorders to have SCMS is under fire because it does not address artist royalties, the groups claim.

Despite DAT being the topic of the day at Summer CES, several companies including Onkyo and Harman Kardon also showed new analog cassette recorders with Dolby S, which is said to improve fidelity and lower noise to near CD and DAT quality.

PARSEC's AM/FM antenna is said to reduce multipath distortion.

NRSC standard AM

In other CES audio news, Philips displayed its new high-end receivers equipped with NRSC-standard AM tuner sections.

The FR-50, FR-60 and FR-70 are "built to the new NRSC standards" including a higher frequency response and the expanded band that extends the frequency range from 1605 to 1705 kHz.

Philips, however, does not list the AM tuner frequency response range. The NRSC voluntary frequency response standard is 50 Hz to 7.5 kHz.

NAB Staff Engineer Stan Salek said he measured an FR-60 sample and found that it slightly exceeded the NRSC standard with a frequency response of nearly 8 kHz.

The FR-70 also has a FM narrow/wide bandwidth switch to cut down on strong adjacent channel interference (overmodulation, perhaps) in urban areas.

Salek said he witnessed a demonstration of Denon's TU-660, also an NRSC-specification tuner, which features a wide/narrow band switch.

Salek said observers were amazed by the difference between the 4.5 kHz narrow mode and the 8.5 kHz wide mode of the tuner.

(continued on page 13)

DAT and RDS dominated discussions on the CES trade show floor in Chicago.

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Circle 89 On Reader Service Card

Hot Topics at CES '90

(continued from page 11)

On another front, the Radio Data System (RDS), a broadcaster-dependent digital display technology that is popular in Europe, was demonstrated courtesy of Sansui and Chicago's Z-95 (WYTZ-94.7).

Sansui showcased RDS through its RDS-9200 auto receiver/tape player on the show floor.

RDS is likely to catch on in the US during the next few years because of its capability to automatically select stations of a desired format and transmit digital messages to home or audio display.

RDS supporters said the technology is likely to catch on in the US during the next few years because of its capability to automatically select stations of a desired format and transmit digital messages to home or auto display.

RDS is transmitted via an FM station's 57 kHz subcarrier. The technology was demonstrated at both the 1989 and 1990 NAB spring shows and at the 1990 Winter CES in Las Vegas.

There were other repeat product displays shown at the Winter CES show, too, including mobile single play CD players for less than $400 and cheaper car CD changers.

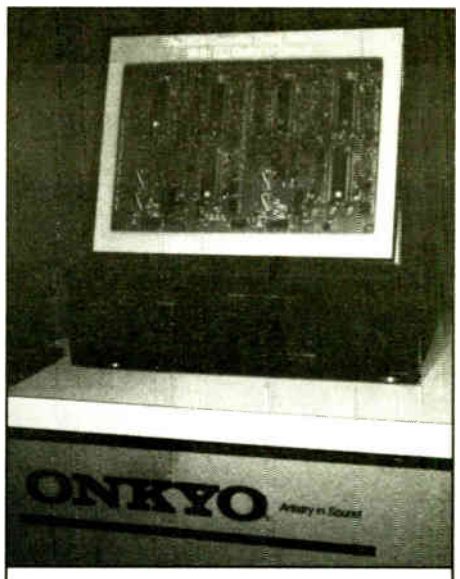
Sangean, which introduced a personal portable radio with both AM stereo (C-QUAM) and FM stereo last year, again promoted the radio among its products.

A Sangean spokesman said the company has sold more than 1000 of the radios, many to AM stations who use the radio for promoting their stereo service.

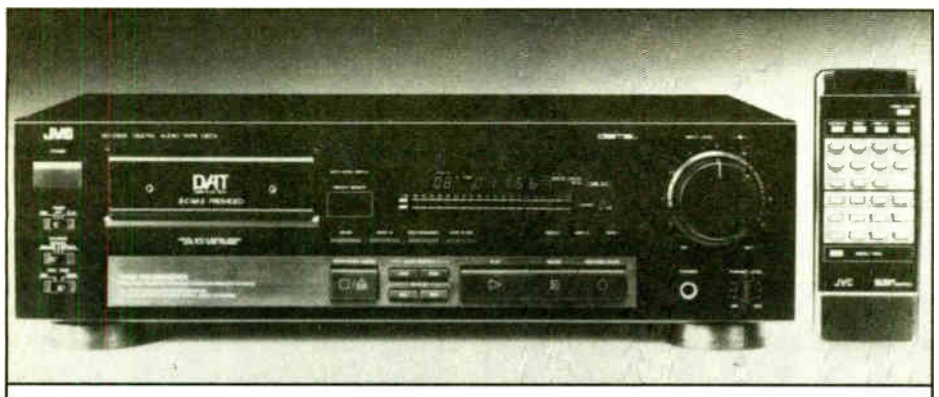
PARSEC of Delaware Ltd. introduced its WaveCatcher and Model 2000 indoor antennas that work for both AM and FM. The patented circuitry of the antennas is said to improve reception and reduce multipath distortion, according to the company.

The WaveCatcher is a passive antenna system that improves FM gain up to +3 db. The FM section can be omnidirectional or unidirectional. AM reception is unidirectional.

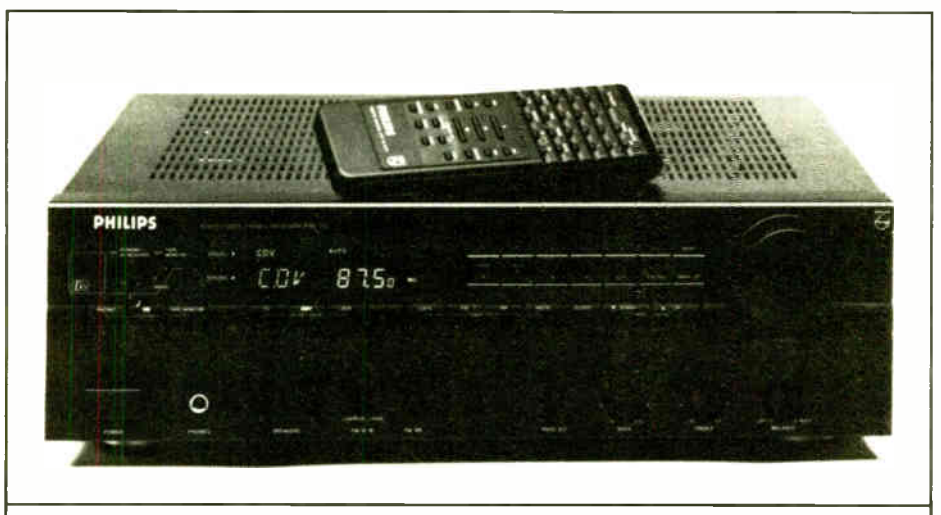
The more advanced Model 2000 is an "energized" antenna that provides −20 dB to +40 dB of gain on FM and +15 db of gain on AM. The Model 2000 also receives omnidirectional or unidirectional. Both antennas are matched for the new expanded AM band, according to the company.



Onkyo's TA-2800 cassette deck is retrofitted with Dolby S circuitry.



The XD-Z505 DAT deck, from JVC



Philips' FR70 AM receiver provides improved high frequency response.

Canada Begins Testing of DAB

(continued from page 1)

(France) and the Institut fur Rundfunktechnik (West Germany); the two principal developers of Eureka.

The transmitter, a new 1 kW Thomson-LGT UHF unit, was loaned by Rogers Broadcasting of Toronto. It was modified for DAB, using UHF channels 68 and 69. A Kathrein vertically-polarized UHF panel antenna came from Tennaplex systems, with Leblanc & Royle Telecomm installing both it and transmission lines. These also were provided *gratis*.

Inside the minibus, Michael McCabe, president of the CAB (center), discusses the technology with Liberal MP Shelia Finestone (by window).

The programming, produced by CBC, was broadcast by Ottawa commercial station CHEZ-FM over its emergency tower. Installed on the Ottawa Board of Education building, this tower was once used for locally produced educational broadcasts.

The Canadian test team plans similar experiments for Toronto 5-15 July, Montreal, 23 July-3 August, and Vancouver, 10-18 August—mobile and fixed-location demonstrations.

Grabbing hold of technology

In Toronto, a transmitter will be set up in the CN Tower. It's so tall, that both terrestrial and satellite applications can be simulated.

CAB President Michael McCabe said he believes DAB can overun conventional AM and FM, even if it is adopted as a third service, as some in the US propose.

"That's why we, the private broadcasters of Canada, have moved to grab hold of this technology at the very beginning," McCabe said, "and made sure that we have a hand in shaping it, so that it does not just become a national service that blows away our local stations across the country."

Phasing out AM, FM

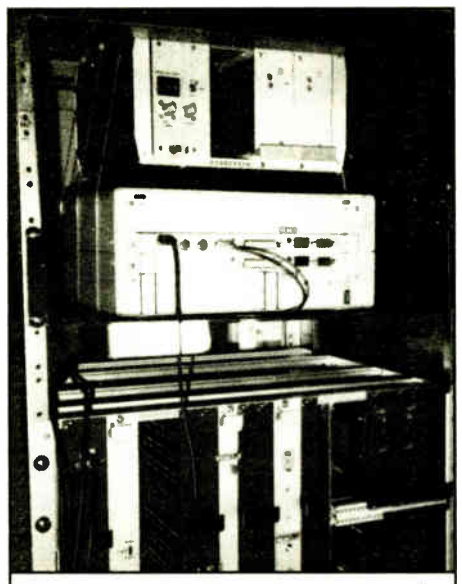
As for the fate of AM and FM when DAB arrives in Canada? If smart AM owners make the shift to digital (simulcasting for a while, until consumer receivers have taken a large market share), their stations will finally have "the level playing field that they need to compete."

Canadians believe digital will replace AM and FM as the single radio broadcast medium to make all broadcasting equal.

Given this, why aren't the Americans clamoring to get on board?

The DAB test vehicle, on the road for the first time in Hull, across the river from Ottawa.

Some might say, with some justification, that Canadian private radio is not quite the same animal as it is in the states. The Canadian Radio-Television Commission protects AM, for instance,



The Eureka 147-DAB receiver unit. At top is the decoder; at bottom are radio receiver boards.

by denying FM competitors the right to go top 40, so the market is healthier here.

Walter Unger, CBC's director of network radio resources for Toronto and the man in charge of the July demo there, admitted that "mom and pop stations should be worried" about the cost of switching to digital. "Real professional broadcasters will rally round this," he added, "and I think it will be a monumental success in North America."

Canadian broadcasters are looking for their American counterparts to rally around DAB before the World Administrative Radio Conference (WARC) planned for Spain 1992, specifically to lobby for a digital radio band between 100 MHz and 1.5 GHz.

"We have had some difficulty convincing the Americans that they should pay attention." McCabe said. "Private broadcasters have been so wrapped up in HDTV at the national level that they have not really tuned to radio ... We're going to have a missionary job to do with the Americans to convince them, because we need their negotiating power along with us at the World Conference where the space on the spectrum is allocated."

There are some signs that are buoying McCabe's hopes. He reported that some "senior radio executives," after seeing Eureka demonstrated at the 1990 NAB in Atlanta, have said they will turn up at later Canadian tests scheduled for Vancouver and Toronto. (The NAB planned to send a staff engineer to Ottawa later in the demo and others to testing this summer.)

But it was frustrating to him, and indeed other Canadians in radio, that a country which built itself on risk is seemingly so lukewarm towards a "relatively sure thing" such as digital radio.

Walter Unger, of CBC

It is with some pride that Walter Unger explained Canada hosting the launch by saying, "We got it first, because we got our act together ahead of the Americans."

Tapeless Systems Master CDs

by Frank Beacham

Los Angeles CA The era of the tapeless radio station has inched a notch closer with the recent announcement of two new systems that allow the simple in-house mastering of single, one-at-a-time compact discs.

Gotham Audio's SPOT 90 is a CD mastering system utilizing the Audio+ Design PRODAT 1B DAT recorder.

Two American companies, Sonic Solutions of San Francisco and Gotham Audio of New York, have teamed with separate Japanese technology giants to offer systems that both contend is ideally suited for radio broadcasting.

Both systems allow the mastering of single compact discs that meet the worldwide "Red Book" Sony/Philips standard and therefore can play on virtually any conventional CD player.

Recordable CDs

Sonic Solutions has teamed with START Lab Inc. of Tokyo to offer CD-maker capability with its established Sonic System audio workstation. Digitally edited and mixed programming on the workstation can be transferred directly from the system's hard disk to the CD recorder, thus bypassing the use of magnetic recording tape in the production chain.

The Macintosh-driven Sonic System with CD-maker is available in a basic version for less than $50,000. It utilizes the Sony CDW-E1 encoding unit and Sony CDW-W1 compact disc recorder. The write-once optical recording media, which holds 63 minutes of recorded audio, is manufactured by Taiyo Yuden of Tokyo. It's sold under the That's brand and sells for about $40 per disc.

Gotham Audio recently introduced its SPOT 90 system for broadcasters, which is designed to allow stations to make in-house CDs of programming material, spot announcements, sound effects, jingles, commercials and music cues.

Unlike the Sonic System, Gotham's SPOT 90 is not a production workstation but a self-contained CD mastering system utilizing a Yamaha YPE-101 EFM encoder, Yamaha YPR-201 optical recorder, Audio+Design PRODAT 1B R-DAT recorder, Dell 286-based IBM-compatible personal computer and custom software.

The system is compatible with the Taiyo Yuden media as well as recordable optical disks manufactured by Yamaha/Fuji.

Menu driven

"A simple menu drive program directs the operator through the entire procedure until a finished CD pops out of the optical drive," said Russell Hamm, president of Gotham Audio.

Using the PC as the operating terminal, any source audio material is transferred to the DAT, which is conformed to become the master for the CD recorder. When the DAT master is completed, the operator hits a single button to record a Red Book standard CD of up to 68 minutes in length.

The complete SPOT 90 system is priced at $42,500. An off-line system that allows DAT conforming without the CD encoder or recorder is available for $17,500.

Both companies claim major interest from radio broadcasters for their systems and Sonic Solutions announced its first radio sale to Century 21, a radio syndication producer based in Dallas. The system was due for delivery at press time.

A Yamaha YPE-101 EFM encoder and YPR-201 optical recorder are also used in the SPOT 90 system.

Gotham announced that WQCD-FM of New York is utilizing CDs recorded by the SPOT 90 system on the air. Though the station does not own a SPOT 90, it has produced 59-track CDs with air jingles and station ID's on a SPOT 90 owned by an outside vendor.

"The discs sound great and work great," said Andy Bater, CE at WQCD. Though he said the SPOT 90 is too expensive for individual radio stations, Bater had high praise for the end product.

"The stations do feel the systems are expensive. I couldn't kid you about that," said Harry Klane of Gotham. Therefore, the initial target market will be broadcast chains, production houses and large stations. Gotham announced that National Public Radio, WNBC, WBLS, WCBS and the Canadian Broadcasting Corp. have all expressed interest in utilizing the SPOT 90 for their programming.

Tapeless editing

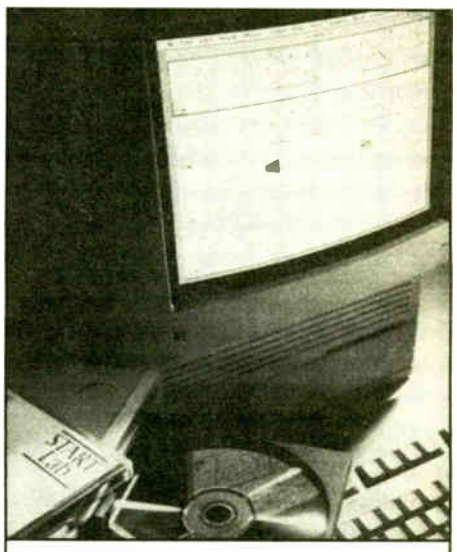
"There are significant productivity advantages which accrue when you use the Sonic System," said Bob Doris, president of Sonic Solutions. "Tape is completely avoided with our system and it is much faster. And you can do background CD-making while working on something else."

The "something else" Doris refers to is digital audio post production on a multi-channel workstation with options for sample rate conversion, time compression/expansion and NoNOISE™ software.

NoNOISE is a process that can remove tape hiss, surface noise and rumble, clicks and pops, and unwanted hum and buzz from audio tracks without affecting the original program material. It has been used to restore a wide range of priceless archival recordings.

Gotham, for its part, highlights simplicity and user friendliness as major assets for its new system. "It's incredibly simple to operate, much easier than a U-matic (digital) system, and at only a tenth the cost," said Gotham's Hamm. "SPOT 90 and recordable CD technology signify the beginning of a new age in broadcast audio."

SPOT 90's benefits to broadcasters are digital audio fidelity, instantaneous and accurate cueing, excellent long term reliability and easy automation control, Hamm said. "By turning every CD player into a cart machine, SPOT 90 eliminates the problems inherent with conventional NAB cartridges—tape jamming, wow and flutter, stereo phasing, tape noise and continuous maintenance," he added.



Sonic Solutions and START Lab have teamed up to produce CD-maker capability in the Sonic System workstation.

For information from Gotham call 212-765-3410 and from Sonic Solutions call 415-394-8100.

Cuba and the "Pig" In Tampa

MARKET UPDATE

by Paul Rebmann

Tampa FL While most radio stations are intent on battling their competitors across the dial, those here on Florida's Gulf Coast have another force they must contend with: Cuban interference.

A number of stations in the market employ technology to their best advantage in light of such interference deliberately cast into the region to retaliate Voice of America's Radio Marti, which is broadcast into Cuba.

Two AMs, for example, have special temporary authorizations (STA) for increased night power. WTKN on 570 kHz is licensed for 5 kW both day and night, but has a STA for 10 kW operation at night.

WEND "Spirit of 76" is licensed to operate on 760 kHz at 5 kW day and 1 kW at night but also has a construction permit to increase to 10 kW day and a STA for 2 kW night operation, according to WEND GM Bruce Mysick.

Sharing common threads

Such exceptions set the nation's 21st-largest radio market apart, but that's not to say it doesn't share the common threads of most cosmopolitan markets: hardy competition, various applications of modern technology and format fluctuation.

Despite the threat of interference from the outside, the AM situation in Tampa/St. Petersburg/Clearwater appears relatively healthy. Two primary minority groups in the region are each served by two AMs: WTMP and WRXB are oriented to the African-American community, while WAMA and WQBN serve the Hispanic community with Spanish language programming.

Two AM stations simulcast FM programming in the bay area: CHR WRBQ and Music-of-Your-Life WGUL. WQYK-AM stopped simulcasting in May and switched to Satellite Music Network's traditional format, anticipating a possible FCC mandate against the procedure. Gannett-owned WDAE has a live nostalgia format with music selected in house; and WNLT-FM sister station WHBO covers oldies on the AM band.

The four other Tampa Bay AMs air news/talk: Jacor's WFLA, WSUN, which is awaiting FCC approval of an ownership change from CBS to Cox Broadcasting, WHVE-FM sister station WTKN, and the newest AM to the Tampa area, WEND.

WEND is the flagship station for the Sun Radio Network, based in Clearwater. The network celebrated its third anniversary in March with 156 full-time affiliates on the 24-hour talk network, according to the company's GM Tom Holter.

NRSC, where are you?

Technically, a check with several AMs found that they were waiting until the last minute to install the NRSC emissions standard, which was required by the FCC by 30 June.

Also, AM stereo is not a priority here. Country music WQYK, the only bay area AM station broadcasting in stereo, uses Motorola C-QUAM. WRBQ-AM, meanwhile, was one of the early AM stereo stations with the Kahn system, but it now has dropped it. According to WRBQ Director of Engineering Ralph Beaver, the station is now taking into consideration public demand and perception.

In addition to 13 AMs, 13 commercial FMs also go after the $60.5 million in radio advertising revenue in the market. One element that creates a unique situation for these stations is the region's flat terrain. As a result, no FMs use either boosters or translators.

Also, about half of the FMs reported the use of an SCA. Two of the stations utilize two SCAs.

WGUL-FM, the single Class A station in the market, is in the process of taking advantage of an FCC-sanctioned blanket power upgrade.

Music playing, formats changing

Over the air, Tampa has seen some volatile momentum in recent months: the change from an oldies format to CHR by WFLZ last year prompted classical music WXCR to switch to oldies WYUU within a week, taking on Gannett's oldies outlet WUSA, known as W-101.

CBS Radio's WYNF is being directly challenged in the AOR arena since classic rock WKRL became intensive AOR WXTB after starting off the new year playing only Led Zeppelin music.

On the CHR side, WFLZ-FM—the Power Pig—has seriously threatened WRBQ-FM's long-standing number one position with its high-energy music and outrageous antics.

WRBQ—known throughout the industry as Q-105—had used extensive community involvement and promotion in addition to the original Q-Zoo morning show to build seemingly invincible ratings.

But Jacor Communications' Power Pig apparently awakened the sleeping giant, when, in late March, Edens Broadcasting removed three air personalities from their positions at Q-105 in a refocusing of the station, according to WRBQ GM Mike Horne.

"Q-105 was successful because it was always on the cutting edge of radio," Horne said, "but the last few years the station had been resting on its laurels."

The staff change was accompanied by the announcement that Cleveland Wheeler, a member of the Q-Zoo, was returning after a three-month hiatus.

Loud but within limits

But in all this, high energy does not translate into the modulation wars found in other highly competitive markets. Loud, yes, but most engineers stressed that while maintaining competitive but not excessive modulation levels, they

(continued on page 18)

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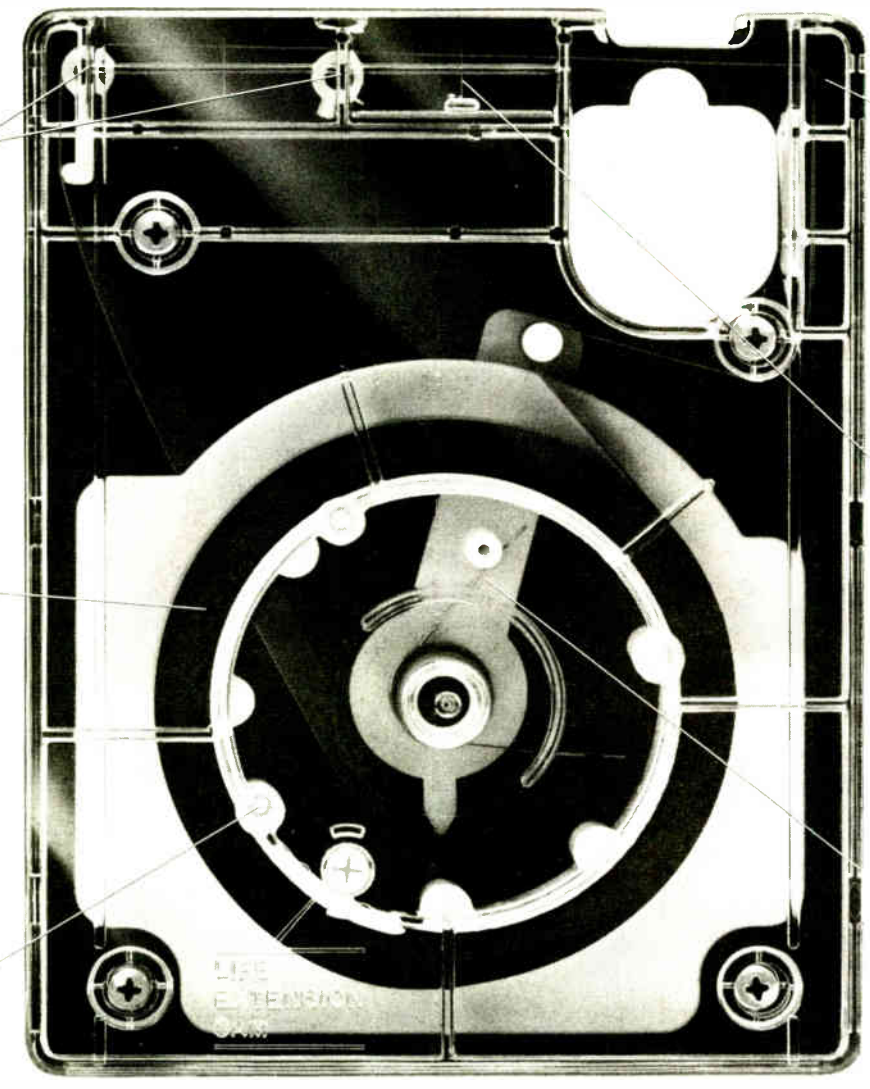

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Radio's Future Secure, Study Says

NERA Research Points to Establishment Of Systems to Serve Niche Markets

Washington DC Despite new technologies threatening the livelihood of today's radio broadcasting, the medium will remain a vital part of America's daily routine.

That was one conclusion of a study prepared by the National Economic Research Associates (NERA) for the NAB, which emphasized the importance of broadcasting and telecommunications in our lives.

The NAB submitted the study's findings as part of its filings with the National Telecommunications and Information Administration (NTIA) on spectrum re-evaluation.

NERA predicted several significant changes during the next two decades, including the evolution of newer, radio-based systems to serve niche markets, such as MMDS and DBS. However, the possibility of witnessing the development of a new medium that will replace broadcasting is unlikely.

"The automobile replaced the horse and buggy, but (the telephone) has not replaced the Postal Service," NERA said. "It has taken a century for the telegram to be replaced by the telephone call and ultimately by facsimile. The advent of television did not spell the demise of radio, although it served to change radio's role."

The report also downplayed recent developments that focus on the feasibility of wire-based and fiber-based systems: "Broadcasting is the most efficient means of delivering the mass message," it concluded.

. . . the development of a new medium that will replace broadcasting is unlikely.

As evidence, NERA reported that with more than 12,000 full-service commercial and non-commercial radio and TV stations nationwide, broadcasting reaches almost every home and business. Consumer investment in broadcast equipment now reaches nearly $66 billion annually.

The study concluded that 98% of American households depend on broadcasting services for public service announcements, emergency services, entertainment, news and information. By comparison, it noted that household telephone penetration stands at only 93%.

Florida's Radio

(continued from page 16)

were most concerned with providing a quality signal to the input of the processors.

"This station is not fighting a war," Beaver said.

There are a number of stations remaining on the dial in Tampa which add to the overall market sound. On the lighter side of the bay are adult contemporary stations WNLT and WWRM, which had previously been easy listening WWBA.

This left WDUV across the bay in Bradenton and WEZY to the east in Lakeland as the only easy listening stations available to those area listeners that can receive them.

Alone on the FM band with their formats are country WQYK, nostalgia WGUL, and WHVE with jazz, new age and contemporary music. Since WFLZ and WRBQ have split up the CHR audience, WQYK has topped some of the recent ratings reports.

Also prominent is WMNF-FM, a 70 kW community station, providing a radio outlet for a diversity of music styles, including folk, reggae, blues, classic rock and new wave.

The non-commercial station receives 80% of its funds from community donations and the other 20% from the Corporation for Public Broadcasting, according to interim GM Mercedes Skelton. In addition to the various music programs, WMNF carries news from the Pacifica News Network, Skelton added.

The University of South Florida operates WUSF-FM, a non-commercial classical music/jazz/news and public affairs station licensed to the Florida Board of Regents.

■ ■ ■

Paul Rebmann is CE, WEZY-FM/WLKF-AM, Lakeland, FL.

"Auditronics' 400 is the best production board for the money,"

Bumper Morgan, Producer WYHY-FM

Cameron Adkins Chief Engineer WYHY-FM A Jacor Communications station

says Cameron Adkins, Chief Engineer of Nashville's outrageous Y107 FM. "In fact, Auditronics' sound has helped make us number one in our market for the last five books, and we expect to capture our sixth one as well."

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Bumper Morgan, Producer at WYHY says, "Auditronics has really set a new standard in radio production consoles. Going from our old board to this 400 was like going from night to day. The light-bar display gave me instant gratification. I use the foldback modules a lot. I like the range of the eq and the very clean overall sound of the board. Besides our own work, I do a lot of promos, sweepers and liners for other broadcasters from Honolulu to New York, and I continually get compliments that the sound of our packages helps stations sound better than their competitors."

Adkins says, "The Auditronics 400 was easy to wire in. And nobody's board surpasses this 400 for reliability or stability. We're a heavily produced station with seldom a break that we don't air something that was produced here on this board. Even with this heavy workload, we've had zero failures. Literally nothing has gone wrong since day one," he says.

Call 1-800-638-0977 toll-free today for more information on the 400 production console Cameron Adkins buys.

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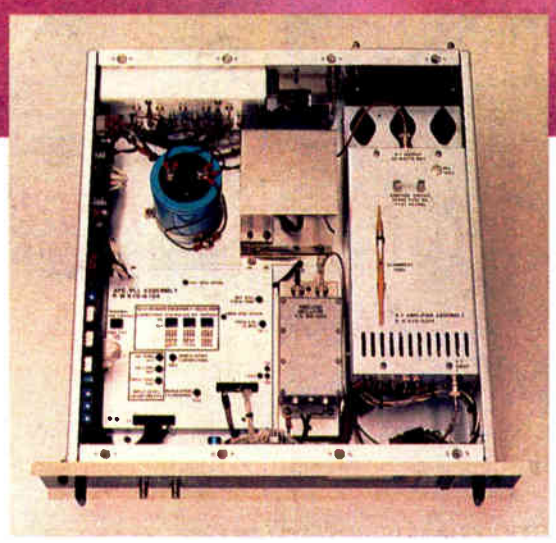

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NRSC Eyes a US RDS Standard

by John Gatski

Chicago IL The National Radio Systems Committee (NRSC) plans to take up the adoption of a Radio Data System (RDS) standard for the United States.

Because of increasing interest in the service that enables a station to transmit text to RDS-equipped receivers and other services, the NRSC discussed the issue at its meeting here during the Summer Consumer Electronics Show in June.

According to accounts of the meeting by NAB Staff Engineer Stan Salek, the members seriously discussed the issue, but have taken no action to formalize a RDS standard. (The news media is no longer allowed to attend NRSC meetings.)

Informal discussion noted several potential problem areas in adopting RDS in the US, Salek said.

Subcarrier compatibility

One of the major issues to consider is the compatibility of the RDS 57 kHz subcarrier with the FM signal and other subcarriers, Salek said.

RDS is transmitted via the subcarrier that is encoded onto the main carrier.

Program information and format codes are another area that must be addressed, according to Salek.

Along with the ability to transmit a station's call letters to an RDS receiver, the technology has the ability to allow a listener to tune to a certain format, no matter where he or she is.

The receiver would lock on a classical station, for example, based on the station's RDS subcarrier that contained a classical format subcode that is programmed into the encoder.

Ideally, all classical stations (or whatever format is chosen) using RDS would be locked onto by a receiver based on that format if the listener so desires.

Formats codes

But there may be some issues regarding program codes which need to be addressed. In Europe, there are fewer codes because there are fewer stations and formats.

But in the US, where there are numerous music formats, agreement would have to be reached on the categorizing of various formats and assigning them a code, Salek said.

Along with format codes, RDS' compatibility with AM would have to be addressed by the NRSC, Salek explained.

The technology is being developed to allow RDS to operate on AM, but on a more limited basis, he said.

"The data rate would have to be slowed down considerably to work on AM," Salek added.

The NAB Board of Directors was scheduled to discuss RDS at it June meeting, according to Salek.

In other action, the NRSC has changed the name of its NRSC interim voluntary standard for AM receivers from "performance recommendations for AM broadcast receivers" to "audio bandwidth and distortion specifications for AM broadcast receivers."

The change was made when some NRSC members pointed out that the voluntary standard did not apply to all performance characteristics of a receiver, Salek said.

The voluntary NRSC standard is rated at 50 Hz to 7.5 kHz, +1.5 dB or −3 db with no more than 2% distortion.

A joint group of the NAB and Electronic Industries Association will use the voluntary standard as the basis for a quality AM certification mark that will be promoted to manufacturers.

TV Marti Expected to Continue

by John Gatski

Washington DC TV Marti is likely to continue broadcasting its mixture of news and entertainment to Cuba following completion of initial testing, scheduled to end later this month, according to Rep. Al Swift (D-WA).

Cuban jamming prompted

The controversial Voice of America TV service has led to Cuban jamming of its Radio Marti counterpart for the first time in its five-year existence and threats of increased retaliation against US AM stations. It is opposed by south Florida AM broadcasters and the NAB.

Despite the furor, Swift maintained that President Bush is likely to authorize the $16 million already earmarked to operate the service through 1991.

The funding bill that approved the TV Marti test also allotted $16 million for permanent operation for two years if the President approved it.

"The President has to make a finding that the project is technically feasible, which he is likely to do," Swift said.

Swift, a member of the House Telecommunications and Finance Subcommittee, is a vocal opponent of TV Marti and predicted during the NAB convention that Cuba would make good on its promise to jam Radio Marti.

(continued on page 22)

Daytimer Deadline Draws Closer

by Charles Taylor

Washington DC In April 1985, the FCC met with authorities in Canada, Mexico and the Bahamas and secured permission to adopt rules allowing more than a thousand US AM daytimers to operate at night on former foreign clear channels.

Five years later, the deadline for stations granted the option to upgrade is fast approaching—yet a large number of stations have yet to act.

By making the changes necessary to broadcast at night, a number of these low-powered stations will protect themselves from being pushed out by other stations able to upgrade at the end of the FCC's five-year transition period.

"If you intend to do it, don't wait too long," warned Wilson La Follette, who was in charge of the international negotiating for the FCC in 1985. He now works as an engineering consultant for Washington's Cohen, Dippell and Everist, PC.

Max up to 500 W

The new rules state that stations affected would be allowed to transmit at night at a maximum power of 500 W. Stations could apply for power increases up to the maximum permitted during this transitional period, however, at least 250 W must be specified on such applications.

During this period, stations need only provide protection to foreign and domestic stations that existed before the new rules, La Follette said.

The intent of these decisions, he explained, was to make it as easy as possible to upgrade to the minimum power of 250 W that would ultimately ensure interference protection.

"The FCC performed its power calculations using the existing daytimers' antenna systems," La Follette said. "These antennas, however, were not designed to provide optimum protection to other stations during nighttime hours. Thus, except in rare cases it is necessary for these daytimers to have nighttime antenna systems designed for nighttime protection requirements."

After the transition period . . .

After the approaching five-year transition period has expired, the maximum nighttime power permitted on these foreign clear channels is increased to 1000 W, consistent with protection requirements.

Also, any power increase must provide full protection to all foreign and domestic stations operating with at least 250 W of power, including the former daytimers that were able to achieve a minimum power of 250 W during the transitional period.

Further—and significantly—stations that operate at night with less than 250 W will be considered secondary and will receive no protection from stations that propose to increase power.

That, said La Follette, is why it is important for stations that have not yet upgraded to do so promptly. "It's something for them to take note of. If they plan to do something in the future, some of them will have to start considering it now," he said.

Stations bordering each of the countries have different transition deadlines. For former Canadian clear channels with non-directional antennas, upgrades are required by 30 August, 1990. For those with directional antennas, the transition period ends 23 September.

The transitional period for former Mexican clear channels ends 16 June, 1991. For Bahamian clear channels, the deadline is 1 December, 1991.

TV Marti Still On Air

(continued from page 21)

Prior to Cuba's jamming of Radio Marti, Swift said there was a chance Bush would consider suspending TV Marti based on the use of unusual transmitter technology, which is housed in an Air Force observer balloon 10,000 feet above south Florida.

The remote chance that President Bush would suspend TV Marti all but disappeared when Cuba began jamming the previously interference-free Radio Marti that has been transmitted to Cuba since 1985, Swift added.

Cuban programming

A powerful Cuban station, known as Radio Taino, is now broadcasting on Radio Marti's 1180 kHz frequency 24 hours-a-day. The VOA began transmitting Radio Marti on shortwave to try to reach Cuban listeners who lost the AM signal.

The communist government has been jamming TV Marti from 3:45 AM to 6:45 AM, since 27 March when it went on the air. Reports from Havana indicate that the TV Marti signal is only getting into the outlying areas of the city.

Swift said there is congressional opposition to TV Marti and it could try to block funding. But, he added, such action is unlikely because of the Radio Marti jamming.

Swift promised, however, that any future congressional funding for TV Marti will be scrutinized more closely than the initial funding.

According to Swift, the original TV Marti funding was buried in state department authorization funding bills and many legislators who voted for them were not well informed about TV Marti and its implications.

In order to put pressure on the administration, broadcasters also need to document and report any interference from Cuban stations and report it to the FCC, Swift said.

Although Radio Marti had not been directly interfered with by Cuba, commercial AMs have reported being overpowered by Cuban stations on various frequencies since 1985.

But many stations don't bother to report it because management does not want to get involved, Swift said.

SBE Race Heats Up

by Marissa Friedman

Kansas City MO The function of the president of the Society of Broadcast Engineers, as well as the role of the SBE itself are the major differences marking two campaigns for the organization's top office.

While one candidate—Andy Butler, CE of WBAL/WIYY in Baltimore—has officially declared himself in the running for the presidency, incumbent Brad Dick has not yet disclosed his plans to run again. "I have not announced my decision, but I see no reason why I wouldn't run," he said. "It's very early to announce a candidacy."

Among the differences between the two, Butler said Dick wants "to ease into a method of running the society by hiring additional staff. We—the board of directors—tend to think of the 'society' rather than the 'members,'" he continued.

But Dick, who admitted that he fired Butler as part-time executive director because he did not think Butler could handle the job said, "Butler believes the SBE presidency should be a full-time lobbying position."

Dick said he plans to hire a full-time executive director to fulfill some of his long-term objectives. He also noted he will continue to enhance membership communications through workshops, newsletters and various member services.

Dick said services such as these have resulted in "an increase of 300 people in the first quarter of 1990, which is the highest growth rate ever."

If Dick decides to seek re-election, he said his experience will be the backbone of his campaign. "I'll run on my performance, not promises," he said. "I've made promises before, and I've delivered."

Despite Dick's success, Butler said there is "a good deal of confusion" about the SBE's current direction.

Butler said he believes the members need a vehicle to express their concerns and opinions about the direction of the society, and he has implemented a toll free personal campaign number (800-767-1052) available to SBE members specifically for that reason.

Along with a toll free number, Butler said he is in the process of developing a five-year strategic plan as part of his campaign.

Butler also maintained that "there is too much effort to increase growth from the top down. We need to build the organization from the members up," he said. "The least important person in the SBE is the president. The president needs the vision to guide the members."

Butler said he believes direct open communication with the members will "bring me a lot closer to reaching the goals that members feel are important."

Butler said he views the presidential seat as a salesman's job. "We have to do two selling jobs. We have to convince the industry of the validity and viability of the SBE, and we must convince the engineers of the validity of their own profession, by providing support."

SPL: More Than Meets the Ear

by Barry Mishkind

Tucson AZ Whenever engineers get together, several topics always find their way into the discussion.

What's the best transmitter? Which audio processor is the best? How about those modulation wars in (name of city)?

Indeed, one of the hottest topics debated over the past year is how a station can accurately measure its modulation peaks to be legal and yet as loud as possible.

ECLECTIC ENGINEER

Different modulation monitor manufacturers each contend that their methodology is more accurate than the other guy's. But for most of us, the basic question remains: What's "too loud?"

Lots of engineers already know the answer to that one. What's too loud are the control room speakers.

Pump up the volume

No, I'm not so old that I can't remember trying to squeeze the last milliwatt of energy out of a speaker system from time to time. In fact, probably all of us, at one time or another, have turned up the volume on our stereos *really* loud and enjoyed "the beat" of the music.

Many DJs go one step further and tell you that unless they "feel" the audio they can't get into the right mood.

However, in the best tradition of watching out for each and every one of us, OSHA has released standards of just how much audio should be available in the workplace.

OSHA (The Occupational Safety and Health Administration) is the government agency responsible for protecting the health and welfare of workers.

TABLE 1
Sound Pressure Levels

dB	
140	Loud vocal (1" from source)
130	Threshold of pain Jet takeoff (200' from source)/pneumatic drill
120	Loud auto horn
110	Nearby thunder
105	Subway train passing
100	Car manufacturing plant Symphony orchestra
90	Heavy street traffic (5' from source)
80	
70	Inside automobile Normal converstaion
60	Average office/backgound music
50	Average residence
40	Very soft music
30	Quiet auditorium
20	Quiet whisper (5' from source)
15	Quiet sound studio background noise
10	Anechoic room
0	Threshold of hearing

Its standards have been adopted by most states and help define when dangerous levels of sound are present, among other things.

The trick is just how to convince the DJs that this information has value other than to provide bureaucrats something to do.

OSHA over your shoulder

Most DJs really take their hearing for granted, not readily believing that excessive sound really can inflict damage.

Yet studies have shown for many years that hearing loss or even deafness can be caused by exposure to loud noises. This includes evidence gathered long before the advent of the electronic amplifier.

Examples where loud noise has damaged hearing include everything from factory workers to aircraft pilots. Some workers such as blacksmiths routinely develop "ringing" in their ears after years of plying their trade.

Many employers now provide ear plugs for their workers to use in high noise environments like the factory floor or airport runways. Unfortunately, issuing earplugs is not a viable option for radio stations. It's hard for the DJ to function without high quality monitoring of the program audio.

Nevertheless, under the law, the employer *can* be held liable for any work-related hearing loss suffered by the employee, even though the employee may have some control over audio levels.

Sounds crazy? Perhaps. But, a number of legal cases have established that the employee can't unilaterally waive employer liability for possible injury.

So what can the station do? First off, it's important to know exactly what the

(continued on page 24)

The ABCs of Loudness Levels

(continued from page 23)
OSHA rules are and how you can tell whether or not you are in compliance. Using that knowledge, it's then your station's responsibility to formulate a policy to protect the employees.

Sounds you can hear

The sound levels of the workplace today can range from the quiet of a research library to the jet flightline.

There are even greater extremes: The threshold of hearing is defined as 0 dB SPL (sound pressure level). A loud vocal shout might reach 135 dB or more above that, right past the threshold of pain. (Table 1 gives a few samples of how loud various audio sources can become.)

Using a sound meter, it is relatively easy to know how loud the ambient noise is at the workstation. Comparing that with the OSHA maximums tells you if you are in compliance.

For example, OSHA has determined that exposure to more than eight hours of a sound level of 90 dB ("A" weighted) will cause hearing damage. And, employees are never to be exposed to sound levels over 140 dB(A).

At 95 dB(A), the maximum is only 4 hours. Hearing damage can occur after only two hours of exposure at 100 dB(A). And at 115 dB(A) (each five dB halves the acceptable time for exposure) it takes only 15 minutes or less to harm a person's hearing!

Taking a sound level meter into the control room, I've found anywhere from 95 to 110 dB(A) at the DJ position when the speakers are turned all the way up. You can see that the allowable time span at these levels is shorter than many DJ shifts.

. . . employees can't unilaterally waive employer liability for possible injury.

However, a problem in measuring a radio studio is that in most cases the audio level is not constant, as it would be on a factory floor. DJs turn the audio up and down constantly.

As the limits mentioned are for constant levels, a time weighted average needs to be developed for studio operations.

A little observation and algebra can provide the cumulative levels in your facility.

Making changes

What should you do if you feel your studio monitors are too loud? What can you do?

The answer to the first question is somewhat easier than the second. You should turn your monitoring system down until it meets the specifications.

But this is a complex matter with no easy resolution, especially in rock stations. Firm support from management is essential.

If you make an abrupt change, you can probably expect a lot of complaints from the DJs. This may moderate when they discover that the change won't be reversed.

Easing into the new levels, by turning the maximum down a little each week until you achieve your chosen level, may avoid some of these hassles and complaints.

On the other hand, it could cause other problems such as monitor pot failure as the DJs will tend to run the pot to the top more often.

And, we haven't mentioned the headphone levels, which can often exceed the levels experienced from the loudspeakers. With the variety of headphones used, it may be difficult to actually find an OSHA-approved way to keep the whole staff happy.

Still, don't forget: The station *is* ultimately responsible and liable for employee hearing damage. A combination of good sense and employer/employee cooperation will often develop a good resolution.

A quick discalimer. Obviously, I'm not a lawyer. So, if you're in doubt about exactly what liability you may face in this area, check with your station counsel for specific advice.

■ ■ ■

Barry Mishkind, aka **RW***'s "Eclectic Engineer," is a consultant and contract engineer in Tucson. He can be reached at 602-296-3797, or on FidoNet 1:300/11.*

Fortunately for us, most radio engineers look before they leap.

You've always been an analytical bunch, so we're sure you know that our MX-55NM 2-track not only gives you the features you need, but that it's also priced several thousand dollars below its nearest competitor.

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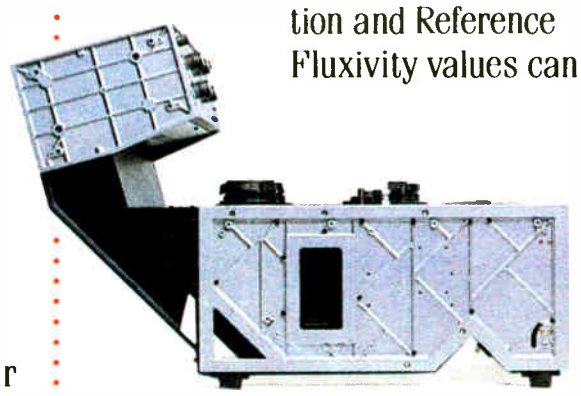
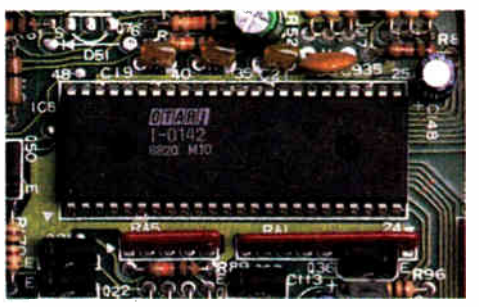
For example, the MX-55NM incorporates a printed-circuit capstan motor (like that used on our MX-80 multitrack machine). This not only gives you low wow and flutter right out of the chute, but very fast start times. It's also worth noting that EQ selection and Reference Fluxivity values can be changed with a flip of a switch. And as you put the deck through its paces, notice that the varispeed control provides 0.01% step resolution. This means you can make precise changes, and perhaps more importantly, you can repeat a change *exactly* when necessary.

Three cue locations and a zero memory can be accessed via the MX-55NM's built-in locator.



A 1.5" cast alloy deckplate, plus cast side frames give the MX-55NM the rigidity and ruggedness you've come to expect from Otari. (Do our competitors show you the inside of their machines?)

For your convenience, an optional voice editing module maintains normal pitch at twice normal speed. And the meterbridge keeps knobs and switches out of the way while you're editing.



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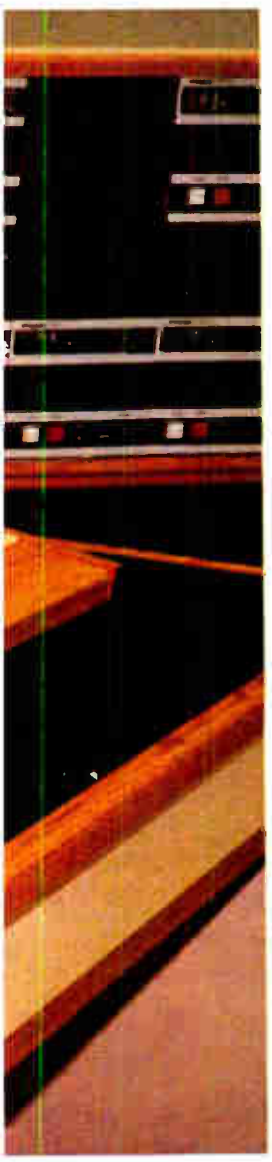

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TAKES THEM WHENEVER THERE'S LIGHTNING.

is the tallest object for miles around. "We've been hit so hard the tower beacons were blown out of their sockets," he told us recently, "and so often that the lightning rod looks like someone's been beating chunks out of it with a sledgehammer. But so far our new Harris HT 20FM transmitter barely blinks at lightning. Occasionally we get a PA Plate Overload message, but that's it."

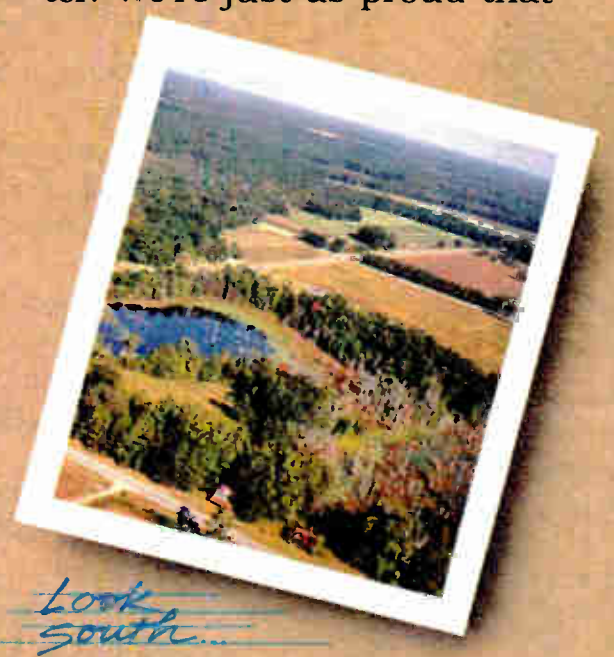
Robert also knows something about Harris reliability: Until they received a power increase to 50,000 Watts last year, WQPW had been on the air with a 3.5 kW Harris transmitter for thirteen years. "That transmitter was very good to us," Robert reports. "Still is, in fact—it's our back-up now. Basically, we shopped around enough to be sure Harris could match or top the competition in both price and features: Things like Automatic Power Control for simple remote operation. Then we ordered a 20 kW HT 20FM transmitter."

About 45 days later WQPW's transmitter arrived (meanwhile, Robert supervised construction of a new transmitter building, tower and antenna). "We just took it out of the box and put it right on the air," he says. "Even the tuning movements were small. The installation went so smoothly, I told the factory 'You've got to do something—this transmitter's *boring*.' "

After a number of months of service, WQPW's HT 20FM remains just as "boring." Robert has only shut it down for routine monthly maintenance. "Even that is minimal," he told us. "I vacuum the cabinet out, check tube cooling, make sure nothing's overheating, and that's about it. Two or three times a week I do a meter check and log the readings. They hardly ever change. In fact, we're still using almost the same tuning numbers we got from the factory. And we're getting a very noticeable improvement in audio quality from our new Harris THE-1 exciter."

Chief Engineer Robert LaFore...
WITH HIS NEW HARRIS HT 20FM 20 KW FM TRANSMITTER.

As you can tell, WQPW is very proud of their new transmitter. We're just as proud that



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Circle 64 On Reader Service Card

Golden Age of Tools and Calls

by George Riggins

Long Beach CA Several issues ago I described how KIEV, Glendale, CA acquired the two towers used to support the Flat Top antenna. That antenna has now been retired.

Yes, KIEV is using a standard vertical radiator as is almost everyone else in the US. The Flat Top—used for the last several years as a standby—is being retired and will soon be dismantled. The station has upped the power to 10 kW from the original 100 W, and has moved from the basement of the old Glendale Hotel to new quarters on a second floor where they can finally look down to ground level.

There are still two other Flat Top antennas in use locally. KGFJ, Los Angeles is using a Flat Top antenna erected by Ben McGlashan many years ago. The other local old timer is used by KPPC, Pasadena.

Old Timer

One has to know the schedule for KPPC because they are only on the air Wednesday PM and for 24 hours Sundays (at least this is the schedule reported to me a few weeks ago). Don't know how many other Flat Top antennas are still in use, but it might be interesting to hear from those who are still tending to the "old timers."

Farthest calls in the west

Tony Wortman, engineer of WJAG/KEXL, has taken me to task for making the comment that "apparently WBAP, Fort Worth was the most western station to still have a "W" call. I stand corrected. A quick look at a highway map of the US shows where the Dallas/Ft Worth metropolitan area is located as referenced with cities to the north.

So, it was time to get out the set of sectional maps from WW II that I've lugged over quite a bit of these United States for the past 46 years. It was even a good excuse to purchase some new sectionals from the local aeronautical map supplier.

After a couple of hours with the sectionals and the *Broadcasting Yearbook*, it turns out that there are at least four stations that continue to use a "W" prefix that are west of the normal north/south line associated with the Mississippi River.

Others include WDAY, Fargo, ND and WNAX, Yankton, SD. Using a long ruler and sifting through all the clutter that now appears on the current Dallas-Ft Worth sectional, it appears that the WBAP transmitter site is still just west of Grapevine, TX—a little north of the Dallas-Ft Worth International Airport.

The longitude for the center of Ft Worth is approximately 97°20', with the transmitter located at roughly 97°1'30".

The center of Norfolk, NE—WJAG—is approximately 97°25' with the transmitter west of town at some 97°29'30". These measurements place Norfolk, NE about 4 1/2 miles west of the center of Ft Worth. The WJAG transmitter is located approximately 24.8 miles further west than the WBAP transmitter location.

Actually, WNAX at Yankton, SD is just a little west of WBAP. Yankton is located at 97°23'30" west longitude with the transmitter at 97°18'30" west longitude. This puts WBAP in third position and WDAY Fargo in fourth place by just a few a few miles.

. . . there are at least four stations that continue to use a "W" prefix that are west of the Mississippi River.

All four stations trace back to original licenses issued in 1922. Not bad to have kept the same call signs for 68 years, in these days when stations seem to change call signs as often as the seasons change.

Jack of all trades

I goofed on two items in the 14 March column. It seems that I made Don Parker the gofer at WIBU when Don was actually the entire staff. Don reports that he was the announcer, engineer and anything else that needed to be tended to at the Portage studio.

The Portage studio was on the air from 1 PM to about 4 PM daily. Don also reports that at the time he was working at WIBU, they had three other studios in addition to the facilities in the "Farm House" at the transmitter. The studios were in Madison, Portage, and Baraboo, WI.

Both Portage and Madison were tied directly to the "Farm House" and the transmitter. The line from Baraboo ran through Portage and required a switch closure to patch the signal through to the transmitter.

WBZ was inadvertently printed as WVZ. My apologies to Group W for the misprint.

Had a call from a gentleman who works in an allied part of entertainment with some comments about processing and the results. The gentleman, whom we will call Bob, related as to how he was in college when the local college radio crew recorded a live dance band. After the recording session, a couple of the others involved decided to take the tape down to New York where some post production "equalization" was added.

Bob said there was no relationship to be heard between the "un-enhanced" recording and the "equalized" tape. Bob says that he still prefers the un-equalized tape because it represented what had been heard in the dance hall by both the engineers and the audience.

In his present position Bob has the opportunity to listen to what is recorded in an associated studio and what is presented to radio stations to air. He still would go with the "un-enhanced" version the majority of time—especially after the product is again put through a funnel to try to make the signal louder on some cheap automotive or battery-operated portable receiver.

Signals and field strength

On the return from the NAB convention with the XYL (the wife, to you nonhams) somewhere in west Texas, we heard one station that had louder splatter up and down 20 kc than the signal it was transmitting on the main carrier frequency.

I wonder what the station engineer or program director was using for quality control. Or is this an instance of quality assurance rather than quality control?

I thought that David Harry of Potomac Instruments, Inc. had a handle on every field strength meter that has ever been produced. David was stumped when shown a picture from the first issue of the *RCA Broadcast News*. The picture shows Mr. Adler of RCA using "Cumbersome Old-Style Field Intensity Measuring Equipment" in 1930.

The unit pictured was sitting on a folding camp stool and must have weighed the better part of 100 pounds from the looks of it. The 1931 replacement could be placed on a lightweight tripod for stand-up operation. The "new type" monster was designated TMU-21. Mr. Harry admits to having seen one of the TMU-21s. I think he has one hidden away somewhere—for a keepsake or a door stop, I'm not sure which.

Early sponsors

The first *Broadcasting Yearbook* was published in 1935. (Any early copies looking for a home?) At least this is the year reported by Harrison B. Summers in his *History of Broadcasting: Radio to Television*, published by Arno Press and the New York Times, New York 1971.

Mr. Summers has compiled a very complete listing of major network radio programs that were on the air in January of each year. As of January 1927 there were 24 sponsored programs listed. At the same time there were eight sustaining programs, and one with no listing for

(continued on page 30)

Adopt NRSC, for AM's Sake!

by Lex Felker

Washington DC By the time this article is published, 30 June 1990—the date by which AM licensees must comply with a new set of off-channel emission requirements—will have come and gone. On the basis of accounts in trade publications, however, it appears as if some AM licensees have elected not to modify their facilities to meet the new rules.

I am astounded by these reports. The FCC has been eminently reasonable both in adopting rules urged by the industry and in fashioning a transition procedure that minimizes broadcasters' costs. If the accounts I have seen are accurate, not only may the licensees involved find themselves in some regulatory jeopardy, but ultimately the AM service as a whole could be a big loser.

The new emission requirements are part of the Commission's ongoing AM improvement effort. It was hoped that they would help break what had become a vicious cycle of broadcasters transmitting increasingly wider signals and manufacturers producing receivers with ever-narrowing frequency response. This continuing sequence has contributed to the gradual reduction in the quality of the AM broadcast service.

Standards developed by industry

The history of these emission standards is well known. In the mid-1980s, the National Radio Systems Committee (NRSC)—a body composed of broadcasters and equipment manufacturers—developed a pair of AM radio standards.

One standard, called NRSC-1, is meant to apply to both the audio chain of a radio station and the corresponding audio circuitry in a radio receiver. The other standard—NRSC-2—is concerned with reducing the amount of adjacent channel energy actually transmitted by a broadcast station.

The National Association of Broadcasters petitioned the FCC to mandate broadcaster compliance with the NRSC-1 *audio* standard. In initiating the requested rulemaking, however, the Commission instead proposed establishing only the companion *emission* standard—NRSC-2. This proposal was ultimately adopted and the Commission's rationale in taking this approach was twofold.

First, there was a concern that an audio standard would have little or no effect in reducing adjacent channel "splatter." Because non-linearities can sneak into any system, interference to adjacent signals could be created even by stations that comply completely with the NRSC-1 audio standard. Such a result could undermine the Commission's AM improvement efforts.

Second, the Commission reasoned that its primary interest was in controlling interstation interference, not tailoring the frequency characteristics of the audio enjoyed by listeners. Therefore, the FCC concluded that it should fashion rules that controlled the output signals of broadcast stations directly while providing licensees with as much discretion as possible in meeting these standards.

FELKER'S FORUM

The Commission did find merit, however, in commenters' arguments that FCC endorsement of the NRSC-1 standard would encourage receiver manufacturers to design higher performance equipment. The agency also expressed concern with the possibility that the transitional costs of complying with the new rules could be extremely high for some stations.

"Presumptive compliance"

To accommodate these concerns, the Commission provided licensees with an alternative means of demonstrating compliance with the new emission standard. This optional procedure, which will be in effect for a period of four years, is dubbed "presumptive compliance." Under this approach, licensees who comply with the NRSC-1 audio standard will, absent hard technical evidence to the contrary, be presumed to be in compliance with the NRSC-2 emission standard.

Licensees choosing to comply presumptively with the new regulations are relieved of performing the annual emission measurements required by the FCC. There are only two catches.

One such catch is the requirement to *comply* with NRSC-1. The means by which licensees ensure themselves of compliance with the audio standard is not specified, but one obvious approach is to install an NRSC-1 audio device at the input to the transmitter. (Installation at any other point may not ensure that the transmitter input signal is in compliance.)

The other catch is the fact that the presumption of compliance is rebuttable by solid technical evidence indicating a station's emissions exceed the NRSC-2 limits. Any licensee who is in compliance with NRSC-1 but who nonetheless is found to have radiated emissions exceeding those specified in the rules will be required to take the steps necessary to maintain compliance.

After 30 June 1994, all AM facilities are expected to be in compliance with the emission standard, regardless of whether the facilities employ NRSC-1 audio processing equipment. However, to minimize the financial burden of replacing an aged transmitter that is not physically capable of meeting the new standard, the Commission has indicated a willingness to consider hardship waivers on a case-by-case basis.

Commission may take a hard line

The Commission appears ready to take a hard line with AM licensees who ignore the new emission standards. In May, the agency released a public notice reminding broadcasters of the new requirements and notifying licensees that the Commission's forfeiture authority has been increased to $25,000. My discussions with Commission staff suggest that, in bringing sanctions against noncompliant licensees, they may very well exercise this new authority.

By the way, that same public notice made it clear that stations wishing to avail themselves of the "presumptive" compliance option must have NRSC-1 processing equipment installed by 30 June 1990. Stations not meeting that deadline are presumably stuck with complying with the emission standard directly.

In addition to the very real penalties involved, AM broadcasters should act promptly to comply with the new emission standards; in the long run this collective action could have positive effects on the service as a whole.

The FCC has done its part in refining the technical standards to promote reduced levels of interference. The Commission's approach ensures a less disruptive and less costly transition. It is now up to broadcasters to take the initiative to improve their facilities.

■ ■ ■

Lex Felker is a technical/engineering consultant with the law firm of Wiley, Rein & Fielding, Washington, DC, and former FCC Mass Media Bureau Chief. He can be reached at 202-429-7000.

Vintage Call Signs

(continued from page 29)

either a sponsor or sustaining. Some of the companies are still around and others are long gone.

Heading the list was Eveready Batteries. Some of the other trade names that are still with us such are Maxwell House and Hires Root Beer. A noteworthy name missing from the modern day is Atwater Kent, one of the early receiver manufacturers.

Over the years we have all read and experienced the laws of nature as listed by Mr. Murphy. We ran across a new promulgator of technical laws. Mr. Jeff Angus, writing in the May 1990 issue of *Portable Computing*, lists a new twist.

Angus' Law of Why Technology Fails: "In any process dependent on human skills or decision-making, 85% of all products will be mediocre or worse, 10% will work acceptably and 5% will perform exceptionally."

■ ■ ■

George Riggins has experience in radio and electronics dating back to the 1930s. He is also a licensed ham operator and has had his own broadcast sales and service company, Riggins Electronic Sales, for over 20 years. He can be reached at 213-598-7007.

SPARS Examines Workstations

by Mel Lambert

Studio City CA In late May, the Society of Professional Audio Recording Services (SPARS) held another in its regular series of business and technical seminars. The theme of SPARS's gathering in Nashville was "Digital Audio Workstations," and their long-term implications for the recording, broadcast and audio-for-video industries.

Representatives from 11 companies were invited to present hour-long overviews of their respective hardware, followed in the evening of the first day by hands-on demonstrations. On the second day of the conference, a lively roundtable discussion of data interchange and files standardization was followed by another series of one-on-one demo sessions.

Cornucopia of products

The various designs displayed during the SPARS Conference included Alpha Audio's DR-2 hard-disk recorder/editor, Advanced Music Systems AudioFile, Digital Audio Research SoundStation II, Lexicon OPUS and New England Digital PostPro SD/Sound Designer. Others included the Otari D.A.R.E. hard-disk recorder/editor, Solid State Logic Screen-Sound, Sony Pro Audio DASH tape recorders and editing systems, Studer-Editech Dyaxis, Symetrix DPR100 Digital Processing Recorder and Wave-Frame's AudioFrame.

Of the newer hardware under discussion, the Alpha Audio DR-2 is being marketed as a "simple-to-use digital recorder/editor for the price of an analog two-track," A suggested pro-user price of $10,500 buys you 15 minutes of stereo recording at a sampling rate of 44.1 kHz, plus a host of very handy features not available from its analog equivalent.

The DR-2 features a dedicated controller for rock-and-roll edit location with a scrub/shuttle wheel, and selectable various crossfade profiles. The menu-driven software and familiar tape-machine controls allow up to 256 cue points to be labeled and selected at will—a useful function for automated play lists, or for rapid and extremely accurate random access to commercials or station IDs, for example.

Eight SCSI-equipped drives can be connected to the DR-2, for additional storage times up to several hours of stereo. A fully-equipped serial remote control port allows the recorder/editor to be commanded from literally hundreds of feet away.

One potential application of the DR-2's capabilities might involve the use of multiple transports to provide automated access to a complete day's programming from a central DJ location, with the subunits housed in a central control room, where editing and on/off loading from hard disk to Exabyte data cartridges could be coordinated.

New and improved

The AMS AudioFile is now available in an enhanced, higher-speed version utilizing Transputer technology. AudioFile+ now offers an enhanced set of macros for defining routine functions via softkey sequences and four-times play speed archiving to external magneto-optical disk storage. Under development is a 16-track version of the random-access recorder/editor, with an enhanced eight-hour storage capacity.

DIGITAL DOMAIN

The system can also be cued via external contact closures, for replay of stored sound files in the digital equivalent of a digital "jukebox."

Studer-Editech was demonstrating a new four-channel version of its product, Dyaxis 2+2, which comprises two processors linked via controller software running on the Macintosh workstation. The company is currently evaluating a variety of archiving formats, including C-3 Data DAT (a more robust format than conventional audio DATs, in which each byte of stored information being stored is checked after it has been printed to tape) and erasable magneto-optical media.

Other options soon to be offered for the Dyaxis Series include real-time EQ with low/highpass filters and a three-band parametric section, selectable for mono or stereo modes, plus a digital fader and gain-trim functions.

New England Digital demonstrated new backup formats for its Post Pro systems, including Data DAT, plus various DSP (digital signal processing) options, including real-time parametric EQ and mixing. ABC Watermark, North Hollywood, currently uses a Post Pro system to prepare Shadoe Stevens' "Top 40" program, by storing the various music cuts to hard disk and then recording his narration elements directly into the

(continued on page 34)

How to Add Phantom Power

by Bruce Bartlett

Elkhart IN If your studio uses condenser microphones, remember these devices need power to operate their internal circuitry. Some use a battery. But batteries wear out, and if this happens on the air, you'll hear a weak or distorted mic signal.

It's better to remote-power each condenser mic with a phantom power supply. This month's column explains phantom powering—how to use it and how to add it to your mixer.

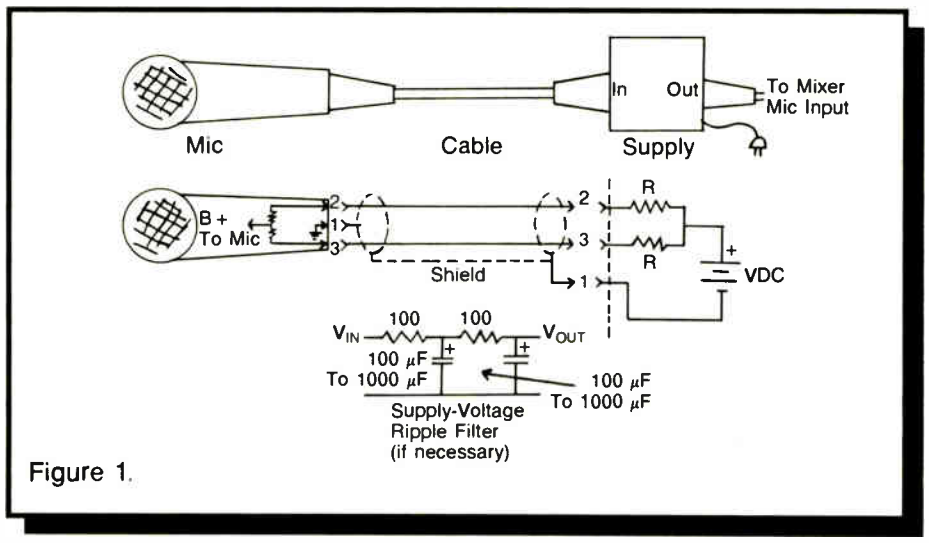


Figure 1.

LINE OUT

Phantom power is supplied to the mic through its 2-conductor shielded cable. The power can be supplied either from an outboard box or from your mixing console (at each mic connector). The microphone receives power from, and sends audio to, the mixer along the same cable conductors.

According to DIN standard 45596, phantom powering is a positive voltage (12-48 V) on XLR pins 2 and 3 with respect to pin 1. The cable shield is the supply return. There is no voltage between pins 2 and 3. Pin 1 is ground, pin 2 is audio in-phase and pin 3 is audio return.

You can plug a dynamic microphone into a phantom supply without damaging the mic. That's because the voice-coil leads are not connected to pin 1, so no current from the phantom supply can flow through them.

However, if there's any imbalance in the phantom voltage applied to pins 2 and 3, a current will flow through the microphone voice coil (which is connected to pins 2 and 3). For this reason, it's best to switch off phantom power for dynamic mics.

Circuit details

In a typical phantom power supply (Figure 1), a B+ voltage (say, 48 V) is applied through two equal resistors to pins 2 and 3. Inside the microphone, two equal resistors in series are across pins 2 and 3. For the microphone circuitry, B+ is taken off the center tap of the two equal resistors. (These are built into the mic; you don't need to add them.)

The power-supply resistors must be high enough in value so they don't load down the microphone and high enough to isolate several microphones from each other in case one mic cable shorts the supply.

These resistors also must be low enough in value so that, when the mic drains current through them, they don't drop the phantom supply voltage excessively.

If the resistors are too high the phantom voltage will sag when a mic is plugged in. The higher the current drain of the mic, the more the supply will sag.

You can buy a phantom power supply (Figure 2) from your microphone dealer. Some supplies are AC powered; some are battery powered. Some power a single microphone; others power several at once.

In any case, you plug the supply in series with the mic line. The supply has XLR-type input and output connectors, one pair per channel. Connect a mic cable between your microphone and the supply's input connector. Plug another mic cable between the supply's output connector and your mixer mic input.

Adding phantom power to a mixer

If your mixer doesn't have phantom power and you want to add it, here's how (refer to Figure 1).

First, find a well-filtered DC voltage in your mixer. Around 48 V is ideal; 24 V works with most microphones, but 15 V may be inadequate. If that's all you have, try to find a power transformer winding at about 48 V; full-wave rectify it and filter it as shown in Figure 1.

Apply the DC voltage through two equal resistors to pins 2 and 3. These must be matched within 1% so that the line stays balanced. The specifications below, based on DIN spec 45596, show which resistors to use:

- V supply: 680 ohms
- 24 V supply: 1.2 kilohms
- 48 V supply: 6.8 kilohms

(Warning: the 680 ohm resistors may load down a microphone excessively.)

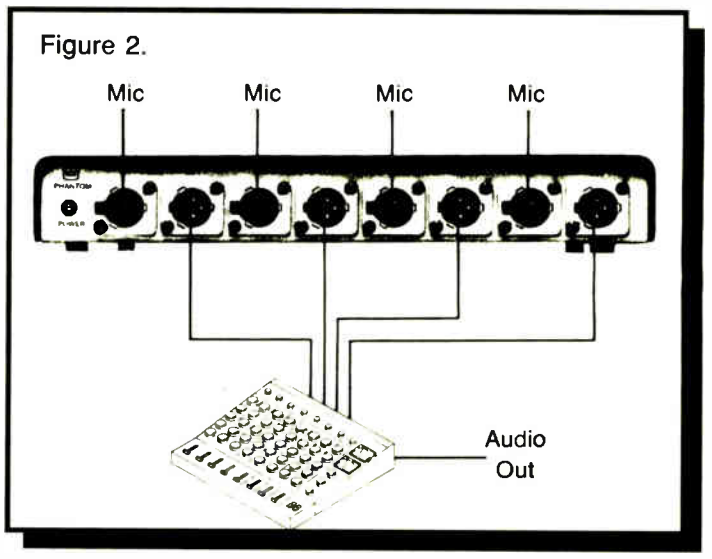
Solder a matched pair of these resistors to each mic input connector, pins 2 and 3. Supply all these resistors from a common voltage source.

Here's another method. Apply phantom power through one resistor to the ungrounded center tap of the mixer mic input transformer (Figure 3). Use these resistor values:

- 12 V supply: 340 ohms
- 24 V supply: 600 ohms
- 48 V supply: 3.4 kilohms

This method is not recommended. Any imbalance in the windings on either side of the center tap will cause phantom supply current to flow through the transformer, possibly magnetizing and saturating the transformer, which causes distortion. For best results, use a transformer with bifilar windings, or use the two-resistor method.

Figure 2.



Cautions for use

Don't plug a mic into an input with phantom already switched on, or you'll hear a loud pop. If you have no choice (as during a live concert), try to have the mic's fader down when you plug it in.

Have a spare 48 V supply in case the main supply goes down.

Avoid having phantom in a patch bay because someone is likely to patch in and cause a pop. If you must patch into a jack with phantom on it, mute the input module that the mic is connected to, or turn down its fader. Mic-level patches should be avoided anyway. Some phantom supplies cause a hum when

(continued on page 34)

Built to Survive The Morning Zoo

Don't let its stylish chassis fool you: Micromax® is engineered from the inside out to handle everything your crew can throw at it. The way DJs in a hurry sometimes "slam-start" carts, for example. Ordinary cart machines can't always keep up with that kind of treatment. But Micromax's belt drive flywheel/capstan and DC servo pinch roller motor roll with the punches—they deliver smooth, wow-free starts in as little as 60 milliseconds.

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Workstations Reach the SPARS

(continued from page 31)
system. Then, during a relatively simple editing sequence, the various intro and outros, plus asides, can be added to complete the finished material.

The Digital Audio Research SoundStation II currently offers 16-track capacity with up to eight hours of disk storage. Designed to behave like a tape-based editing system, the SoundStation's unique control surface comprises a touch-sensitive screen, edit wheel and several dedicated function keys.

Unique among most comparable designs, the DAR unit can perform background archiving and uploading from magneto-optical disc while the primary processor is performing real-time playback and editing of digital audio.

Doing production on a D.A.R.E.

Otari Corporation was demonstrating a pre-production version of its new Digital Audio Recorder and Editor (D.A.R.E.), which the firm is developing in conjunction with Digidesign and J.L. Cooper. A Macintosh IIcx/ci serves as a workstation that houses Digidesign's proprietary 64-times oversampled analog-to-digital plus Sound Accelerator 8-times oversampled D-to-A convertor cards with Apogee anti-aliasing filters. It is controlled from Digidesign's Sound Designer II recording, waveform editing, mixing, time compression/expansion and signal-processing software.

The new unit features a 350 MB hard disk capable of storing up to 60 minutes of mono sound files; subsystems will interconnect to provide additional track capacity, with optional magneto-optic drives.

A dedicated control surface features a scrub edit wheel, virtual transport controls for the built-in digital recorder, plus additional functions designed to replace/supplement the Mac's mouse and keyboard. Prices begin at $20,000 for a base system, complete with Mac controller.

Symetrix announced that its DPR100 Digital Processing Recorder will also be made available in a two- and a four-track version, in addition to its "flagship" 40-track system that is designed to function virtually as a completely integrated production studio. The entry-level recording and editing station, as yet unnamed, will offer full-function EQ, dynamics control and level-adjustment, and will come complete with object-oriented editing software and a dedicated control surface.

On the agenda

The primary topic during the subsequent panel discussion turned out to be standardized formats for exchanging sound files and edit information between workstations.

Addressing the first topic, several participants pointed out that both Audio DAT and Data DAT formats are finding increasing acceptance for both archiving and data exchange of two-channel audio, in addition to the familiar AES/EBU, IEC Type II ("S/P DIF") and other digital interfaces for short-haul data transfers.

For higher data capacities, and enhanced transfer rates, many companies are looking towards second- and third-generation erasable magneto-optical drives, using ISO3-format, 650 MB drives, plus WORM CD drives capable of recording 24-bit data at higher rotational speeds.

While data exchange was considered a vital feature, other participants pointed out that edit information and similar automation data (level, EQ, dynamics, etc) also need to be transferred between systems, so that projects can continue on the second platform.

Complete data interchange might remain a dream for the foreseeable future—few firms, after all, would be willing to give too much away concerning their unique marketing advantages. Still, several companies—including NED, WaveFrame and Solid State Logic—agreed to publish their respective interface protocols and file structures, so that disk and optical files can be read by "foreign" systems.

David Haynes, VP of engineering at Studer Editech, summarized the activities of various AES Committees, who are currently examining such topics. In addition to one committee that is currently discussing practical implementation of the AES/EBU I/O, a Synchronization Standards committee is considering how digital systems should be locked to one another at the bit-clock level,

A third committee is studying the use of labels to uniquely identify data streams; another is compiling various standardized measurement techniques for AES/EBU interfaces. A fifth committee is looking at timecode standards for DAT, edit-decision list standardization, and optical-disc formats for exchanging data between systems.

All in all, the quality of topics raised during the SPARS Business Conference was high, and their variety impressive. I would advise any **RW** reader to consider future gatherings closely; in this day and age of rapidly advancing technologies, any help from whatever quarter should be warmly welcomed.

■ ■ ■

Mel Lambert has been intimately involved with the production and broadcast industries on both sides of the Atlantic for the past dozen years. Now principal of Media&Marketing, a consulting service for the professional audio industry, he can be reached at 818-753-9510.

Phantom Powering

(continued from page 32)
you plug in a connector that ties the shell to ground. Float the shell. This also helps to prevent ground loops.

Since the cable shield carries the DC return, be sure the shield and its solder connections are secure. Otherwise you can expect crackling noises—especially when the cable is moved.

Power supplies are rated in the total number of milliamps they can supply. Make sure that the total current drain of all the mics plugged into the supply doesn't exceed the supply's current rating.

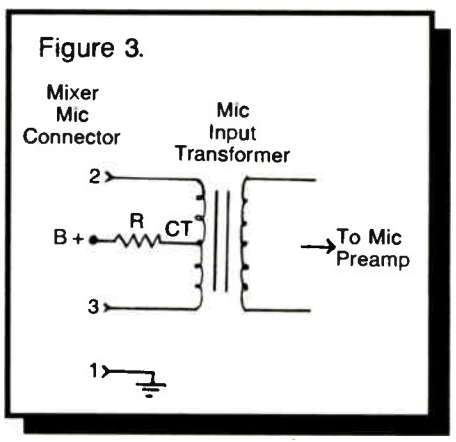
Some microphones work on either internal batteries or external phantom power. In most designs, connecting the mic to phantom automatically removes the battery from the circuit. Otherwise, the battery would severely load down the phantom supply. If this appears to be happening, remove the battery.

If a condenser microphone doesn't work due to low phantom supply voltage after the mic is plugged in, try these suggestions:

- Supply phantom from a better-regulated console.
- Use a mic with less current drain.
- Redesign the phantom supply as described in this article.
- Add a voltage regulator to the supply voltage.

By using an external phantom power supply, or by adding phantom power to your mixer, you can depend on reliable powering for your condenser microphones.

Figure 3.



■ ■ ■

Bruce Bartlett is a microphone project engineer and technical writer with Crown International. He can be reached at 219-294-8000.

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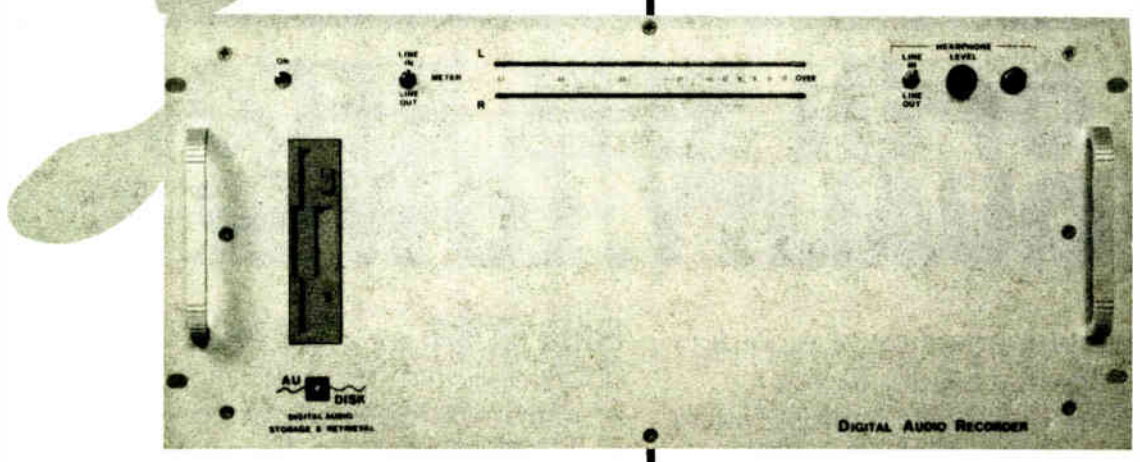

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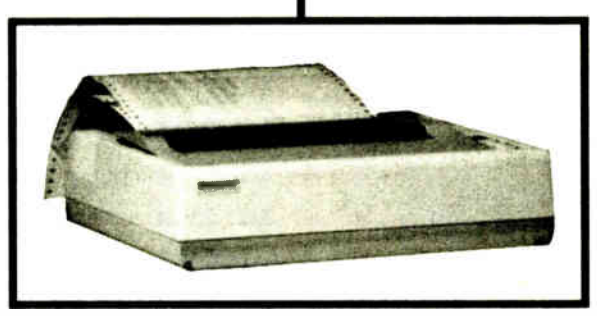

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Thieves Uproot Radio Liberté

by Dee McVicker

Port-au-Prince HAITI On March 10, 1990, someone pulled the plug on an AM station in the Caribbean. That someone also uprooted a 160 foot antenna tower, two transmitters and an STL system. In less than three hours, an entire AM transmission site was uplifted and stolen. Even the ground system was stripped bare from the earth that once supported Radio Liberté AM, located in the Caribbean country of Haiti.

"The only thing I can figure is they came in and carried it off," said traffic manager Linda Baker from the station's office in Wayne, NJ. In recent months, Radio Liberté's AM site, located in downtown Port-au-Prince, had been obstructed by a large gully left over from road construction. The only access to the tower site was on foot, over a thin plank.

The station's studio is located on top of a building in Port-au-Prince.

OFFBEAT RADIO

One can only guess that the tower and copper grounding were dismantled piece by piece to be hauled across the plank. As for the two transmitters—a 1 kW and a 5 kW—"I don't know how they got them out of there," said Baker. "Those transmitters weighed a ton."

Who could have carried off an entire AM radio transmission site? Hard to say, replied Baker, but she hasn't ruled out the possibility of a political coup.

At gunpoint

If so, it won't be the first time Radio Liberté has looked down the barrel of political opposition. In April 1989, machine gunfire sliced through Radio Liberté's AM and FM transmitters, causing over $10,000 worth of damage. This incident arrived on the heels of a Haitian rebellion doused by General Avril's soldiers, who reportedly saw to it that Radio Liberté transmitters were silenced.

The incident also followed a visit paid to Radio Liberté by American engineers, who had volunteered their services to increase the stations' signal strength (see **RW**, 8 March 1989). This work destroyed by gunfire, American engineers arrived in Haiti once again to volunteer their help. Within a month after being held at gunpoint, Radio Liberté was back on the air again.

This latest round, however, is taking a more exacting toll. According to Radio Liberté's Serge Beaulieu, estimated damages hover at $100,000. Independently owned by the US-based Caribbean Network System, which provides news of the Caribbean to news agencies around the world, Radio Liberté is lacking in funds and resources to pull off a speedy recovery.

Fortunately, Radio Liberté's FM station was not affected. "The FM they didn't get to," said Beaulieu. "I guess we were more prepared for the FM." But while Radio Liberté FM, located atop the windswept mountain peak referred to as "Boutilliers," remains on the air with its main signal on 94.1 and its translator on 96.7, the AM frequency of 1360 has been silent since March.

All that remains of Radio Liberté AM is an old 1 kW Gates transmitter that, previously used for parts, had been safely stored in the studio during the siege. Sorely missing are its 5 kW RCA and 1 kW Collins transmitters, antenna, TFT STL, Optimod processor, tower, ground system and a backup generator.

"You don't expect something like this to happen," said Baker, who explained that insurance is cost prohibitive in the unstable country of Haiti. All losses have been absorbed by the Caribbean Network System and by philanthropists.

Not wholly unexpected

The recent theft, however, was not a total surprise to Baker and those who have followed Haiti and Radio Liberté history. Licensed in the mid-'70s by Geneva officials, Radio Liberté' spent its first 15 years in gestation, waiting for the government of then Haitian leader Jean-Claude Duvalier to honor its license.

That day never came. In February of 1986, Jean-Claude Duvalier was ousted from power. Soon after, the commercial license for Radio Liberté AM and Radio Liberté FM was recognized and the stations went on the air to educate and entertain the listeners of Haiti.

Billed as the number one station in Haiti, Radio Liberté reaches an estimated three million listeners, a good majority of whom do not own television sets and rely on Radio Liberté as their primary news source.

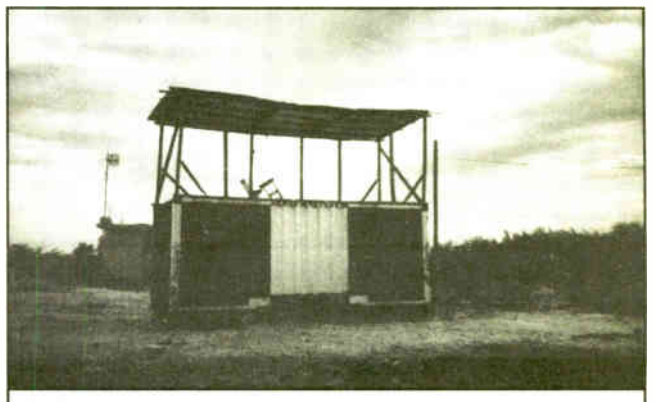
"TVs are rare (in Haiti)," said Baker. "But everybody has a radio, or if they don't have one, they can be near one."

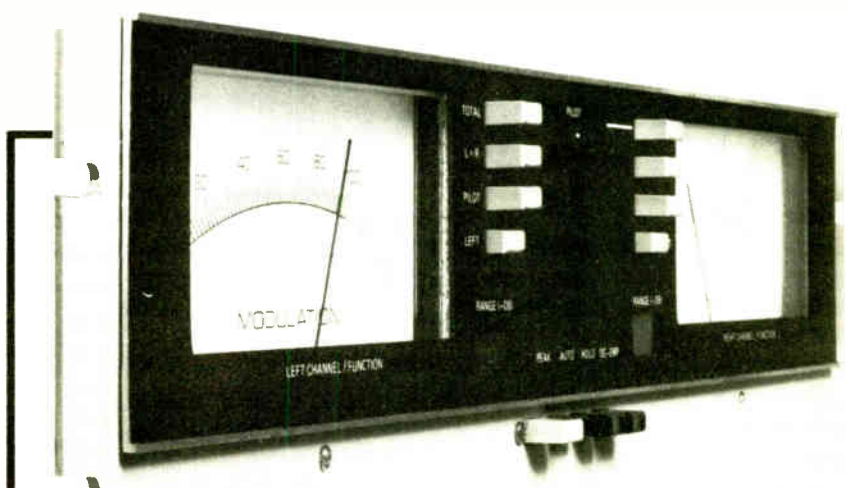
Loyalties and determination

In a country where political loyalties can change at the drop of a dollar, it is little wonder that radio stations are primary targets for partisan control. "All stations (in Haiti) are somewhat politically oriented. That's what makes the country go at this point," said Baker. Radio Liberté is a rare exception to the rule, an exception that those involved with the stations take pride in.

Serge Beaulieu and his American wife, Sondra Singer Beaulieu, both professional journalists, established Radio Liberté on the principle of objective, truthful broadcast journalism. In keeping with that commitment, said Baker, "we have interviews with people of all different persuasions, so we're not one-sided by any means. Everybody gets a chance to say whatever they want to say."

(continued on page 38)


Radio Liberté's transmitter house is located behind a container, which doubles as a bandstand.



Making Your Stereo Sparkle

by John "Q" Shepler

Part I of II

Rockford IL The promise of stereo is the captivating depth and sparkle that emulates a live performance. But the reality of many stereo signals is a disappointing flatness that sounds livelier than mono, but lacks that certain "something" the really outstanding stations possess.

What makes good stereo?

Stereo is two signals: left and right, right? Actually, stereo only begins and ends as two signals. It's what happens between the two recording microphones and the two loudspeakers that causes problems.

The very best you could do is run the live microphones directly into your monitor amplifier and adjust the balance control to even out differences in the mics and electronics.

A close substitute would be to record the performance on digital audio tape (DAT). Once again, the only adjustments would be setting the volume to a natural level and tweaking the balance between left and right.

What is preserved in these ideal arrangements is the frequency response and low distortion of the original signals and the electrical separation between them.

Separation is a major factor in the width or "bigness" of the stereo image. Any time the left and right channel signals bleed into each other, separation is reduced.

Q-TIPS

The AM and FM stereo broadcast schemes have an inherent weakness in that the left and right channels must be combined so they may be transmitted on a single channel.

The sum of left and right or L+R is on the main channel and the difference or L–R is assigned to a piggyback channel. On FM, this piggyback signal is an AM modulated high frequency subcarrier.

On AM it is phase modulation of the main carrier for C-QUAM systems. The Kahn system modulates the AM sidebands with the L and R stereo signals.

Understanding good separation

The stereo generator that combines the left and right channels to create the stereo composite signal has some touchy adjustments. In order to get really good separation, you have to set the input levels exactly the same, and align the stereo generation circuits for phase and amplitude. They tend to drift with temperature and time.

What is good separation? On FM, the FCC likes to see around 30 dB. Now, if you really have 30 dB across the audio band from source (and that means the phono test record, CD, or cartridge tape, *not* the board input) through the system and out the modulation monitor, you have pretty good but not awe-inspiring audio.

Some stations are probably lucky to have 10 or 20 dB of total, not just transmitter-measured separation. This is why they sound better than mono, but not exciting—even on a car radio.

Decent FM separation starts at 40 dB and gets exciting at 50 dB+. You can do this well if you want to work at it hard enough. Maybe even better.

Is separation the whole story? No. Sparkle comes from clean audio. Keeping the channels separated gets rid of some of the haze. The rest of the polish comes from lowering distortion and noise, flattening frequency response, and keeping the channels in phase.

Polishing your sound

Start at the beginning. Get a standard test record, CD and reel and cartridge tapes. Work on your source machines. Get them aligned to the standards and measure the noise, response, separation and distortion. This is as good as your material will ever sound.

Remember that the rest of the equipment in the audio chain from board through transmitter only degrades the source audio. Yes, processing adds punch and brightness, but the better your source material sounds, the more the processing can do.

Don't be afraid to spend a lot of hours working on tape alignment or equipment connections. There is no such thing as too finicky. Many stations throw away the inherent quality of their audio chains with dirty records and misaligned tape heads.

The next stop is the control board or automation switcher. The same considerations of low distortion and flat frequency response apply.

Each channel has a pair of amplifiers for the left and right signals. These amplifiers probably have better specs than the source equipment, but check them anyway. Circuit components may be slowly degrading.

Amplification and headroom

Two new problems may be introduced at this stage. First, the left and right channel levels may be amplified a bit differently. You don't want that. Remember, the stereo generator has a matrix to make L and R into L+R and L–R. Level differences degrade your stereo image.

The solution is to set the reference level on one channel and then adjust the other to be exactly the same. Some

(continued on page 39)

AM Station Stolen

(continued from page 37)

As commercial stations, Radio Liberté AM and FM also bring to Haitian listeners a mixture of entertaining programs. "We have United Nations programs, German programs; we have the Swiss international, (and) we have a heavy country music program. The people love country music. Sometimes we spend all night playing country music," said Serge Beaulieu.

But even on these nights, when country music is wafting through the air in this mysterious, troubled land, Radio Liberté is still in danger of getting caught in the crossfire of political unrest. "The threat is always there," said Serge Beaulieu, "(no matter what) is on the air, you get a threat the next day."

Nonetheless, Serge and Sondra Singer Beaulieu are determined to put the AM station back on the air. Currently, they are looking for a new tower site that will lessen the chances of falling victim to another political coup.

Stepping up security with employees manning transmission sites 24 hours a day is also a possibility, although this has been tried in the past with limited success. "We always tell them (Radio Liberté employees) to leave (if soldiers arrive)," said Beaulieu, should violence erupt.

In addition, a stockpile of backup equipment is on the Beaulieus' list, so that they will be able to bring the stations back on the air quickly should opposition again strike a blow.

But through it all, those involved with Radio Liberté are encouraged by the favorable reception of the Haitian people. "We are on the air now," said a determined Serge Beaulieu of the FM. "And we are still number one."

For those interested in donating equipment and/or engineering for reviving Radio Liberté AM, please contact Linda Baker at Caribbean Network System, 60 Brandon Avenue, Wayne, NJ, phone number 201-694-7733.

■ ■ ■

Dee McVicker is a free-lance writer and regular contributor to **RW**. *To inquire about her writing service, call 602-899-8916.*

Don't Be Pressured into Lying

by Harold Hallikainen

San Luis Obispo CA A recent letter outlined a difficult set of circumstances, somehwat similar to those covered in the 10 January issue of RW. In that issue, we discussed the chief operator's responsibility for station violations when management decides against making a required repair, leaving the station in violation of the rules.

INSIGHT ON RULES

In that case, we pretty much determined that the operator need not turn in the boss, but should leave a "paper trail" documenting the notification of the station licensee of the problems and the required solutions.

The more recent letter involves the chief operator being "forced" to sign the technical portion of an application (for station license), knowing that the application was inaccurate. The inaccuracies involved operation at other than authorized ERP through inaccurate statement of transmission line length.

Because transmission line efficiency is normally quite high, it appears that the gained ERP would be minor, but there was still a willful misstatement of fact on the application. This is a violation of 73.3513(d) and 73.1015. Willful misstatements of fact are punishable by fine or imprisonment.

This was not an easy situation to deal with: The station management required the operator to sign the application or be fired. If a technician finds her/himself in this situation, I'd suggest making a lot of phone calls before signing anything. The laws vary from state to state. I made a few calls. Here's what I found.

The FCC will hold both the station licensee and the operator responsible for supplying truthful information on an application. Before levying a fine, however, the Commission will consider the duress under which the operator signed the application.

Courses of action

Let's say you don't sign the application and get fired. I talked with the California Employment Development Department (which handles unemployment insurance). They would probably hold an eligibility interview to determine whether the employee is eligible for unemployment insurance. Both the employee and the employer would present evidence to support their sides of the issue.

EDD requires an employee to do what a "reasonable" person would do to maintain his/her job. If the employee did so and was still fired, the employee would be eligible for unemployment insurance payments.

It would not be considered reasonable for an employee to have to violate the law to maintain employment (the representative of EDD gave the example of an employer requiring the employee to sell cocaine). So, if you refuse to sign a false application, you can be fired and collect unemployment, as far as EDD is concerned.

The EDD representative said that there may be some remedy available through the courts. These may include reinstatement of employment (which may not be all that desirable), back pay, loss of earnings, etc.

The California Industrial Relations Department has "whistle blower" laws that protect an employee from retaliation for reporting violations of employment standards and occupational health and safety laws. They did not offer any real help in this situation.

The US Department of Labor also has whistle blower laws. These, howver, deal with public safety, such as environmental and nuclear concerns.

Finally, the State Department of Fair Employment and Housing handles discrimination cases only.

So, if you find yourself in this situation, before signing anything, make a bunch of phone calls. One call may be to an attorney. Once you have full information on all your options, you can make an informed decision between the "rock and a hard place." Good luck!

Reading antenna current

Last month we discussed a circuit that would allow the reading of antenna current without the effects of modulation. I spent yesterday going through microfilm copies of the Federal Register from 1952 through the present.

In 1963, the FCC first allowed the use of automatic equipment to record transmitter parameters. The technology of the times relied on chart recorders. There was, however, quite a discusson on reading antenna current without modulation.

Finally, on page 7378 of the 1963 Federal Register, the FCC authorized the reading of antenna current with modulation if the reading is not affected by modulation. There's nothing new!

By the way, pretty much the entire history of broadcast regulation is available in many libraries. Look for the Federal Register (typically on microfilm). The beginning of the first reel for each year includes an index for the entire year. Broadcast regulation is indexed under the Federal Communications Commission, Radio Broadcast Service (which includes television).

Remote antenna monitors?

Finally, a caller this morning asked about the requirement for remote antenna monitors. Although the remote control rules (73.1400 and 73.1410) do not specify what parameters are to be remoted, 73.69(a)(1) requires the antenna monitor to be remoted.

In this situation, the station was a daytime only directional. The station was going to have an operator visit the transmitter site once or twice a day to check the DA.

Although this appears adequate technically, the rules appear to require the monitor be remoted. Further, during a station inspection, I'd expect the FCC to ask the operator on duty to read the antenna monitor and interpret the readings (i.e., are they within limits, what are the limits, etc.).

Posted operator instructions should include how to interpret the antenna monitor readings. Some antenna monitors read loop currents while the FCC limits loop current ratios. The operator can either calculate ratios, deviations from licensed ratio, or check a limit chart that gives the minimum and maximum loop current for a variety of reference tower loop currents.

■ ■ ■

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

Give Stereo Sparkle

(continued from page 38)

boards make this easier with a difference or L–R meter. If the levels are balanced equally, the L–R meter should read zero for a mono test tone.

The second potential hazard is adding distortion on peaks because of lost headroom. Be sure the board distortion is the same with 0 dB and +20 dB signals at the same pot setting. Also check that the noise floor is inaudible—at least –70 dB or more down.

The output of the board should also be set for the desired level and left and right channels balanced exactly. Don't trust the meters alone.

Some boards have a separate meter calibration pot. Set the amplifiers with an external audio meter. Then adjust the meters to read 100% each.

A portable audio meter is a really handy device. You want a battery powered VU meter that can be switched through 10 dB ranges from –60 dB or –70 dB up to +20 dB.

Perhaps you can whip one of these up in the shop using a high grade op-amp, a couple of 9 V batteries, a rotary switch and resistors and a good—not bargain basement—VU meter. While you're at it, add another op-amp to drive headphones or a speaker.

In the next column, we'll look at making your stereo sparkle through the rest of the audio chain and out the antenna. For now, get to work on those studio sources.

■ ■ ■

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

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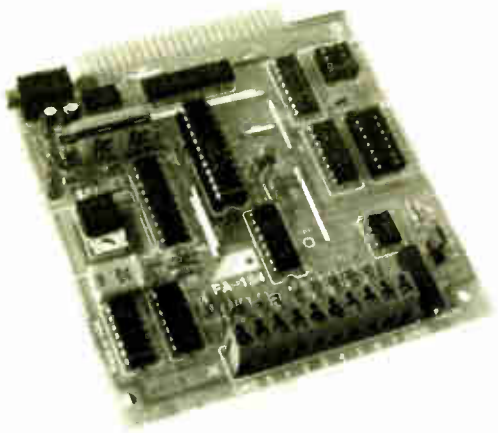
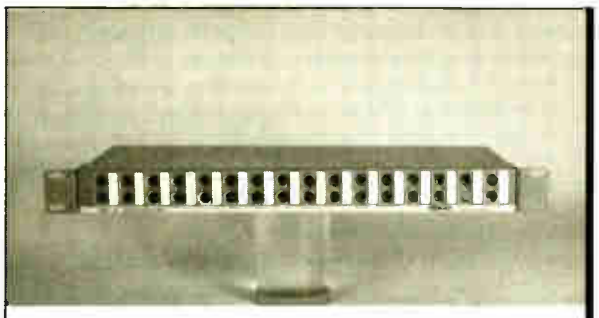


Analog converter

Alpha Products has introduced its FA-154 high-speed 12-bit analog to digital converter.

The conversion speed of the FA-154 is 10 μs and each of the eight input channels will accept 0-5 V signals at its input terminals.

For information, call **Kevin Tschudi at Alpha Products: 203-656-1806** or circle **Reader Service 67.**



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The APB 32 features 16 pairs of ¼ inch jacks (front and rear), 1 ¾ inch rack mount space saving convenience and screening for easier patch labeling.

For information, call **Lance Schmidt at Peavey: 601-483-5372** or circle **Reader Service 91.**

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For information, call **Henry Leal at Brian R. White Co.: 707-462-9795** or circle **Reader Service 112.**

Downconverter preselector

Microwave Filter Co., announces the model 6913 MMDS bandpass filter which can preselect the downconverter from interference at the receive site.

Model 6913 covers the passband of 2500-2686 MHz, and has a passband loss of 3 dB maximum and a rejection of 60 dB minimum at 2332 MHz. Impedance is 50 ohms.

For information, call **Elizabeth Buck at Microwave Filter Co.: 315-437-3953** or circle **Reader Service 72.**

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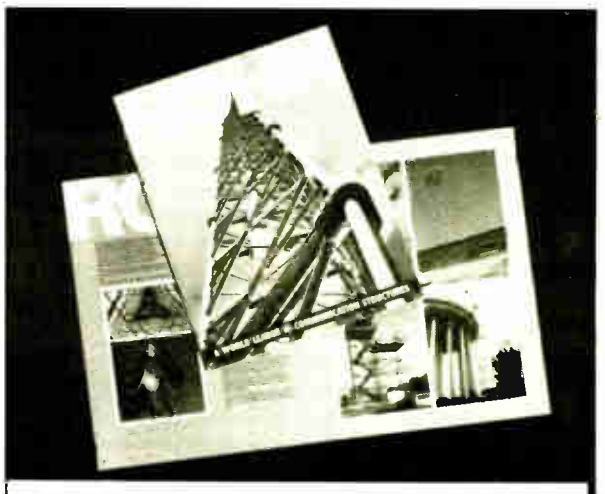
For information, call **Philip DeLangis at Verité: 213-832-1100** or circle **Reader Service 113.**



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For information, call **Richard Kleine at Rohn: 309-697-4400** or circle **Reader Service 25.**

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010	032	054	076	098	120	142
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017	039	061	083	105	127	149
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019	041	063	085	107	129	151
020	042	064	086	108	130	152
021	043	065	087	109	131	153
022	044	066	088	110	132	154

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Page No.	Advertiser	Reader Service No.
9	AKG/Orban	—
36	Allied Broadcast	22 & 115
16	Allied Broadcast	14 & 23
24	Allied Broadcast	51 & 120
38	Allied/Fairchild	40 & 123
26-27	Arrakis Systems	111
7	ATI	55
23	Audio Broadcast Group	79
6	Audiopak	30
19	Auditronics	33
43	Barrett & Associates	119
37	Belar	83
3	Bradley Broadcast	110
20	Broadcast Electronics	139
3	Broadcast Electronics	17
31	Broadcasters General Store	106
13	BSW	45
4	Burk Technology	147
29	Cancomm	141
24	CCA Electronics	52
15	Comrex	44
34	Comrex	38
8	Continental Electronics	114
30	Cortana	19
29	CRL	16
39	Cutting Edge	121
37	Dataworld	75
1	Fidelipac	70
14	Frankford Wayne Mastering	104
42	Full Compass	10
28	Harris	64
22	Hnat Hindes	13
22	Hnat Hindes	135
16	Holaday Industries	47
17	ITC	93
7	Jampro	31
8	LPB	6
21	Marti Electronics	2
14	Microwave Filter Co	68
34	Northeast Broadcast	150
18	Orban	50
25	Otari Corp	73
33	Pacific Recorders & Engineering	129
50	Peter Dahl	27
11	QEI	12
41	Radio Systems	127
10	Radio Systems	36
32	RF Specialties	56
12	Studer Revox	89
35	Studer Revox	59
21	Tannoy	144
49	Transcom	61
2	Wheatstone	81
51	Wheatstone	145
52	Wheatstone	87

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Want to Sell

Telex MC Series record amps (2), mono. M Young, WJON, St Cloud MN. 612-251-4422.

Scott 121-C preamp, mono, mint cond, minor input modification, $75. B Leslie, Pro Recording Srvs, 13709 Maple Leaf Dr, Cleveland OH 44125. 216-662-1435.

Amps including Hafler DH500, MacIntosh 250, API 705, Yamaha M40, SCS 2350, Soundcraftsman A2801 & Sunn Concert, call for details & prices. E Boucher, EAB Recdg, POB 958, Lewiston ME 04243. 207-786-3476.

LEL DA-8 dist amp, never used, $125; Gates Courier 70 2-chnl remote amp w/AC pwr supply, needs work; Gates Attache 70 3-chnl remote amp w/AC pwr supply, needs work. L Wilson, 409 Hillaire, Hopkinsville KY 42240. 502-886-1678.

Bogen 30 W stereo tube type integrated amp, vgc, no case, $75. M Saady, First City Recd, 141-60 84 Rd, 3E, Briarwood NY 11435. 718-846-2062.

Crown power amps DC-300 (2), $450; DC-300 II (2), $490; PS-400 (2), $650, all in excel cond. P Mobley, 300 Main St, Brookings SD 57006. 605-697-5326.

Crest P3500 power amp, 400 W/ch at 4 ohms, 2 spaces, $675. R McMillen, 3235 SE 39th, Portland OR 97202. 503-239-6070.

McIntosh MC-2500, sealed, BO; MC-240 (2), $1175; MC-40 (4), MC-225 (2), $575 ea. R Katz, Allegro Snd, 15015 Ventura, Sherman Oaks CA 91403. 818-377-5264.

MacIntosh MC40 (2), 40 W classic tube amps, new tubes, excel cond, $1000/pair, J Zelinger, Z Productions, 847 Twelfth St, Santa Monica CA 90403. 213-395-9636.

ITA RCFMA-1A tube type FM RF amp, $40; McMartin TBM 2500A tube type FM RF amp, $20. B Umberger, WNLT, 813-446-0957.

McIntosh C-4 mono tube preamp in gd working cond, w/D-8A power supply, $250 plus shpg. L Hoover, L.A.S. 325 Saude, Essington PA 19029. 215-521-2933.

Vital AA1A (11) audio DA in main frame, 1 input, 6 output, BO. G Mundkowsky, 12918 Smalley, Grandview MO 64030. 814-966-0731.

Want to Buy

WE, Marantz, Fairchild, Westrex, etc, amps, preamps, signal processors w/vacuum tube electr. D deForrest, 7441 Wayne, Ste 10-0, Miami Bch FL 33141. 305-866-5401.

WE, Westrex, Marantz amps, preamps & other vacuum-tube electronics. D deForrest, Insight Prod, 7441 Wayne Ste 10-D, Miami Bch FL 33141. 305-866-5401.

Dick Smith Electr Cat K-3442, 100 W high pwr amp PCB kit, prefer kit but will buy completed unit w/o pwr supply or enclosure. R Jordan, Southland Rec, 812 Young, Selma AL 36701. 205-874-8009.

Tube amps & remote mixers incl RCA OP-6, OP-7, BN series, BA & 80 series amps. B Davies, 5548 Elmer, N Hollywood CA 91601. 818-761-9831.

Scully '100' recorders, record/play amplifiers, 8, 16, 24 track heads. Sequoia Electronics, 1131 Virginia Ave, Campbell CA 95008. 408-866-8434.

ANTENNAS & TOWERS

Want to Sell

Phelps Dodge CP-1000-4 4-bay, circular, 102.3, all connectors, just removed, freq change. T Donnelly, KRJH, 111 N Main, Hallettsville TX 77964. 512-798-4333.

RCA 10 bay tuned to 92.9, approx 900' of 4" coax, both on ground ready to ship, will sell separetely, $12,000/BO. M O'Brien, KTGL, 3201 Pioneers Blvd Ste 208, Lincoln NE 68502. 402-483-6814.

Phelps Dodge CP 2 2 bay CP, 100.9 MHz, gd cond, $1000. A McCartny, KUIC, Fax: 707-446-0122.

Cablewave 750' 5" heliax, spooled. D Bischoff, KKCW, 12655 SW Center, Beaverton OR 97005. 503-643-5103.

Cablewave HCC 158 1-5/8" coax, 75', no connectors, $8/foot. R Biever, KDOM, 1450 N Hiway 60, Windom MN 56101. 507-831-3908.

Rohn 65G 300', 3 yrs old, guys, bolts, beacon, side lights, on ground in 20' sections ready for shipping, $12,000. M Blakemore, WCVP, Peachtree/Central, Murphy NC 28906. 704-837-2218.

Rohn 65G 90' in 4-20' sections & one 10', complete w/guy wire, insulators, bolts, anchors, will sell or trade for self-supporting tower. C Freinwald, KBSG, 1739 Minor, Seattle WA 98101. 206-343-9700.

Harris/ERI FML-3E 3 bay CP FM on 99.3 MHz; 370' Andrew HJ7-50A 1-5/8" transmission line, both less than 3 yrs old, avail in June. T Stine, KTXI, 106 Farrar, Cape Girardeau MO 63701. 314-335-9099.

1 5/8 " line 90 degree elbow, w/EIA flanges, $75. N Beaty, 2116 Osman Lane, Greenfield IN 46140. 317-326-3620.

Scala FMO-4 4-bay, plus pwr divider & coax cables, $550. S Lawson, KAK Prod, 928 Hyland, Santa Rosa CA 95404. 707-528-4055.

Swap 500' of Rohn 45 tower for 500' of Rohn 80 tower or other tower that will stack 500' high, BO, will pay cash for difference. K Diebel, KTJC, 1207 Louise St, Raysville LA 71269.

RCA TFU 30J Pylon antennas, one for ch 19, one for ch 48, both are down & ready to go, $25,000 ea or will consider exchange for production equipment or up & running used 60K on ch 19; need TBCs, VTRs & more powerful xmtr, are small market Christian UHF TV station. J McFarland, WLCN, 27 Grapevine, Madisonville KY 42331. 502-821-5433.

Phelps Dodge 3 bay CP FM tuned to 99.3 MHz, $1200 plus shpg; Jampro single bay CP tuned to 99.3 MHz, $400 plus shpg. B Downs, KISX, Box 131869, Tyler TX 75713. 214-593-4444.

Jampro 7 bay FM, JLCP-7/106.3 MHz, pwr gain 3.65, documentation, 200' of 1-5/8" Prodelin Spiroline w/EIA connectors, $4900/all. B Dickerson, WEAG, Starke FL 32091. 904-964-5001.

Comark 4-bay horizontal, tuned to educ band, gain 3.8, power input up to 1 kW, gd cond, $1800. R Franklin, Super Snd Stds, 211 Virginia, Norristown PA 19401. 215-277-7112.

Magnum 24"x150' w/guys & (3) fiberglass insulators, BO. S Hess, KDUC, 29000 Radio Rd, Barstow CA. 619-256-2121.

Gates/ERI Cycloid 3-bay, circularly-polarized w/input & interbay sections & de-icers, tuned to 95.3 MHz, BO. F Weller, KVNU, POB 267, Logan UT 84321. 801-752-5141.

Phelps-Dodge 3-bay Class A, 107.1 MHz, gd cond, $1500; Heliax 1-5/8" approx 90' w/flange connectors. B King, KLBU, 500 Leland, Austin TX 78704. 512-832-4061.

ERI G4CPH-10, 10 bay CP tuned to 96.1 MHz, Jampro Penetrator 10 bay CP tuned to 93.1 MHz, both in gd cond & avail now in Eugene OR, call for price on both systems. C Murray, KMGE, 503-484-9400 or R Sparks Scott, KSND, 503-686-9125.

ERI 4 bay CP FM w/deicers, rebuilt recently by ERI on 95.3, for sale due to upgrade, $2500. E Moody, KJEM, 216 N Main, Bentonville AR 72712. 501-273-9039.

ERI FMC-3E 3 bays on 95.9, working when removed for pwr increase, $1000. R LaFore, WQPW, POB 1327, Valdosta GA 31603. 912-244-8642.

Phelps Dodge ECFM-2 w/radomes 92.1, BO; Phelps Dodge ECFM-2 94.3, BO; Phelps Dodge ECFM-2 98.3, BO. Howells Audio, POB 6184, Kingman AZ 86402. 602-753-4915.

Antenna 92.1; 1-5/8" coax. R Whitlock, 512-792-4560.

ERI/Harris FMH6AE 6-bay high pwr FM Rototiller tuned to 94.9 MHz, $6000. W Boller, WGIL, 154 E Simmons, Galesburg IL 61401. 309-342-5131.

Heliax, 6" eliptical waveguide in various lengths, 100' lengths, some up to 200', BO. K Diebel, KTJC, 1207 Louisa, Reyville LA 71269. 318-728-4915.

Scala CA-4VV 2-bay w/(2) CA-2 antennas & matching harness for vertical polarization spacing, tuned low-band group, original 92.1 MHz, 50 ohms ea bay, 50 ohms harness input, gd cond, $450/complete. TX Valley Translator, 6903 Spring Garden, San Antonio TX 78249. 512-696-5615.

Andrew 7/8" foam LFD5-50A, 175'/$450, 275'/$750; Andrew 1/2" foam LFD4-50A, 300'/$300, 330'/$325. E Burkhardt, WLEE, 121 Wyck, Ste 300, Richmond VA 23225. 804-232-0300.

Phelps Dodge CPFM-12 12-bay high power antenna on 101.9, $3500. D Miller, KATP, 810 N Pierce, Amarillo TX 79107. 806-373-6777.

Harris/ERI FML-3E, 92.1 M, gain 1.5588, 3 bay circular, tower mounts, end feed, on ground, excel cond, $2150. L Halstead, KPNY, #2 Elmwood Grove, Gering NE 69341. 308-635-1996.

Collins remote meter/control panel 831 series, $100; Potomac remote meter panel RMP-19, $150; ERI Isocoupler 3-1/8" flanges, tunable, $500. W Blackwelder, KNUE, POB 7935, Tyler TX 75711. 214-581-0606.

Fort Worth 300' CATV tower, on ground, in Plover WI, fair cond, $500. R Kotas, WSFP, 10934 Bird Song La, Bokeelia FL 33922. 813-489-9580.

Gates/ERI FMA-8B 8 bay horizontal on 94.5 M, complete, BO. F Hellon, GNB Inc, Rt 1 Box 72, Plymouth IL 62367. 217-392-2340.

ERI 2 bay 1-5/8" 92.7 M. J Phillips, WZOM, 408-1/2 Clinton, Defiance OH 43512. 419-782-6591.

PiRod 60, 110' tower complete w/4 level strobe system, $130,000. A Warmus, 216-659-4440.

Gates ERI cycloid 3 bay, circuitry pwrd w/input, interbay sections & de-icer, tuned to 95.3 MHz, BO. F Weller, POB 267, Logan UT 84321. 801-752-5141.

Gates FMA-4 4-bay hor 10 kW tuned to 103.1, changes in adj up to 1 MHz plus or minus, BO over $2000. A Branch, KYAY, Box 1979, Decatur GA 30031. 404-325-7847.

Dielectric 6-bay, 1-5/8" FM antenna line tuned to 93.5 MHz; 10 kW isocoupler 1-5/8" line; 300' 1-5/8" heliax transmission line; Scala CL-FM yagi antenna for translator tuned to 93.5 M, new; 40 & 50' Andrews LDF-50A coax line. E Nearman, KUMU, 411 N Nimitz Hwy, Honolulu HI 96817. 808-531-4511.

Collins 2-bay dual polarized face mount FM antenna on 102.3, $1200; Electronic Research Type 402 isocoupler on 102.3, $600. W Christensen, KLOH, Box 456 West Hwy 30, Pipestone MN 56164. 507-825-4282.

Phelps Dodge 300' of 7/8" air dielectric Heliax w/flanges, gd cond; ERI 402 isocoupler, 10 kW; (3) ERI sample loops & isolation coils for AM directional monitoring, gd cond; Kintronics 3 wire lighting choke, new; Gates 2 wire lighting choke, in gd cond. C Gennaro, WJMT, 1018-A E Main, Merrill WI 54452. 715-536-6262.

AM Utility tower, 300', 26", all accessories, including beacon, side lights, flasher unit, guy wires & jonny balls, plus hardware, dismantled & ready to load, located in the Pacific Northwest. M-R-S, 110 North 2nd Ave #39, Chula Vista CA 92010.

Want to Buy

Tower, 350' & CP FM high pwr antenna on 93.3 or near by freq. E Moody, KJEM, 216 N Main, Bentonville AR 72712. 501-273-9039.

Self-supporting tower, 100'; ERI 2-bay rototiller, low pwr antenna. E Sutton, WOKI, 1900 Winston, Knoxville TN 37919. 615-531-2000.

Class A 3-bay on 98.9 plus or 2 chnls; also need a 10 kW FM xmtr in gd cond w/ 6-bay antenna on 98.9 MHz. J Maxton, KGGF, POB 1087, Coffeyville KS 67337. 316-251-3800.

24" face, 400' tower, also need coax. E Moody, KJEM, 216 N Main, Bentonville AR 72712. 501-273-9039.

Coaxial switch, 4 port 1-5/8" EIA flange, needs to be automatic type in gd working order; also need any type 6?R 1-5/8" flange or equiv. JP Connor, WSBY, Salisbury MD 21601. 301-742-5191.

Air-dielectric cable, (2) 200' sections of 1-5/8", 500' of 7/8" used Heliax or other low loss cable. K Diebel, KTJC, 1207 Louise St, Raysville LA 71269.

Rigid transmission line, 400' of 3.125". J Coursolle, WGGQ, 414-324-4441.

2 or 3 Bay tuneable to 96.3, radomes. L Maierhofer, 101 Armory Blvd, Lewisburg PA 17837. 717-523-3271.

High power circular 8 bay FM antenna at or near 107.7 MHz, also 3" line & fittings. T Smith, KSXM, Box 340, Pendhston OR 97801. 503-276-1511.

Need 3-1/8" to TYPE N female reducer thats reasonably priced & in working order. K Browall, Box 808, Riverton WY 82501. 307-856-2922.

ERI FML type, pre-1984 FML bays on or near 92.1 M, must be in gd cond. J Fellows, KCMA, 2021 S Lewis, Ste 760, Tulsa OK 74104. 918-747-9999.

AUDIO PRODUCTION

Want to Sell

ART DR1 digital reverb w/remote, MIDI. S Wytas, 165 Linden, New Britain CT 06051. 203-224-1811.

Eventide H-949 harmonizer, changes pitch & has prod effects built-in, $2250. W Waldron, KSOS, Layton Hills Mall, Layton UT 84041. 801-546-1722.

Shure M63 EQ, filter, $50. M Maciejewski, WMUS, 3565 Green St, Muskegon MI 49441. 616-744-1671.

Rane ME-15 stereo 2/3 octave graphic EQ, new cond, $250. M Osborne, WKSQ, POB 9494, Ellsworth ME 04605. 207-667-7573.

Outboard processing equip including dbx 167, Yamaha R1000, Eventide PS-101, Quad-B N8-120, Orban 111B, Deltagraph EQ-10, Furman LC3, Immedia BB23B, Altec A322C, Gates SA-398 & Eventide 1745, call for details & prices. E Boucher, EAB Recdg, POB 958, Lewiston ME 04243. 207-786-3476.

Various pieces of equip including ITC RP R/P cart machine; (2) 47" equip racks; 5 element Yagi antenna; (3) Switchcraft 96 jack patch panels; SMC 521 PB cart; MCI JH-110 & (3) Ampex AG600B R-R's; (5) RCA BFC antenna bays w/radomes; Heath GC1000 most accurate clock; (2) Marti RPT1/150K xmtrs; Scala PR-450U paraflector. M Young, WJON, St Cloud MN. 612-251-4422.

Orban 674A stereo para-graphic EQ, $575. M Maciejewski, WMUS, 3565 Green St, Muskegon MI 49441. 616-744-1671.

Shure M610 graphic mic EQ, $75. M Maciejewski, WMUS, 3565 Green St, Muskegon MI 49441. 616-744-1671.

Dolby 361 A NR (2), $450/ea plus shipping. M Holwin, Anamnesia Studios, 49 S Oxford, Brooklyn NY 11217. 718-852-7630.

Optimod 8100A exciter. R Whitlock, 512-792-4560.

UREI 575A 1/3 octave mono, $350; AKG 1291E1 stereo echo, $300; Inovonics 375 mono electronics, $200; ITC 854 mono electronics, $150; ESE 112LS slaves, $40/ea. E Burkhardt, WLEE, 121 Wyck, Ste 300, Richmond VA 23225. 804-232-0300.

Audio Digital TC 2 DDL digital delay/effects, 18K bandwidth, 2.25 second extended memory, 2 outputs, $575/BO; Dolby 361 A type NR SR ready, $1475/pr; Scamp mini rack, studio outboard gear w/F300S expander/gate, S01 compressor, S04 parametric EQ, S23 stereo autopanner, Anvil case, pwr supply, TT patchbay, $800/BO. R McMillen, 3235 SE 39th, Portland OR 97202. 503-239-6070.

Used equip inventory incl Texar Audio Prism w/Phoenix AM upgrade, $1500; Carousel 248-II & Carousel electr for parts, $350/BO; IMP-3 tri-band AM audio processor, needs work, $350/BO; Ampex 600 w/rack mount & Ampex 600 transport for parts, $400/BO; Magnecorder 1021 transport/electr in gd shape, & one for parts, $450/BO. M Johnson, KGAL, POB 749, Albany OR 47321. 503-451-5425.

Sony PCM 701, $1000; Lexicon 200, $2000; Scully 280B, $1300; Shure EQ's & room analyzers. D Kocher, DLK Snd Std, 1901 Hanover, Allentown PA 18103. 215-432-0520.

Klark-Teknik DN 405 EQ 5 band studio EQ, new cond, never rack mounted, $300. R Hull, 918-254-0464.

dbx 140A NR units (2), $300 ea or $550/both. T Cochran, KNOM. Box 988. Nome AK 99762. 907-443-5221.

Tascam M-30 mixer, one intermittent chnl, otherwise gd cond, $495/BO; Delta Labs DL-4 effect processor, mint cond, $200/BO. C Fries, KSQY, 666 Main, Ste D, Deadwood SD 57732. 605-578-3533.

Studio Sound S-305 passive filter sets (2), matched pair, rack mount, very rare, $250/BO/ea. R Katz, Allegro Snd, 15015 Ventura, Sherman Oaks CA 91403. 818-377-5264.

AUDIO PRODUCTION . . . WTS

Audio Design 1500 EQ's (3), 4 band, 14 frequencies, $40/ea. R Humphrey, WLIJ, 7 Parkway Ctr, Pittsburgh PA 15220. 412-922-9290.

Lexicon 1200 mono time compressor/expander interface to ATR's & VTR's, $700. J Zelinger, Z Productions, 847 Twelfth St, Santa Monica CA 90403. 213-395-9636.

McMartin audio processor & McMartin stereo gen, $250 ea or $400/both. G Gaskey, KWHO, 261 Main, Ste 6, Weed CA 96094. 916-938-3828.

Want to Buy

W A N T E D
DEAD OR ALIVE!
PULTEC EQ'S

Fairchild & Teletronix Limiters; Neumann, Telefunken, AKG, RCA, & Schoeps microphones. Tube McIntosh or Marantz amps & pre-amps. Sontec, ITI, & Lang EQs. Neve or API equipment. Boxes of old tubes; Urei, Orban, United Audio, DBX, & other outboard gear. Ampex ATR102s or 104s. Parts for MCI JH110/114 recorders. Altec 604s/crossovers/Tannoy speakers, JBL 2231; Altec 288h drivers; Misc. equipment of all types.

Please Call:
Dan Alexander Audio
2944 San Pablo Ave.
Berkeley, CA 94702
1-(415) 644-2363
FAX: 1-415-644-1848

AUTOMATION EQUIP

Want to Sell

Sono-Mag Carouosel, worked when removed from service, $600/BO. A Lane, WEHB, POB 2892, Grand Rapids MI 49501. 616-451-9904.

ATC fade start unit w/manual, $20; Gates ATC time announce control mdl TA w/manual, $15; ATC 55A silence sensor w/manual, $35. J Feasel, W64BG, 13549 Morse Rd, Pataskala OH 43062. 614-927-2592.

Colorado Magnetics NS-200-B Transtar network switcher, mint cond, w/fanout board & instruction manual, $600. N Allebaugh, WICE, 100 John St, Cumberland RI 02864. 401-725-9000.

SMC ESP-2 w/(4) Carousels, (2) SMC single play cart decks & (9) Otari reel PB units w/25 Hz sensors, $31K. M Ball, KWKL, POB 650, Wichita KS 67201. 316-265-1065.

Broadcast Products 2000 event automation system w/all cables & spares, $500/BO. R Maxwell, 114 S 4th St, Yakima WA 98901. 509-457-8115.

IGM Stereo Instacart 48 tray, $4000/BO. R Maxwell, 114 S 4th St, Yakima WA 98901. 509-457-8115.

Cetec/Schafer 902 1/2 2000 event; 3 Revox A-77, 2 Audiofile 2A; 3 equip racks, printer w/all cables, I/O cards & spare pts, avail in July, $7800. B Spitzer, POB 460, Rapid City SD 57701. 605-343-6161.

Harris SC-90 brain/switcher, (2) IGM Go-Carts, (4) ITC 750 R-R decks, all in gd cond, BO. R LaFore, WQPW, POB 1327, Valdosta GA 31603. 912-244-8642.

BE SAT 16 w/4 racks, 2000 event memory, Go-Cart, (3) Carousels, (2) Instacarts, (2) monitor racks, keyboard, printer, used w/SMN. G Magill, WHPA, POB 464, Hollidaysburg PA 16648. 814-695-4441.

Schafer 7000 Level 2 sys w/3 stereo Audiophiles & 2 add'l input cards, CRT terminal, logger, 3 racks, $9000. V Argo, POB 2277, Missoula MT 59806. 406-728-5000.

IGM Instacarts, one mono & one stereo, both 48 trays, $300/both; Otari ARS-1000 R-R reproducer, near mint, w/25 Hz sensor, $1000; Schafer Blue equip rack, $100; IGM 12 tray Instacart, $750. G Gaskey, KWHO, 261 Main, Ste 6, Weed CA 96094. 916-926-5946.

SMC 20 chnl (2) rack automation unit w/(3) 350 Carousels, twin cart unit & set up for satellite automation including DP-1 Brain, $4500/BO. J Hansen, KKSR, POB 699, St Cloud MN 56302. 612-253-9600.

SMC 352 RS Carousels (6), $800 ea/BO plus shpg. B Downs, KISX, Box 131869, Tyler TX 75713. 214-593-4444.

IGM 90 Cart 42 tray, $1200/BO. R Maxwell, 114 S 4th St, Yakima WA 98901. 509-457-8115.

Schafer 8000 automation controller, minicomputer w/CRT terminal, loggers, 3 rack cabinets, complete extra system for backup, $1500/both plus spare parts; SMC Carousels if purchased w/Schafer 8000 (4), $500 ea. G Gaskey, KWHO, 261 Main, Ste 6, Weed CA 96094. 916-926-5946.

SMC Carousels (2) 250's, (1) 350, $800/BO. R Maxwell, 114 S 4th St, Yakima WA 98901. 509-457-8115.

IGM 78 tray Go-Cart stereo bi-directional, BO. Howells Audio, POB 6184, Kingman AZ 86402. 602-753-5352.

SMC ESP2 w/remote controller, (4) Carousel 350's & (4) reels, $7000/BO. J Flynt, WSGY, 200 John Howard Way, Tifton GA 31794. 912-382-1101.

Shafer 903 w/(3) Carousels, dual cart machine, network card for satellite, plus extras, $6000. Tom, 509-522-9412.

SMC 12 chnl (2) rack automation w/(2) bi-directional Carousels, set up for satellite automation & complete w/DAS-12 audio switcher; MSP keyboard; (2) 721 twin carts; (2) 452 bi-directional Carousels; MSP 12 programmer; monitor, excel cond, 18 mos old, $23,000/BO. J Hansen, KKSR, POB 699, St Cloud MN 56302. 612-253-9600.

Harris 9002 automation system, 2 CRT terminals, racks, (4) Otari ARS-1000 R-R's, (2) IGM Go-Cart 24, spare parts, fully loaded, super clean, $7500. G Gaskey, KWHO, 261 Main, Ste 6, Weed CA 96094. 916-926-5946.

Satellite automation unit, complete in roll around rack, w/(3) Carousels, 1000 event Satmaster programmer, wired into 19" rack 84" high, in use now, $7500/BO. B Tolby, WMKO, Box 1129, Millen GA 30442. 912-982-5695.

Schafer 903E, & other equip for new KITE FM in Kerrville TX. R Whitlock, 512-792-4560.

MSP-1 10 chnl switcher/programmer for satellite, $2500/BO; interface, $2500/BO. J Hansen, KKSR, POB 699, St Cloud MN 56302. 612-253-9600.

Otari ARS-1000 DC (4), $800/ea, Persons programmer 3A, $425, Conex CG-25 25 Hz tone generator, $200, entire package for $3500. S Speheger, WCFY, 108 Beck Ln, Lafayette IN 47905. 317-474-4436.

SMC MSP-1 for live assist, satellite, or RTR automation, 4 yrs old, perfect cond, $3400. Can include Otari ARS-1000's & ITC 3-D & SP cart machines. D Doelitzsch, WDDD, 1 Bdct Ctr, Marion IL 62959. 618-997-8123.

Sentry controller w/PC card, (2) IGM Go-Carts 78 tray, IGM Go-Cart 24 tray, (3) IGM racks, software included, $12,500. T Noordyk, WSHN, 517 N Beebe, Fremont MI 49412. 616-924-4700.

Cetec Series 7000, 2×48 carts, (4) reels, (2) terminals. B Wilson, WLSM, POB 111, Louisville MS 39339. 601-773-3481.

Satcue 400 switchers (2) for Unistar formats, mint cond, $500 ea. D Igou, KGNB, 1540 Loop 337 N, New Braunfels TX 78130. 512-625-7311.

SMC RP-1000 brain, DS-20 switcher, PDC-3A clock, pwr supply, TS-25 tone sensor, (4) Otari ARS-1000DC, (4) BE auto rewinds, (4) SMC 352-RSB Carousels, (3) SMC racks w/doors, manuals, parts, SMC remote control, unlimited walkaway w/auto rewind units. E Nichols, KMCR, POB 189, Montgomery MO 63361.

Otari ARS-1000 w/25 Hz decoder (4), $1000; IGM Go-cart 24, $2500; SMC RP-1000 Brain w/DS-20 switcher & clock & TAC-1 time announce, $2700; (2) SMC 250 Carousel, one w/electr random select, one w/Schaffer random access, $350; SMC 721 dual cart PB in drawer, $500; SMC 710 single cart PB in drawer, $250. J Wenstrom, Wynne Bdctg, 503-882-4656.

DS-20 audio switcher; RP-1000 brain; time clock (4); 350-RSB Carousels; racks w/drs, pwr sup, wiring, etc (2); spare cards for Carousels, switcher & brain, extender card, all manuals, wiring charts, schematics, etc. $8000/all. Call C Ferguson, 701-852-4646.

Schafer 8000 automation controller, minicomputer w/CRT terminal, loggers, 3 rack cabinets, complete extra system for backup, $1500/both plus spare parts; SMC Carousels if purchased w/Shafer 8000 (4), $500 ea. G Gaskey, KWHO, 261 Main, Ste 6, Weed CA 96094. 916-938-3828.

Auto-Jock for automation, the economical & simple way. C Mandel, KAMP, POB 1018, El Centro CA 92244. 619-352-2277.

IGM Instacarts, one mono, one stereo, both 48 trays, $3000/both;Otari ARS-1000 R-R reproducer, near mint cond, w/25Hz sensor, $1000; Schafer blue equip rack, $100; IGM 12 tray instacart, $750; IGM Go-Cart 24, $1500. G Gaskey, KWHO, 261 Main Ste 6, Weed CA 96094. 916-938-3828.

Harris 9002, (2) CRT terminals, racks, (4) Otari ARS-1000 R-R's, (2) IGM Go-Cart 24, spare parts, fully loaded, super clean, $7500. G Gaskey, KWHO, 261 Main, Ste 6, Weed CA 96094. 916-938-3828.

Schafer 901-902 automation system w/(6) Teac/Schaferdeck R-R's & I/O cards, (6) cart I/O cards, (3) rack cabinets. E Nearman, KUMU, 441 N Nimitz Hwy, Honolulu HI 96817. 808-531-4511.

SMC ESP2, 2 yrs old and on air, includes (4) Carousels, (9) Otari R-R's w/25 Hz sensors, (2) cart PB units, (6) racks, (2) Amdek video monitors & studio remote unit, $30K. L James, KWKL, POB 650, Wichita KS 67201. 316-265-1065.

Complete automation system including CD28M, CD12C, CD28A, CD28P, (5) CD25S, (5) Revox A-77, (3) CD24R, IGM Instacart, Perma Power UPS, Pioneer Centrex monitors, 4-bay rack w/rear doors, cabling, manuals & schematics, spare parts & source cards, $15,000. G Elmer, Slew Tech, 1617 N Poinsetta Pl Ste 205, Hollywood CA 90046. 213-851-0870.

Live-Assist Tape System including (4) IT 750 Series PB only, stereo 25 Hz tone detect card, M.W. Persons mini-mixer includes count-up clock, cabling & hardware interfacing, $2300. G Elmer, Slew Tech, 1617 N Poinsetta Pl Ste 205, Hollywood CA 90046. 213-851-0870.

Want to Buy

Any commercial video insertion system, small to mid-range tape capacity, prefer 3/4" or 1". J Worrall, 4618 Gabriel Dr, New Orleans LA 70127. 504-241-6634.

25 Hz tone generator & R-R easy listening music library. E Moody, KJEM, 216 N Main, Bentonville AK 72712. 501-273-9039.

Insta-carts or Go-carts or Carousels. C Mandel, KAMP, POB 1018. El Centro CA 92244. 619-352-2777.

Schafer 800 manuals & clock for 800 Series. E Stanley, Standey Bdcts, Box 161X, Jeffersonville NY 12748. 914-482-3158.

IGM 48 tray Instacart, call or write, prefer seller within 200 miles driving distance. C Leasure, WTBO, POB 1644, Cumberland MD 21502. 301-722-6666.

Insta-Carts or Go-Carts or Carousels. C Mandel, KAMP, POB 1018, El Centro CA 92244. 619-352-2277.

Controller cards for Automated Bdct Controls, automation system, maybe interested in other parts for same. B Stevenson, KCRT, 100 Fisher, Trinidad CO 81082. 719 846-3355.

CAMERAS (VIDEO)

Want to Sell

JVC KY 1900 3-tube color camera, case, EFP AC pwr supply 10-100 Tamron zoom, $900. D Hurd, Box 853 Station A, Searcy AR 72143. 501-279-4658.

Panasonic WV 340 P B/W camera, pushrod zoom, $100. D Hurd, Box 853 Station A, Searcy AR 72143. 501-279-4658.

JVC KY 2000B 3-tube color camera, case, AC pwr supply, Anton Bauer battery bracket, mic holder, multipin cable for EFP, 10-100 Tamron zoom, $1000. D Hurd, Box 853 Station A, Searcy AR 72143. 501-279-4658.

Philips PCP-90, minicam, complete w/backpack CCU, lens, set-up panel & camera support harness, (3) 1" plumbicons, BO. G Spiller, BES Teleproductions, 6829 E Atmore, Richmond VA 23225. 804-276-5110.

Ikegami 305 w/24-400mm lens, CCU, cables, gd tubes, BO. A Weiner, 14 Prospect, Yonkers NY 10705. 914-423-6638.

Panasonic WV 360 P B/W camera, pushrod zoom, $100. D Hurd, Box 853 Station A, Searcy AR 72143. 501-279-4658.

Sharp XC-800 3-tube bdct color camera, Fuji 12X lens w/2X ext, 2L image enhance, road case, etc, excel cond, $3600/BO. R Jensen, Racine Telecable Corp, 5812 21st, Racine WI 53406. 414-632-3131.

Panasonic WVCD 20 B/W security camera, new, w/25mm & 8mm lens (2), $1900. D Hurd, Box 853 Station A, Searcy AR 72143. 501-279-4658.

RCA CC002 single tube color camera w/case & AC pwr, $150; Panasonic WV RC 30 Panasonic remote control unit for Panasonic 777 color camera, 50' of cable, $800. D Hurd, Box 853 Station A, Searcy AR 72143. 501-279-4658.

Sharp XC-800 3-tube broadcast color camera, Fuji 12x lens w/2x ext, 2L image enhancer, road case, etc, excel cond, $3600/BO. R Jensen, 5812 21st St, Racine WI 53406. 414-632-3131.

RCA TK44B studio cameras (3) w/full CCU, $3500/all. C Almasian, Tri-Core, 27503 Five Mile Rd, Livonia MI 48154. 313-427-8784.

Hitachi FP10 cables, AC pwr supply, 10:1 zoom hard shell case, manual, $1500/BO. D Garcia, 69 Pine, Waterberry CT 06710. 203-574-4857.

Want to Buy

JVC BY-110U & any related access, in particular, lens & mic access, send item & parts list. R. Lawrence, Moonshadow Video, 4280 Reston, Roseburg OR 97470. 503-679-8966.

Old Norelco, RCA, Bendix, Ikegami portable cameras, HL-33, HL-35, PCP-70, PCP-90, etc. A Weiner, 14 Prospect Dr, Yonkers NY 10705. 914-423-6638.

Old tube type RCA, Dumont, GE, Marconi, etc, & tripods. A Weiner, 14 Prospect, Yonkers NY 10705. 914-423-6638.

TK-86, TK-76 & HL-79 camera cases, (3/4) needed for reworking into remote kits for air travel, will pay freight, donation preferred but can pay a reasonable price. J Hart, 502-782-2052.

GE B&W studio camera; RCA TK-42/43. B Gentry, KA21VY, 622 Plymouth, Mattydale NY 13211. 315-455-7257.

Collecting old IO, Iconoscope b&w & color cameras. RCA, Dumont, GE. Also looking for early portable TV cameras, CBS, Bendix, Ikegami, etc. A Weiner, 14 Prospect, Yonkers NY 10705. 914-423-6638.

CART MACHINES

Want to Sell

Sparta 4520 (2) single cart players, operational & functional when removed, $100 ea; Tapecaster 700-P (2), $200 ea & 700RP, $350, no tones, in service, w/manuals. W Waldron, KSOS, Layton Hills Mall, Layton UT 84041. 801-546-1722.

MEI Digisound digital hard-disk cart recorder, great for automation, inc (2) 332 meg hard disks, (2) remote keyboards, tape drive, software & manual. System configured for 15 kHz stereo/mono, 76 minutes of stereo, 152 minutes mono storage or any combo, fully functional, low hrs, $10000. J Addie, WFMT, 312-565-5033.

Audi-Cord A Series dual R/P cart machine, working order, BO. R Meadows, Southeastern Sports Prod, 1203 Seaton Ste 117, Durham NC 27713. 919-544-1366.

Spotmaster 505, $250; Sparta delay, $150; Gates Criterion, needs work, $75; (2) BE 2000 RP, $750. J Phillips, WZOM, 408 1/2 Clinton St, Defiance OH 43512. 419-784-1059.

ITC 3 deck stereo, excel cond. J Arzuaga, POB 980, Quebradillas PR 00742. 809-895-4198.

Harris Criterion (2) triple deck repro, 10 yrs old, gd cond, $700/both. T Stine, KGIR, 106 Farrar, Cape Girardeau MO 63701. 314-335-9099.

ITC PDII mono play excel cond. G Beeker, 4110 W Bank Ave, Tampa FL 33624. 813-960-8153.

Tapecaster 700-P in gd cond, $100; Gates R/P (2) in gd cond, $175/ea plus shpg; Spotmaster PB, gd cond, $100. J Lee, BCI, 2139 10th Ave N, Lake Worth FL 33461. 407-547-0600.

RCA 4-Spot cart decks (2), $400 both/BO; Spotmaster Model 500 GRP (3); one Model 500C play only; Tapecaster Model 700 (2); one RP, one play only, BO. L Maierhofer, 101 Armory Blvd, Lewisburg PA 17837. 717-523-3271.

Broadcast Electronics 2100 RPS stereo R/P, $1650; BE 2100 PS stereo PB (3), $950/ea; BE 3200 RP/DL mono R/P w/optional delay, $1250, all very low hrs, like new. G Jones, POB 229, Uvalde TX 78802. 512-278-1545.

ITC RP cart recorder, $850; ITC cart machine rack mounts, will work w/Premium series cart machine such as RP, WP, etc, $20. G Gaskey, KWHO, 261 Main, Ste 6, Weed CA 96094. 916-926-5946.

ITC Delta record unit, new, record electr only, $650. R Thomson, KDKB, 1167 W Javelina, Mesa AZ 85202. 602-897-9300.

ITC Delta record unit new, $650. R Thomson, 1167 W Javelina, Mesa AZ 85202. 602-897-9300.

Dynamax CTR10, new, BO. Howells Audio, POB 6184, Kingman AZ 86402. 602-753-4915.

Tapecaster X-700 mono RP in gd cond, $200. T Stine, KGIR, 106 Ferrar, Cape Girardeau MO 63701. 314-335-9099.

ITC RP Premium stereo; RP Premium mono; SP high speed cue mono; (2) BE 2000 RP mono; Sparta RP mono & delay; Spotmaster 505; Gates Criterion. J Phillips, WZOM, 408-1/2 Clinton, Defiance OH 43512. 419-782-8591.

Sparta MC 104 PB's (4) plus spare in cabinet w/spare pwr supply, 150 Hz & 8 kHz Q-tones, $700. L Beigel, On-Cue Record, POB 85042, Los Angeles CA 90072. 213-466-3595.

SMC 570 PB unit. E Nearman, KUMU, 441 N Nimitz Hwy. Honolulu HI 96817. 808-531-4511.

ITC RP cart recorder, $850; ITC cart rack mounts, will work w/Premium series cart machines, $20. G Gaskey, KWHO, 261 Main, Ste 6, Weed CA 96094. 916-938-3828.

BE cart winder w/timer, $125. W Blackwelder, KNUE, POB 7935, Tyler TX 75711. 214-581-0606.

ITC RP Series cart machine w/all tones, $845. P Willey, POB 560, Bennington VT 05201. 413-663-3419.

ITC R/P 3 tone, $700. J Wenstrom, Wynne Bdctg, 503-882-4656.

ITC Premium RP rack mount, mono, excel cond w/low hrs & manual, $1150; ITC late mdl premium SP mono, less than 5 yrs old w/low hrs, rack mount w/manuals (4), $875. D Doelitzsch, WDDD, 1 Bdct Ctr, Marion IL 62959. 618-997-8123.

BE 5301 mono triple-deck cart machine, working cond but needs top motor bearing, $500. B Bicoy, POB 65, Medford MA 02153. 617-629-8476.

ITC RP stereo, 3 tones, excellent, $1250. ITC RP mono, 3 tones, excellent, $1050. ITC RA, $450. ITC RA, 3 tones, $500. Michael Brown, 503-245-4889.

Want to Buy

R/P cart machine w/tones, mono preferred, will trade for 6' equip racks. A Lane, WEHB, POB 2892, Grand Rapids MI 49301. 616-451-9904.

Erase/splice finder should be in gd cond, will consider unit in repair. B O'Connor, 4001 Brandywine St NW, Washington DC 20016. 202-364-3982.

ITC-SP & RP, must be in gd cond. E Stanley, Standey Bdctg, Box 161X, Jeffersonville NY 12748. 914-482-3158.

ITC PB & record. S Jeffries, Hwy 14 East, Mankato MN 56001. 507-345-4537.

ITC 3-deck working cond, mono, all tones. R Yaw, Box 7000, Havre MT 59501. 406-265-7841.

CASSETTE & REEL-TO-REEL RECORDERS

Want to Sell

Pioneer 1020L 3.75-7.50 ips, 1/4" 2 chnl, lots of 10" reels of tape included along w/editing supplies, $400. B Ford, Turbo Sound, POB 1052, El Granada CA 94018. 415-726-4786.

Tascam FP 70 ft SW for 3440 & 40 Series machines, $25; Tascam 44-480B extender service board, new, $20. R Cannata, Cantrax Recdrs, 2119 Fidler, Long Beach CA 90815. 213-498-6492.

Presto 800/908 7.5-15 ips professional plus rack, pick up in NYC, $1000. B Rose, Program Rec, 228 E 10th, NY NY 10003. 212-674-3060.

Telex CD2M & CD2S slave unit, 2 mos old, like new, duplicates 5 tapes at a time, $1700. R Meadows, Southeastern Sports Prod, 1203 Seaton Ste 117, Durham NC 27713. 919-544-1366.

Fostex 4030/4035 audio-for-video synchronizer, mint cond, $1000/BO. S Wytas, 165 Linden, New Britain CT 06051. 203-224-181t.

Ampex AG-350 FT in console, 7.50 & 15 ips, gd heads, service manual, vgc, $600/BO. R Barwig, Barwig Recording, 5254 W Agatite, Chicago IL 60630. 312-283-2820.

Sony PCM 701 ES, 14/16 bit, 2 chnl processor, turns any VHS/Beta recorder into a 2 chnl digital audio recorder, $1400/BO. B Ford, Turbo Sound, POB 1052, El Granada CA 94018. 415-726-4786.

Pioneer 1020L 3 3/4" - 7 1/2" ips, 1/4" 2 chnl lots of 10" reels of tape included, w/editing supplies, $400. B Ford, POB 1052, El Granada CA 94018. 415-726-4786.

Sony PCM-2500A, PCM-2500B R-DAT, used very little, $5,000/BO. T Noordyk, WSHN, POB 190, Fremont MI 49412. 616-924-4700.

Nagra IV LE FT portable, 7.50 ips w/crystal sync & resolver, case, ATN pwr supply & manual, recently overhauled, $2800/BO. R Barwig, Barwig Recording, 5254 W Agatite, Chicago IL 60630. 312-283-2820.

Studer A80 operation/service-parts manual for 1/4 to 2/" versions, $60 pls shpg. R Cannata, Cantrax Recorders, 2119 Fidler, Long Beach CA 90815. 213-498-6492.

Tape recorders including Otari MX7800, Teac 3340S, Scully 280, Revox A77, Hitachi D-E10, Nakamichi 550 & Sony TC124, call for details & prices. E Boucher, EAB Recdg, POB 958, Lewiston ME 04243. 207-786-3476.

Tapesonic stereo 2 trk 10.5 reels, 3 speed, $350; Crown 5X844 4 chnl R/P, 3 speed, mint cond, $700; Teac A4010S (2) 1/4 trk stereo, auto reverse, gd cond, $200 ea or $350/both; Telex 1422 2 trk stereo plus 1/4 head for PB (2), $350/both. J Parsons, 10375 Cannas, No Huntingdon PA 15642. 412-863-9590.

Century 21 Auto Seque for CD players, like new cond, works great, $3250; Revox PR-99 PB units (2) w/25 Hz tone detectors, $900 ea. W Waldron, KSOS, Layton Hills Mall, Layton UT 84041. 801-546-1722.

Scully 270 (4), PB only, $300 ea. E Moody, KJEM, 216 N Main, Bentonville AR 72712. 501-273-9039.

Ampex 351-2 2-trk, mint cond, one has original tube electr, other has Inovonics, both in roll-around, one walnut, one plywood. R Nelson, Tropical Bdct, 14093 SW 142 St, Miami FL 33186. 305-238-5024.

Otari MX 5050 BII, less than 1 yr old, perfect cond, complete w/tilt back sides, buyer pays freight, $2200; Otari MX 5050 4 trk 1/4" older unit but in great cond, heads like new, left brake needs slight adjustment, complete w/dbx NR, pre-wired, buyer pays freight, $2200. B Hanson, Reel Trax Prod, 209 E El Cortez, Columbia MO 65203. 314-449-8433.

Roberts 720 1/2 & 1/4", vgc w/case, $90 plus $10 S&H. P Salois, KPCR, POB 1 Hwy 54E, Bowling Green MO 63334. 314-324-2283.

Duplicators including comp Kaba cassette duplication system, Recordex DUP II, Pentagon C4322 7 Wollensak 2770AV, call for details & prices. E Boucher, EAB Recdg, POB 958, Lewiston ME 04243. 207-786-3476.

Telex 3 plus 1 high speed portable cassette duplicator, duplicates 3 cassettes at a time, $450. R Meadows, Southeastern Sports Prod, 1203 Seaton Ste 117, Durham NC 27713. 919-544-1366.

Otari ARS1000 7.5/15 ips w/tone detect, clean & complete, $900/BO. B Webster, WLIT, 150 N Michigan, Chicago IL 60601. 312-329-9002.

Ampex 440B (4) mono, complete, (2) roll around units, BO. J Stanford, WYLD, 2228 Gravier, New Orleans LA 70119. 504-822-1945.

Pioneer RT1020L 2 speed 10.5" 1/4 trk w/4 trk PB head, w/$200 in tape, some unopened, gd cond, recently tweaked, $400. B Ford, Spunk Prod, POB 1052, El Granada CA 94018. 415-726-4786.

Otari MX-5050B-II-2 tape decks w/stands (2), well maintained, very low hrs, $2250/ea plus shpg. D Glasser, Airshow Inc, 7021 Woodland, Springfield VA 22151. 703-642-9035.

Revox PR 99's (2) reproduce only; automation controller, all used only a few months, excel cond, BO. K Diebel, KTJC, 1207-1/2 Louisa, Rayville LA 71269. 318-728-4915.

Otari 5050 B II 2, rack mounted, $1775; Panasonic SV 250 mini DAT, 1 yr old, low hrs, perfect cond, $1800. R McMillen, 3235 SE 39th, Portland OR 97202. 503-239-6070.

Crown & Ampex CR tube decks (2); (2) Ampex AG-500 solid state; Ampex 350 stereo tube, $200 ea. C Elmasian, Tri-Core, 27503 Five Mile Rd, Livonia MI 46154. 313-427-8784.

Teac Syncaset 124, $200 plus $10/UPS. N Mishaan, POB 335, Lynbrook NY 11563. 516-582-1338.

Ampex 350 full trk transports w/Inovonics solid state R/P electronics & floor cabinets (2), $500/ea. G Liebisch, POB 29521, Raleigh NC 27626. 919-876-0674.

Ampex 440-C R/P, mono, Ampex electr, recently removed from srvs, gd cond, $650. B Norman, KFLI, 3200 N Willow Creek, Prescott AZ 86301. 602-776-3785.

Fostex 250 porta studio replacement motor, $50 or trade for Revox A77 remote. E O'Brien, Imperial Sound, RR 31 Box 405, Terre Haute IN 47803. 812-877-2663.

Otari MX5050 MK III 2 trk w/roll around stand, manual & remote, less than 60 hrs use, mint cond, C.O.D. pick-up only, $1400. G Finerman, Fintronics, 18 W Maple, Suffern NY 10901. 914-357-5419.

Otari ARS 1000 (2) in excel cond, $1500/both. M McAnalcy, WEKC, Williamsburg KY 40769. 606-549-3000.

Ampex 440-B R/P in Russlang cabinet, gd cond, $375. J Lee, BCI, 2139 10th Ave N, Lake Worth FL 33461. 407-547-0600.

3M M79 1/2" 4 trk in excel cond w/synch resolver, $750. G Zelinger, KCET, 4401 Sunset Blvd, Los Angeles CA 90027. 213-667-9310.

Tascam 44 4 trk 1/4", excel cond, $650, C.O.D. pick-up. G Finerman, Fintronics, 18 W Maple, Suffern NY 10901. 914-357-5419.

Revox A-77 3.75-7.5 ips, has record amps (3), $700/ea plus shpg. B Downs, KISX, Box 131869, Tyler TX 75713. 214-593-4444.

Teac X-300 1/4 trk, 3 motor transport, 3 head, mic/line mix, record mute, tape/source monitor select, new cond, $625. B McCue, WEXL, 317 E Eleven Mile, Royal Oak MI 48067. 313-544-2200.

TEAC 90-16 16 trk in excel cond, $7000/BO. B Kaplan, POB 644, St Cloud FL 56302. 612-253-9600.

Scully 255 reproducer 1/2 trk stereo, BO. Howells Audio, POB 6184, Kingman AZ 86402. 602-753-4915.

Revox A77 (2), one rack mount, one not, $350/ea or $500/both. E Moody, KJEM, 216 N Main, Bentonville AR 72712. 501-273-9039.

Ampex 440 deck w/Schafer stereo solid state PB electr, $250; Teac/Tascam 32-3 2 trk, stereo, dual capstan recorders, factory rack mounts, (4), virtual new cond, $750 ea. G Gaskey, KWHO, 261 Main, Ste 6, Weed CA 96094. 916-926-5946.

Otari MX-5050 Mark III-8 8 trk w/ext control input, excel cond. L Runge, WOI-TV, Communications Bldg, Ames IA 50011. 515-294-3880.

Scully 280B 4 trk half inch, gd cond, $995/trade. G Liebisch, POB 29521, Raleigh NC 27626. 919-876-0674.

Studer A80 1" 8 trk, 7.5/15 ips, 1100 hrs use, $8000. 212-645-6319 & leave message or B Mason at 212-242-2100.

Studer Revox HS-77 Mk IV special fact order FT mono, 15/7.5 ips, only 10 hrs use, wood case, mint cond, $575/BO. R Katz, Allegro Snd, 15015 Ventura, Sherman Oaks CA 91403. 818-377-5264.

Ampex 350 mono R/R w/Inovonics solid state rack mount, $500. A Baker, 804 E 38th, Indianapolis IN 46205. 317-925-7371.

Scully 270S (5) used very little, BO for one or all. L Maierhofer, 101 Armory Blvd, Lewisburg PA 17837. 717-523-3271.

Studer Revox port case for A77 w/mon spkrs & pwr amps, excel cond, $275/BO. R Katz, Allegro Snd, 15015 Ventura, Sherman Oaks CA 91403. 818-377-5264.

Ampex AG 350 mono R/R w/solid state electronics rack mount, $800. A Baker, 804 E 38th, Indianapolis IN 46205. 317-925-7371.

Studer B-77 1/4 trk, excel cond, recently checked out, $500/BO. R Herman, Frontier Radio Network, POB 9292, Austin TX 78766. 512-280-5691.

ITC 770 Series PB units, gd cond, one for $600, (2) for $1000, plus shpg. L Jones, Mediaworks, POB 625, Columbia SC 29202. 803-765-1133.

Otari MX5050 MKIII 2 trk, less than 60 hrs used w/roll-around stand, remote & manual, cash & carry, pick-up only, $1400. G Finerman, Fintronics, 18 W Maple, Suffern NY 10901. 914-357-5419.

Tascam 22-2 w/manual, needs some repair, $375. W Blackwelder, KNUE, POB 7935, Tyler TX 75711. 214-581-0606.

Otari MX 5050-II (2), 7.5-15 1/2 trk, one w/rack mounting & one in wood case, both excel cond, $1500 ea. R Rhodes, Roger Rhodes Music, POB 1550, NYNY 10101.

Ampex 440 deck w/Schafer stereo solid state PB electrs, $250; Teac/Tascam 32-2, 2 trk, stereo, dual capstan recorders, factory rack mounts (4), new cond, $750 ea. G Gaskey, KWHO, 261 Main, Ste 6, Weed CA 96094. 916-938-3828.

MCI R/P console R-R (2), complete w/mic/line meter bridge, pwr supply, tape drive elec, one unit is less capstan, $350/BO. C Woodrome, KVLL, 100 Spring Valley, Woodville TX 75979. 409-283-3734.

Inovonics 375 (4) & a mdl 370 w/Ampex R-R electronics; (3) Ampex 350's & one 354 R-R transports; (2) Teac R720 R-R transport. E Nearman, KUMU, 441 N Nimitz Hwy, Honolulu HI 96817. 808-531-4511.

Magnecord 1022 stereo (2), transports for parts, electr OK; (2) Magnecord 1021 mono, transports for parts, electr OK; Magnecord 1021 mono, in port case, gd cond; Ampex AG-600, mono, in port case, gd cond; (4) Scully 270's for parts, BO on all items. D Igou, KGNB, 1540 Loop 337 N, New Braunfels TX 78130. 512-625-7311.

Revox A77, $350. J Wenstrom, Wynne Bdctg, 503-882-4656.

Ampex AG 350 mono w/solid state rack mount, $800. A Baker, 804 E 38th St, Indianapolis IN 46205. 317-925-7371.

Ampex 350 mono, w/Inovonics solid state rack mount, $500. A Baker, 804 E 38th St, Indianapolis IN 46205. 317-925-7371.

Ampex 440 FT recorder in roll around console, $1250. B Blynder, TVA Inc, 11024 SW 112 Ave, Miami FL 33176. 305-595-9898.

Inovonics 375 (2) w/R/P electr, like new w/interconnect cables, ZTR R/P head stacks avail, $400; Inovonics tension control for Ampex 351-354-440 tape recorders, all installation, wiring & sensors & manual, $300; Ampex 440-C R/P electrs w/spare VU meter, cards avail w/7.5-15 or 15-30 ips EQ cards, $225. W Helander, MRT Recdg, 4311 Miranda, Palo Alto CA 94306. 415-948-0972.

Scully 280B (6), gd cond, rack mountable, $1800; Scully 280B (2) sets R/P electronics, BO. T Ray, WTIC, 1 Financial Plaza, HTFD CT 06103. 203-522-1080.

Want to Buy

Ampex AG500 for parts. D Ibel, KICD, 2600 N Highway Blvd, Spencer IA 51301. 712-262-1240.

Tascam 32 1/4" 2 trk in new or reconditioned reel motors, reasonable, will consider cash &/or trade AT&T Comkey 416 phone system, complete w/cables, punch block & box. H Hart, Media Prod, 9440 Montego, Shreveport LA 71118. 318-687-6745.

Revox A-77 remote control, rack mounting housing & roll-around/tilting rack. B Harwell, Compact Disc Jockey, 2409 Wynncrest Crs, Ste 6104, Arlington TX 76006. 817-633-8462.

Otari 4 or 8 trk. S Jeffries, Hwy 14 East, Mankato MN 56001. 507-345-4537.

ITC 850 service manual. K Scheffel, 9 Cougar Rd, Edwardsville IL 62025. 618-692-9798.

Revox A77 remote control. B Berry, Karavan Bdct Srvs, 13 Montgomery Pl, Conroe TX 77384. 409-273-2801.

Instructions/manual for Eumig FL-1000 cassette recorder, also interested in buying used FL-1000. B Harwell, Compact Disc Jockey, 2409 Wynncrest Crs, Ste 6104, Arlington TX 76006. 817-633-8462.

ITC 750 PB-only decks for standby use, parts (2). K Browall, Box 808, Riverton WY 82501. 307-856-2922.

Ampex MR-70 working 2 trk in original cond. D deForrest, 7441 Wayne 10-D, Miami Beach FL 33141. 305-866-5401.

ITC-750 stereo PB deck for spare, fair-gd working cond. K Browall, Box 808, Riverton WY 82501. 307-856-2922.

ITC 3D & low price reel. E Nichols, KMCR, POB 189, Montgomery MO 63361.

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 ATR100 taperecorders for parts. Circuit cards, heads, motors, machine parts, or electronic parts. Call 818-907-5161.

CONSOLES

Want to Sell

LPB S515A 8 input mono Signature II console, gd working order, $950/BO. K Kushnir, Empire Comm, 2120 Bluebell Dr, Santa Rosa CA 95403. 707-545-8300.

Consoles including API 2042, Altec 250T3 & Damon 5200, call for details & prices. E Boucher, EAB Recdg, POB 958, Lewiston ME 04243. 207-786-3476.

Sparta A-10B mono 4-chnl board, excel cond, w/manuals. B Weiss, KJLA, 3435 Broadway, Kansas City MO 64111. 816-753-7707.

Tascam 10, 12 in 4 out, $550. A Weiner, 14 Prospect, Yonkers NY 10705. 914-423-6638.

Auditronics Series 110-4 6 input mod 4 output comes w/3' prod table, 2 trk Scully 280, all working, BO. J Caracciolo, WORE, 1600 Stewart, Westbury NY 11590. 516-832-9400.

Studiomaster 16 input mike chnls 4 or 2 ouptut chnls, BO. L Shew, Techni Sound, 9731 Acacia No 14B, Garden Grove CA 92641. 714-530-9490.

Teac/Tascam 2, slide pot, 6 chnl, $150. G Gaskey, KWHO, 261 Main, Ste 6, Weed CA 96094. 916-926-5946.

Quantum QM-8, 8 inputs, 4 busses, quad & stereo mon, etc, excel cond, $775/BO; Speck 16 inputs, 8 busses, etc, excel cond, $775/BO; Snake, 16 phantom-pwrd inputs w/ext ps, 250' Belden 19-pair cable w/mil connectors & stainless-steel strain reliefs, etc, excel cond, $750/BO. R Katz, Allegro Snd, 15015 Ventura, Sherman Oaks CA 91403. 818-377-5264.

Gately 16x8 w/EQ 4 effects buss, quad monitoring Canon connector for line & Mic inputs & Canon connectors for outputs, $2800. A Baker, 804 E 38th, Indianapolis IN 46205. 317-925-7371.

Broadcast Electronics 4 BEM 50 4 channel console, BO. J Sidote, POB 949, Welch WV 24801. 304-436-2131.

Ampro AC 85 8 chnl stereo dual, $1800; BE 150A 8 chnl, new, $1750. J Phillips, WZOM, 408 1/2 Clinton St, Defiance OH 43512. 419-784-1059.

CCA/QRK Futura Six slide pots fair to good, still in service, BO. L Maierhofer, 101 Armory Blvd, Lewisburg PA 17837. 717-523-3271.

Harris Stereo 5 3 mic inputs & multiple line level inputs, gd cond, BO. R LaFore, WQPW, POB 1327, Valdosta GA 31603. 912-244-8642.

CCA FM-AM 10 chnl radio studio board, $150. Roger, Master Promotions, 5792 E Edison, Tucson AZ 85712. 602-886-1853.

Wheatstone Audioarts 8X recording prod console, factory patch bay, excel cond, $11,500. D Kocher, DLK Snd Std, 1901 Hanover, Allentown PA 18103. 215-432-0520.

Ampro AC-10 dual mono board, mint cond, low use, $950. J Kreines, 5330 Kennedy Ave, Millbrook AL 36054. 205-285-6179.

Gates Diplomat M5700 program amps (3); M-6034 pre amps (3); M-6035 cue amps, misc parts (3), BO. D Dorwart, 570 N Plymouth Blvd, Los Angeles CA 90004. 213-468-8883.

Gates Gatesway 80 in gd cond, $700 plus shpg. J Lee, BCI, 2139 10th Ave N, Lake Worth FL 33461. 407-547-0600.

Sound Workshop Logex 8 20 chnl board w/complete EQ controls, console desk w/heavy metal stand, $2500. D Coffman, WSOR, 940 Tarpon, Ft Myers FL 33916. 813-334-1393.

Bi-Amp 1642 16 chnl, 4 sub masters, 2 masters, parametric EQ, stereo pans, phantom mic pwr, rack mountable, pwr supply, flight case, $850. B Hurley, Audio Chicago, 100 E Ohio Ste 618, Chicago IL 60611. 312-467-0170.

Gates II consoles (2); (4) Ampex 440 C recorders; (2) Metrotec 500 PB & one for parts; QRK TT w/arm & control; (2) UMC/Beau cart machine; UMC/Beau R/P, large quantity of spare parts for all this equip, $1150/all, FOB Ft Pierce. F Sherwood, WDKC, POB 1330, Ft Pierce FL 34954. 407-464-1330 or Fax: 407-464-8578.

BE 4550 4 chnl stereo refurbished & ready to go, $455. R Bronte, WWNT, POB 1828, Dothan AL 36302. 205-792-2161.

Sparta A15 5-pot news console. E Nearman, KUMU, 441 N Nimitz Hwy, Honolulu HI 96817. 808-531-4511.

CONSOLES . . . WTS

Harris Medalist 10 10 chnl, stereo, excel cond, $1800. D Miller, KATP, 810 N Pierce, Amarillo TX 79107. 806-373-6777.

BE 8M20, mono 8 chnl, gd cond, $600. D Igou, KGNB, 1540 Loop 337 N, New Braunfels TX 78130. 512-625-7311.

Ramko DC8MS, 8 chnl 20 input stereo board, excel cond, $3850.00. R Trumbo, KNLF, POB 117, Quincy CA 95971. 916-283-4144.

Gates Producer w/new replacement pots, dual chnl w/q switch, not installed, 4 ch mono, could modify for stereo or mix minus, $150. L Beigel, On-Cue Record, POB 85042, Los Angeles CA 90072. 213-466-3595.

Harris Criterion 90 stereo play all tones, mint cond, $995. P Willey, POB 560, Bennington VT 05201. 413-663-3419.

Teac/Tascam 2, slide pot, 6 chnl, $150. G Gaskey, KWHO, 261 Main, Ste 6, Weed CA 96094. 916-938-3828.

Russco 505-S stereo 5 chnl, $700; Gates Producer 4 chnl mono, needs work, $75. W Blackwelder, KNUE, POB 7935, Tyler TX 75711. 214-581-0606.

Quantum QM-8 8 chnl, quad output, $900. W Blackwelder, KNUE, POB 7935, Tyler TX 75711. 214-581-0606.

Micro-Trak 6444B stereo, new; Ampro AC85; BE 150A 8 chnl prod, new; Ramsa WR-130; Heathkit mic mixer. J Phillips, WZOM, 408-1/2 Clinton, Defiance OH 43512. 419-782-8591.

Gately 16x8 w/EQ 4 effects buss quad monitoring cannon connectors for line & mic inputs and outputs, $2800. A Baker, 804 E 38th St, Indianapolis IN 46205. 317-925-7371.

Harris stereo 5 console, vg cond, $695. P Willey, POB 560, Bennington VT 05201. 413-663-3419.

Collins 121M-1 w/8 pots mono console. B Umberger, WNLT, 813-446-0957.

BE 4M50 mono 4 chnl mixer, little use, $400. P Russell, Bowdoin College, Sills Hall, Brunswick ME 04011. 207-725-3066.

Want to Buy

Howe 10,000 parts, cards, faders, new or used. A McCartny, KUIC, Fax: 707-446-0122.

Literature, manual, schematic for RCA console BC-2B, 1952 mdl. B Leslie, Pro Recording Srvs, 13709 Maple Leaf Dr, Cleveland OH 44125. 216-662-1435.

Sparta Centurian II stereo mixer modules, write w/price per module, will consider mixers which need work. D Proctor, WCPE, POB 828, Wake Forest NC 27587.

RCA & WE tube consoles, mixers, amps, TT's, speakers, mics, on-air lights, literature. R Van Dyke, Caffrey House, Squires Ave, E Quogue NY 11942. 516-728-9835.

Gates Dualux II power supply. D Ibel, KICD, 2600 N Highway Blvd, Spencer IA 51301. 712-262-1240.

Harris Stereo 80, 994-6867-002 manual or copy. J Meredith, WYTH, Box 635, Madison GA 30650.

Tube limiters, compressors & EQ's, Fairchild 660 & 670, Teletronix LA2a, LA3; any Pultec EQ's, Lang EQs, etc; Fairchild 660 & 670, Teletronix LA2a, any Pultec EQs or MAVEC, Lang EQs, etc. J Kreines, 5330 Kennedy Ave, Millbrook AL 36054. 205-285-6179.

Schematic for Tascam 2A & Tascam Portastudio 05; also need meter bridge for Tascam 2A mixer. R Mize, KZMK, 3514 Kings Court Way, Sierra Vista AZ 85635. 602-458-9631.

DISCO & SOUND EQUIPMENT

Want to Sell

DOD/Digitech 831-C graphic EQ, 31 band, as-new cond, $175. B Leslie, Pro Recording Srvs, 13709 Maple Leaf Dr, Cleveland OH 44125. 216-662-1435.

Roland TR-626 digital drum machine, programmable, mono/stereo/individual outputs, like new, $250. M Osborne, WKSQ, POB 9494, Ellsworth ME 04605. 207-667-7573.

Alembic 2 ch guitar preamps (2), Hiwatt L100R & Music Man 210, call for details & prices. E Boucher, EAB Recdg, POB 958, Lewiston ME 04243. 207-786-3476.

Keyboards including Arp string ensemble, Hammond C3, Hohner D6 clavinet, Fender Rhodes piano & Dubreq stylophone, call for details & prices. E Boucher, EAB Recdg, POB 958, Lewiston ME 04243. 207-786-3476.

Klipsch MCM-1900 3-way, $1800/BO. J Flannery, 8395-A Shallowcreek Rd, Liverpool NY 13090. 315-622-9199.

Guitars including ESP strat copy, Hamer electric, Applause AA14-1 & Fender F230 acoustic 6-string, Royce banjo, call for details & prices. E Boucher, EAB Recdg, POB 958, Lewiston ME 04243. 207-786-3476.

JBL 4502, JBL C50SM & Earth B12HC, call for details & prices. E Boucher, EAB Recdg, POB 958, Lewiston ME 04243. 207-786-3476.

dbx Boom Box subharmonic synth, regenerates super low bass, $125; JBL K140 15" speakers (2), $225. R McMillen, 3235 SE 39th, Portland OR 97202. 503-239-6070.

Fostex 765 studio reference monitors, like new, $225/pr. K Thomas, Rebel Recdg, POB 207, Atlantic Bch FL 32233. 904-388-7711.

JBL 4695, 4622 & 2445J 3 way Cabaret series PA system, excel cond, $2400. P Mobley, 300 Main St, Brookings SD 57006. 605-697-5326.

Peterson strobe tuner mdl 400, new cond, $250; Yamaha electronic piano mdl CP30, new cond, $795, formerly Gospeltrax recdg std, out of business. Twila Stoller, 2320 Eade, Ft Wayne IN 46805. 219-484-7390.

Community Light & Sound RS440 (1 pr) 4-way speakers w/Community VB790 bass bins, in Anvil cases, excel cond, $1600. J Kreines, 5330 Kennedy Ave, Millbrook AL 36054. 205-285-6179.

JBL 4350 (2) 15", (1) mid, (1) horn, (1) tweeter w/electronic crossover for biamp application, vgc, $2400/BO. R Nelson, 14093 SW 142 St, Miami FL 33186. 305-253-9240.

LIMITERS

Want to Sell

CRL SMP 850 stereo limiter, current mdl, excel cond, $1250. M Maciejewski, WMUS, 3565 Green St, Muskegon MI 49441. 616-744-1671.

CRL SGC800 AGC w/Dynafex NR, excel cond, $1250. M Maciejewski, WMUS, 3565 Green St, Muskegon MI 49441. 616-744-1671.

Orban 8100ST studio chassis for Optimod 8100 dual STL configuration, gd cond, $400. M Maciejewski, WMUS, 3565 Green St, Muskegon MI 49441. 616-744-1671.

Volumax 400 peak controller, AM, $100; Audimax III automatic level controller, AM, $100; FM Volumax 411 stereo peak controller, FM, $125. L Wilson, 409 Hillaire, Hopkinsville KY 42240. 502-886-1678.

UREI BL-40, $295; Comex bleepmate 675, $499; Lake patch bay, $79. C Dube, WSPR, POB 1270, Springfield MA 01102. 413-732-4182.

Spectra Sonics Complimiter, mono compressor/limiter, gd for dialogue, $150. G Zelinger, KCET, 4401 Sunset Blvd, Los Angeles CA 90027. 213-667-9310.

CBS Audimax 4450, BO; CRL APP-300, BO; (2) CBS Volumax 411, BO. Howells Audio, POB 6184, Kingman AZ 86402. 602-753-4915.

Modulation Sciences CP-803 Composite Clipper, $500/trade. G Liebisch, POB 29521, Raleigh NC 27626. 919-876-0674.

RCA BA-147 FM mono limiter, $200. G Liebisch, POB 29521, Raleigh NC 27626. 919-876-0674.

Aphex Type II aural exciter, BO. J Stanford, WYLD, 2228 Gravier, New Orleans LA 70119. 504-822-1945.

Texar/Gentner Audio Prism latest Model w/PR-1, new cond, never rack mounted, $1300. R Hull, 918-254-0464.

Optimod 8000A, BO. Howells Audio, POB 6184, Kingman AZ 86402. 602-753-4915.

McMartin audio processor & McMartin stereo gen, $250 ea or $400/both. G Gaskey, KWHO, 261 Main, Ste 6, Weed CA 96094. 916-926-5946.

CRL SEP-400B/PMC-300A, excel cond, both only 3-1/2 yrs old, $1100. T Stine, KGIR, 106 Farrar, Cape Girardeau MO 63701. 314-335-9099.

Harris/Gates AGC-994-6629-002 & M6631 Solid Statesman mono AGC & Solid Statesman mono FM limiter, both working when removed, w/manuals, $400/BO. J Durall, WJNZ, POB 494, Greencastle IN 46135. 317-653-9717.

Dual UREI LA-4 limiters in rack mount, $300. G Liebisch, POB 29521, Raleigh NC 27626. 919-876-0674.

Orban 8000-A gd cond, factory test results avail, $1500. D Karns, 915 E Broadway, Columbia MO 65201. 314-874-5676.

CRL AM4 mono (4), 3-1/2 yrs old, excel cond, purchase one or all, BO. M McNeil, Guardian Comm, 800 Compton, Ste 33, Cincinnati OH 45231. 513-931-8080.

Allison Research Gain Brain 700, single chnl, rack mount, Kepex 500, BO; Dorrough 310 DAP AGC peak limiter, update card, BO; Inovonics 230 multiband audio processor, update card, BO. T Liston, WOBL, Box 277, Oberlin OH 44074. 216-774-1320.

Orban 8000A, $1600; CBS Volumax 400, $150; CBS Audimax III, $150; DAP 310 tri-band, $250; (2) Harris/Gates 944 Solid Statesman, $300, all in mint/excel cond. D Igou, KGNB, 1540 Loop 337 N, New Braunfels TX 78130. 512-625-7311.

Harris MSP-90 tri-band AGC & AM limiter, mono, excel cond, new in '84 out of serv in '86, $500/both. R Hines, 250 W Court, Cincinnati OH 45202. 513-241-9500.

CBS Audimax 3 compressor, $100; CBS Audimax 3S stereo chasis compressor, $200; CBS Volumax 410 limiter, $100; CBS DPE 450 dynamic presence EQ, $100; Kahn SP58-1A Symmetra Peak, $50. B Umberger, WNLT, 813-446-0957.

CBS stereo Audimax 4450A. E Nearman, KUMU, 441 N Nimitz Hwy, Honolulu HI 96817. 808-531-4511.

Orban 9000A w/manual, $1200. R Ingram, KKMY, POB 4076, Beaumont TX 77704. 409-833-4400.

CBS FM stereo level control; Optimod 8000; CBS Audiomax; CBS Volumax; CRL AC 400. J Phillips, WZOM, 408-1/2 Clinton, Defiance OH 43512. 419-782-8591.

Want to Buy

CRL SEP400 or SEP800. M Maciejewski, WMUS, 3565 Green St, Muskegon MI 49441. 616-744-1671.

Altec 436 A, B, C, cheap. J Ganguer, 415-644-2363.

Fairchild 660 or 670, Teletronix LA2A, LA3, other tube compressors & limiters; & other vintage tube signal processing equip. J Kreines, 5330 Kennedy Ave, Millbrook AL 36054. 205-285-6179.

Texar Audio Prisms wanted pair plus RCF-5 audio card for Orban 8100-A. J Bahr, 154 Guajataca St, Crown Hills, Rio Piedras PR 00924.

Altec 436 A, B or C & Altec 438 A, B or C cheap. J Gangwer, 942 32nd St, Richmond CA 94804. 415-644-2363.

MICROPHONES

Want to Sell

EV RE-20, never used, $250. R Meadows, Southeastern Sports Prod, 1203 Seaton Ste 117, Durham NC 27713. 919-544-1366.

RCA 77DX, needs repair, $25. L Wilson, 409 Hillaire, Hopkinsville KY 42240. 502-886-1678.

Beyer M-160 double ribbon mic in perfect cond, $180. J Wayne, Silverdisc Prod, 405 Tarrytown Rd, Ste 444, White Plains NY 10607. 914-591-5240.

Schoeps CMC-55U (2) Colette Series 48V condenser mics w/switchable cardioid/omni, matched stereo pair w/addtl MK8 figure-8 capsule & suspensions for M-S recording, mint cond, $2650. J Wayne, Silverdisc Prod, 405 Tarrytown Rd, Ste 444, White Plains NY 10607. 914-591-5240.

Neumann KM-88, rare 3-pattern w/nickel capsule, hot-setup percussion mic, mint cond w/orig case, $875/BO; Neumann KM-86 3-pattern, mint cond, $675/BO. R Katz, Allegro Snd, 15015 Ventura, Sherman Oaks CA 91403. 818-377-5264.

RCA 44-A velocity bi-directional diamond shaped ribbon mic, a classic, yoke & shock mount intact, $550. R Franklin, Super Snd Stds, 211 Virginia, Norristown PA 19401. 215-277-7112.

Telefunken tube CM-61, very rare, uses std plug-in tube, mint cond w/custom ps, BO. R Katz, Allegro Snd, 15015 Ventura, Sherman Oaks CA 91403. 818-377-5264.

EV 1957 collectors edition 667 w/adjustable EQ preamp system, gold plated head & fittings, custom cables & mahogany case, documentation, new cond, $395. D Miller, Airborne Audio Prod, 11647 W 83rd Terr, Lenexa KS 66214. 913-492-8822.

Bruel & Kjaer 4007 high intensity, omni mic, phantom power, never used, still in wood box, ruler flat, $750/firm. B Ford, Spunk Prod, Box 1052, El Granada CA 94018. 415-726-4786.

RCA Classic ribbon mics, send for list. B Davies, 5548 Elmer, N Hollywood CA 91601. 818-761-9831.

Sennheizer 421's (2) in metal boxes. J Phillips, WZOM, 408-1/2 Clinton, Defiance OH 43512. 419-782-8591.

Sennheiser 2003 diversity UHF wireless receiver, new, $2500. B Blynder, TVA Inc, 11024 SW 112 Ave, Miami FL 33176. 305-595-9898.

Shure SM58 (2), new in box, less cable, $135 ea. G Mundkowsky, 12918 Smalley, Grandview MO 64030. 814-966-0731.

RCA ribbon mics including (1) 44-BX; (1) 77-D; KU3A10,0001; BK-11; BK-5; SK-46; WE639A, will trade for other high quality condenser, dynamic, ribbon mics & audio equip. Tracy Eaves, 615-621-6099 (evenings).

Want to Buy

Vintage tube condenser mics, Neumann, Telefunken, Schoeps, AKG & classic ribbon mics, RCA 77s, 44s; Telefunken ELAM 250s or 251s, any cond; AKG C12s & C24s, any cond; Neumann U47, U48, M249B, KM56, U67, etc, any cond. J Kreines, Demott/Kreines Films, 5330 Kennedy Ave, Millbrook AL 36054. 205-285-6179.

Altec M-20, M11 mics, capsules, windscreens shock mounts; Ampex ATR100 & AC-500 tape recorder field engr bulletin sets, booklets/ads. D Bisbee, 685 S Roys, Columbus OH 43204. 614-279-6163.

RCA top dollar and/or trade old RCA movie mikes for RCA (pre-4AA) ribbon-field coil mikes such as PB-17 or PB-31 etc. J Webb, 15117 Hamlin, Van Nuys CA 91411. 818-769-6738.

RCA 77DX/44BX non-working cond is ok. M Brooks, POB 106, Toccoa GA 30577. 404-886-2191.

RCA 44s, 77s & other ribbon mics, working or not, also WE. B Davies, 5548 Elmer, N Hollywood CA 91601. 818-761-9831.

Schematic for Altec 21B mics. R Robinson, 203-269-4465.

Fairchild F/22 power supplies (2) or AU7 condenser mics, buy or trade, also schematics on these. J Edwards, WRET, POB 4069, Spartanburg SC 29305. 803-599-0201.

Will buy or trade for RCA 4 AA condensor mike no major missing parts please. J Webb, 15117 Hamlin, Van Nuys CA 91411. 818-769-6738.

MISCELLANEOUS

Want to Sell

ADC 48 point patch bays, brass 1/4 jack's balanced & 1 is normalled, gd cond, $25/ea. R Cannata, 2119 Fidler Ave, Long Beach CA 90815. 213-498-6492.

Pro-Co cable, 500', 40 pair indv shielded, $1250. M Maciejewski, WMUS, 3565 Green St, Muskegon MI 49441. 616-744-1671.

Tascam 44-480B extender service board, new, $20. R Cannata, 2119 Fidler Ave, Long Beach CA 90815. 213-498-6492.

Onan 40 kW 3-phase diesel generator for emergency operation, $4500. Smokey, KMMC, 1703 Allondale, Amarillo TX 79106. 806-355-9777.

Wilkinson SIA3 240V, 3 phase surge protector, mint cond, $1800. G Gilbreath, KNPR, 5151 Boulder Hwy, Las Vegas NV 89122. 702-454-2085.

Tascam FP 70 FT SW for 3440 & 40 series machines, $25. R Cannata, 2119 Fidler Ave, Long Beach CA 90815. 213-498-6492.

ADC 2X 48 point 1/4" front patch bays, one normaled, one reg, $25 ea. R Cannata, Cantrax Audio Recdg, 2119 Fidler, Long Beach CA 90015. 213-490-6492.

PJ7 ADC stereo patch cords (4), $20. L Wilson, 409 Hillaire, Hopkinsville KY 42240. 502-886-1678.

Executone Equity telephone system, 20 phones & parts, $1000. A McCartny, KUIC, Fax: 707-446-0122.

Audio Engineering audio magazines, various issues 1947-1960. B Leslie, Pro Recording Srvs, 13709 Maple Leaf Dr, Cleveland OH 44125. 216-662-1435.

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MISCELLANEOUS . . . WTS

Elgar HIT-H7.5 7.5 kW isolation transformer, perfect cond, 120/240 V, $2600/firm. A Reis, TNL Resources, 308 Eastgate Court, New Lenox IL 60451. 815-485-7388.

Equipment inventory including Commodore 64 w/monitor & FSD-1 floppy disk drive, $150/BO; stereo monitor amp, gd cond, 30 W tube type, $75; Gra-Lab photo electric timer, $25; part of Gatesway manual & schematics, BO; Miratel Conelrad rcvr, BO. M Johnson, KGAL, POB 749, Albany OR 47321. 503-451-5425.

Tellabs 4008 equalizer modules (2) w/Tellab 1911 single card housing & transformers, $100/ea. N Beaty, 2116 Osman Lane, Greenfield IN 46140. 317-326-3620.

Jingles that sing K-95 FM & 3-40,000 bumper stickers that say I LOVE K95FM, BO. E Moody, KJEM, 216 N Main, Bentonville AR 72712. 501-273-9039.

Trompeter original gold J13-75 patch jacks, PN2BE-75 paralleling, PNS3/.625 & PNS4/.625, TPC-9-75. O Berliner, SounDesign, Box 921, Beverly Hills CA 90213. 213-276-2726.

Misc equip inventory including several hundred feet of RG-8U coaxial cable on reel (2), new, $50/reel; Gates 14425 audio transformer, BO; 4000' of #10 bare copper wire, 1000' rolls, $125/roll. M Johnson, KGAL, POB 749, Albany OR 47321. 503-451-5425.

Radio Systems TM-2R new, in original boxes, studio timers, $125/ea. K Thomas, Rebel Recdgs, POB 207, ATL Bch FL 32233. 904-388-7711.

Alden Electronics C2000R weather radar, 16 pgs of memory, telephone access to site, full color graphics, composite video or RGB interface to monitor. W Rossini, WLQR, 125 S Superior, Toledo OH 43602. 419-244-8321.

Data Signal MTI-700 modular telephone interface, BO; (3) RCA Tactec programmable trunking mobile telephone radios, BO; 3M fax machine, BO. Howells Audio, POB 6184, Kingman AZ 86402. 602-753-4915.

AT&T Comkey 416 telephone system, one base unit, 2 extension units, 2 incoming lines & 1 intercom path, expandable to 5 lines w/2 i/com & total of 16 stations, w/cables, punch terminal & box, $321.27 or trade for Tascam 32 reel motors. H Hart, Media Prod. 9440 Montego, Shreveport LA 71118. 318-687-8745.

Standard rack cabinets (3) 6' military spec, $75/all. G Gaskey, KWHO, 261 Main, Ste 6, Weed CA 96094. 916-926-5946.

Hammond REFK19035-24 rack cabinets (2) w/locking solid front door & louvered rear door w/lock, dual squirrel cage blowers w/filter for clean cabinet pressurization, Hammond RAVB-290 blowers, 35" vertical panel space & threaded rails in racks, gd cond, $350/ea. TX Valley Translator, 6903 Spring Garden, San Antonio TX 78249. 512-696-5615.

Tandy computers, mdl 600HD & mdl #2, in excel working cond, also (2) Tandy printers, sold together or seperate, BO. F Fess II, WLRB, 119W Carroll, Macomb IL 61455. 304-833-5561.

Rotron Blowers for Elcom, CCA, CSI, McMartin, rebuilt & new. Goodrich Enterprises Inc. 11435 Mandersan St., Omaha, NE 68164 402 493 1886 FAX 402 331 0638

Dale SPA 200 power arrestor (2) for 3 phase wiring systems, new, BO. C Phillips, WXVO, POB 987, Clinton TN 37717. 615-457-2697.

Military rack cabinets (3) 6', 19", $75/all. G Gaskey, KWHO, 261 Main, Ste 6, Weed CA 96094. 916-938-3828.

RCA, Presto Etc, 16" disc recorders & other equip including blanks, needles & prerecorded discs. B Davies, 5548 Elmer, N Hollywood CA 91601. 818-761-9831.

Okidata 192 printer. E Nearman, KUMU, 441 N Nimitz Hwy, Honolulu HI 96817. 808-531-4511.

Bird 100 W load, 43, 2-slugs; ESE 301AE timer; McKay base & head. J Phillips, WZOM, 408-1/2 Clinton, Defiance OH 43512. 419-782-8591.

Video radio sales training tapes, 30 topics on 16 VHS tapes, $1500. R Trumbo, KNLF, POB 117, Quincy CA 95971. 916-283-4144.

Broadcasting collectables, including NBC Huntley-Brinkley report bumper slide, etc. P Dowie, Good Sound, 171 Drexel, Lnsdn PA 19050. 215-626-9322.

LEL SF101 splice finder, poor shape, motor works, not finding splice now, $40. B Umberger, WNLT, 813-446-0957.

Let the Government finance your new or existing small business. Grants/loans to $500,000. Free recorded message: 707-449-8600. (MN8).

Executone 'Encore' telephone system recentlly removed from computer store, 12 phone, punch blocks, options, cords, installation jacks, etc, priced low. Goodrich Ent, 11435 Manderson St, Omaha NE 68164. 402-493-1886, Fax: 402-493-1886.

MISCELLANEOUS . . . WTS

Grampian disc cutter heads 1D feedback; lead screws for 6N presto cutter; patch bays 24 inputs, patch cords; manuals for Ampex/Pultec/Altec etc,; 40 new tubes & resistors left; Sencore transistor & diode tester; Edital blocks 1/4" & 1" for tape splicing; Daven 600 ohms attenuators (silent);other items. Mr Oliver, 212-874-7660 in afternoons.

Presto 6N cutter lead screws; Capps disc cutting needles, new; heating stylus ampere boxes w/VU meter & control; Meissner mixer, 5 inputs battery operated; Canon plugs, 3-prong, male & female; Harmon-Kardon DPR7 mixers, new; Lafayette sine wave audio generator. Mr. Oliver, 212-674-7660 in afternoons.

Want to Buy

ARRL Radio Amatuer handbook, 1948 edition, gd cond, will consider 1947 & or 1949. N Allebaugh, WICE, 100 John St, Cumberland RI 02864. 401-725-9000.

Vintage equipment manuals, catalogs & related literature, especially want Fairchild, Langevin, Altec, etc & RCA broadcast equipment books. B Leslie, Pro Recording Srvs, 13709 Maple Leaf Dr, Cleveland OH 44125. 216-662-1435.

Manuals/catalogs for RCA, Dumont, GE sales. A Weiner, 14 Prospect, Yonkers NY 10705. 914-423-6638.

Telos 100 System, complete system which would include (3) Telos digital hybrids & switch console. H Reinders, WWDB, 5558 Hallie, Chippawa Falls WI 54729. 715-723-1037.

Maxitel 82 or any model telephone mixing unit remote bdct system. S Hess, KDUC, 29000 Radio Rd, Barstow CA. 619-256-2121.

WE any mdl amps, mixers, speakers, literature, Altec amps, speakers, top $ pd for WE amps. D deForrest, 7441 Wayne 10-D, Miami Beach FL 33141. 305-866-5401.

Manuals to convert Pioneer multi-play home units CD players to interface w/automation equip for music source of automated radio stations. 703-935-4541 (days); 703-935-9230 (aft 7PM EST).

50's & 60's style radio station clock, naval observatory time w/red light that illuminated on the hour, would like to know mdl number if it had one. B Berry, Karavan Bdct Srvs, 13 Montgomery Pl, Conroe TX 77384. 409-273-2801.

RCA On Air light old style in gd cond, cash or trade. F Beacham, 6201 Sunset Blvd #29, Los Angeles CA 90028. 213-462-2908.

Western Union studio clock, wall clock w/red light, brown case, cream color face, red hands. T Heathwood, Heritage Radio, POB 16, Boston MA 02167.

Schematic & service info for Olivetti electronic typewriter w/TV screen Mdl ETV-240; main flat drive belt for Pioneer RT-909 R-R. Q Morrison, KHLO, 913 Kanoelehua, Hilo HI 96720. 808-961-0651.

Lafayette radio catalogs, any yr before 1978. A Peterson, 117 Park Ln Ste 84, New Milford CT 06776.

Jazz record collections, 10" LP/12" LP bebop, swing, dixie, highest prices paid. B Rose, Program Recdgs, 228 East 10th, NYNY 10003. 212-674-3060.

MONITORS

Want to Sell

Rust SFM-19 19kHz signal & freq monitor, 107.9 Xtal; CCA AMM-1T mod mon, needs work, BO. L Wilson, 409 Hillaire, Hopkinsville KY 42240. 502-886-1678.

Belar RFA-2 AM RF on 1220 kHz, less than 1 yr old, mint cond, $400. T Stine, KGIR, 106 Farrar, Cape Girardeau MO 63701. 314-335-9099.

Delta amplitude mod controller, closed loop, w/optional Delta monitor board, excel cond, $1800. T Cochran, KNOM, Box 988, Nome AK 99762. 907-443-5221.

Ball Miratel 7-007-0200 AM air monitor, BO. T Liston, WOBL, Box 277, Oberlin OH 44074. 216-774-1320.

Gates M5774 tube type AM mod mon, $30; Gates 88F FM freq mon, $30; McMartin TBM 3500 tube type FM mon, $30; Collins 900 F1 FM SCA mon, $100; Collins 900 C2 FM stereo mon, $500. B Umberger, WNLT, 813-446-0957.

McMartin TBM3500B base band monitor w/low level card tuned & calibrated. Goodrich Ent., 11435 Manderson, Omaha NE 68164. 402-493-1886.

McMartin FM package (used), tuned & calibrated to your frequency. TBM 2500C RF amp, TBM 3500A main channel, TBM 2200 stereo, TBM 200B SCA all or part. Goodrich Ent, 11435 Manderson St, Omaha NE 68164. 402-493-1886, Fax: 402-331-0638.

Want to Buy

TFT 763 mono FM mod monitor, working or repairable. N Herbort, KBEN, POB 335, Carrizo Springs TX 78834. 512-876-2210.

Any older McMartin mod monitors. C Goodrich, 11435 Manderson, Omaha NE 68164. 402-493-1886.

MOVIE PROD EQUIP

Want to Sell

Auricon Super 1200 16mm sound, like new, complete w/(2) magazines opt & mag amp mic cases, cables, factory installed new mag head 12-120, zoom, $2200; GBC zoom 1.8 15-90mm, $175; Canon zoom 2.8 15-150, $225; Spirotone Fisheye 1.8 12mm, $90; Synchronizer 3 gang 35mm, new, $95 plus shipping. L Meister, 321 River, Nutley NJ 07110. 201-667-2323.

Eiki ST-OH 16mm sound movie projector, excel cond, $100; Schneider 360mm C-mount telephoto lens, marks on barrel, otherwise excel cond, $29. G Ormrod, GFO Prod, 432 East X St, Tumwater WA 98801. 206-352-8028.

Nagra III internal xtal, rolloff filter, Sennheiser 805 w/KAT 15, leather case, ATN pwr supply, excel cond, $1450; & new Bell & Howell 70 DR w/Anvil case, 1" Comat, instructions, $325. J Kreines, 5330 Kennedy Ave, Millbrook AL 36054. 205-285-6179.

Want to Buy

Mitchell 35 & 16mm cameras & accessories, other professional 16/35mm cameras, incl Arriflex, Aaton, CP, etc; optical printers, Research Products 1000, 1001, & Acme & Oxberry; cine lab equipment; upright Moviolas, especially 35mm. Westrex 35mm; optical recorders, & RCA & Maurer optical recorders; CP16s any condition; good cine optics (Zeiss, Ultra-T, Angenieux, Cooke, etc); also need Zeiss 9.5mm Distagon, reasonable, need not be mechannically mint. J Kreines, DeMott/Kreines Films, 5330 Kennedy Ave, Millbrook AL 36054. 205-285-6179.

RECEIVERS & TRANSCEIVERS

Want to Sell

Yamaha T760 digital AM/FM tuner auto search 10 pre sets, DX mode carton & manuals, excel cond, $75 pls shpg. R Cannata, Cantrax Recorders, 2119 Fidler, Long Beach CA 90815. 213-498-6492.

HH Scott Stereomaster 387 AM/FM rcvr integrated amp 100 W/ch, $90 or will consider trade for classic mic. C Brennan, Brennan VCR Service, 661 Horseshoe Curve, Pike Road AL 36064. 205-272-0692.

Marti RR30-150 dual freq rcvr. M Young, WJON, St Cloud MN. 612-251-4422.

Harris 6550 satellite rcvr chassis, incl pwr supply & downconvertor, no demod cards, gd cond, $400. M Maciejewski, WMUS, 3565 Green St, Muskegon MI 49441. 616-744-1671.

Motorola MT-500 hand held radios, VHF band 150 - 160 Mhz, 4 chnl w/scan, $800/all. C Hoffman, 251 174th St #404, Miami Bch FL 33160.

Motorola HT-220 VHF, single chnl, 2 W handheld w/built-in 2-tone pager, w/charger, $125; GE Delta S UHF, mobile for parts, receiver OK, $40. P Russell, Bowdoin College, Sills Hall, Brunswick ME 04011. 207-725-3066.

Motorola Micor FM 2-way radio less access, mdl T43RXA1900AA, 162-174 MHz, 12 VDC, $150. B Dickerson, WEAG, Starke FL 32091. 904-964-5001.

ICOM R-71A 100 kHz-30 MHz all mode AM/FM/SSB long wave, medium wave & shortwave communications rcvr, w/rack mount panel & monitor speaker, $1100 pls shpg (firm). B Coleman Jr, WIST, POB 460, Lobelville TN 37097. 615-593-2978.

ICOM R-7000 25 MHz-2 GHz all mode AM/FM/NB/WB/SSB communications rcvr, rack mount panel w/built in speaker, $1100 pls shpg (firm). B Coleman Jr, WIST, POB 460, Lobelville TN 37097. 615-593-2978.

Fairchild Dart 384 digital audio receiver terminal, in service less than 1 yr, $4300. E Sears, WXLW, POB 22300, Indianapolis IN 46222. 317-925-6494.

Moseley RPL-2 RPU rcvr tuned to 161.67 & 161.76. E Nearman, KUMU, 441 N Nimitz Hwy, Honolulu HI 96817. 808-531-4511.

Want to Buy

Wegener mainframe equipped for Transtar service. M Maciejewski, WMUS, 3565 Green St, Muskegon MI 49441. 616-744-1671.

Sony SRA100 port rcvr, RCA on-air lights. K Anderson, 2358 S Main, Salt Lake City UT 84115. 801-466-3196.

Motorola handheld radios UHF band, 460 MHz, models HT-600, MT-1000, or Radius P-200. C Hoffman, 251 174th St #404, Miami Bch FL 33160.

Motorola hand held radios, UHF band, 460 MHz, mdls HT-600, MT-1000 or Radius P-200. C Hoffman, 251-174 St, Ste 404, Miami Beach FL 33160.

TFT 760 or newer EBS rcvr-decoder & generator; Scientific Atlanta DAT 32 system satellite receiver & dish or Fairchild Dart system. S Hess, KDUC, 29000 Radio Rd, Barstow CA 619-256-2121.

Schematic for Avcom 100 EBS encoder/decoder, will pay reasonable copying & shipping. D Grant, WLAV, 50 Louis NW, Grand Rapids MI 49503. 616-456-5461.

REMOTE & MICROWAVE EQUIP

Want to Sell

Wilbert mast 7-30-357/367 heavy duty telescoping w/Dodge 150 custom van & 12 volt compressor, van interior customized w/deluxe RV front seats & carpeting, automatic transmission, cruise control, pwr steering, tilt wheel, AC, pwr heavy duty disc brakes, AM/FM stereo radio, all in gd cond, $8000. S Garfield, WYED-TV, 919-553-1700 —.

TFT 2601 10 channel digital remote control, excel cond, just removed from service, $1500. E Stokes, WCVR, POB 249, Randolph Ctr VT 05061. 802-728-4411.

MRC-1600 w/Moseley SCM-1 subcarrier generator. A Kord, WWRX, 401-732-5690.

Motorola MT-500's (3), VHF band 150-160 MHz, 4 chnl w/scan, $800/all, write for info to: C Hoffman, 251-174 St, Ste 404, Miami Beach FL 33160.

Wegener electronics for Transtar radio satellite service including 1608, 1601, 1689, (2) 1610, (2) 1644 & 2046, $3000. D Doelitzsch, WDDD, 1 Broadcast Ctr, Marion IL 62959. 618-997-8123.

Equatorial rcvr w/2' dish & LNA electronics, BO. M Maciejewski, WMUS, 3565 Green St, Muskegon MI 49441. 616-744-1671.

Scientific Atlanta 4.5 meter C-Band satellite dish, $1200. D George, WSSM, POB 4304, Madison WI 53711. 608-276-3541.

Gentner SPH-4 telephone hybrid, lots of features, looks great, stored for 2 yrs, $450; Fon-Box telephone coupler, complete interface for bdctg, works fine, $150. D Doelitzsch, WDDD, 1 Broadcast Ctr, Marion IL 62959. 618-997-8123.

Rust RC1000 telco model, recently removed from service, $600/BO. A Lane, WEHB, POB 2892, Grand Rapids MI 49501. 616-451-9904.

Comrex LXT, PLX, LXR, TLX, RLX, low freq extenders for cleaning up telephone transmission lines, $400-$800. R Meadows, Southeastern Sports Prod, 1203 Seaton Ste 117, Durham NC 27713. 919-544-1366.

Wegener SCPC satellite rcvr for use w/SMN's The Heat format, avail 7/1/90. J Coursolle, WGGQ. 414-324-4441.

Modulation Associates complete SCPC recvr shelf incl pwr supply downconverter & demod, suitable for use on Westar 4 transponder 2D or 2X, $995/trade. G Liebisch, POB 29521, Raleigh NC 27626. 919-876-0674.

TFT 8600 narrow bandwidth on 951.5 MHz, excel cond, w/built-in subcarrier, $2000/both; Moseley subcarrier gen & demodulator, SCG-8/SCD-8 on 39 kHz w/conversion kit for 67 KHz, excel cond, $1700/both. T Cochran, KNOM, Box 988, Nome AK 99762. 907-443-5221.

Complete RPU system, Marti dual-freq xmtr & rcvr for 160 MHz band, w/(2) Scala Yagis w/interbay stacking, ASP whip, omni antenna, all in gd working cond w/manuals, $1050. T Spaight, WLRZ, POB 73, Peru IL 61354. 815-224-2100.

Moseley MRC-1600, like new, latest software, $3700. C Leavens, 412-241-2985.

Moseley MRC 1600 remote control, just back from Moseley for calibation, in factory cartons w/manuals, warranty, excel cond, $2500/BO. J Salov, 3431 W Houghton Lake, Houghton Lake MI 48629. 517-388-5364.

Comtech Transtar AC format system w/Colorado Magnetics network switcher, $1800. B King, KLBU, 500 Leland, Austin TX 78704. 512-832-4061.

Harris SCA gen card for MX-15 exciter, BO; Moseley SCG-4T subcarrier gen, BO; Moseley MRC-1600 remote control, BO; Moseley SCG-8 subcarrier gen, BO; Moseley SCR-8 subcarrier receiver, BO. Howells Audio, POB 6184, Kingman AZ 86402. 602-753-4915.

MCI remote control 9 chnl digital, 450 MHz xmtr, studio-line, SCA cards, 1/2 price; Moseley RPU 161.67 & 166.25 xmtr & rcvr, BO. J Phillips, WZOM, 408 1/2 Clinton St, Defiance OH 43512. 419-784-1059.

Gentner VRC 1000 3 yrs old, exc cond, complete pkg incl relay panel, terminal strip, battery backup, qume computer terminal, TC 100 hybrid interface and printer, $1500/or trade for Moseley MRC 1. T Teagarden, 710 W 14th St, San Angelo TX 76902. 915-655-9879.

EMPLOYMENT

To place ads in this section, use the ActionGram form. To respond to box numbers, write Radio World, PO Box 1214, Falls Church, VA 22041, Attn:_____

HELP WANTED

WJMI/WOAD Jackson MS seeking engineer w/exper in RF & studio maintenance, start $20,000/yr. C Haynes, 601-948-1515.

POSITIONS WANTED

Quality entertainer, 33 yrs exper, marketable, special: Oldies/Big Band, 7/Midnight/all night. J English, 3440 Marinatown Ln, N Ft Myers FL 33903. 813-283-3910.

Experienced/reliable announcer looking to become the next sports director for your station in Iowa or Wisconsin, PBP, production, will relocate. Robert, 319-652-6640.

Gospel radio chain on air personality get numbers, creative character voices, will relocate for correct response, offer. M Michaels, 3371 NW Jct, Ft Lauderdale FL 33311. 305-791-6729.

CE w/20 yrs exper in high pwr FM/AM directional, great w/audio & RF is seeking possible multi-station position. POB 1223, Cockeysville MD 21030.

CE/Asst CE, FCC genrl, ham, ASEE, non smoker/drinker, heavy theory, former CE in Boston, Houston, Miami, Ft Lauderdale, avail now. M Gottesman, POB 1957, Pine Bluff AR 71613. 501-536-6100 X321.

Announcer/DJ '67 Marquette broadcasting major looking to relocate South/Southwest US, let me impress you with a tape. M McKenna, 708-636-0119.

Creative copywriter w/degree in advertising & present copywriting position w/top 40/Country station seeks freelance work, SKD, 318 Cooper Ave, Hancock MI 49930.

Gen Op Dir w/top prod skills seeks bigger market/challenge in N England, MIDI & automation familiar. C Keach, 252 Union St, Littleton NH 03561. 603-444-0659.

Production wiz up for grabs 14 year vet prefers NY area but will relocate for killer offer. Call B Ranes, 718-526-6501.

Graduating 5/20 w/(2) B.A. degrees, business admin & accounting, plus 15 yrs of bdct exper, seeking mgmt position, relocate anywhere. L Witt, 319-242-0400.

NAC PD with digital library considering a format change, serious inquiries only please. B Hallihan, Box 3125, Turlock CA 95381. 209-634-0318.

Morning man/PD w/great leadership skills & 8 yrs exper seeks small/medium market oldies/AC AM/FM, prefer NE PA or Southern NJ. Mike, 814-676-3077.

On-Air production pro w/4 yrs exper seeks new opportunities, very strong on-air/prod presentation & great attitude. R Ray, 404 S Wisconsin, Ste 5, Gunnison CO 81230. 303-641-1258.

Engineer/Businessman engineering, technical sales, communications sales/service, regional manager, teacher, need new challenge, presently DOE for nine station radio group. M Beasley, 1319 Heritage Place, Moberly MO 65270. 816-263-5800 or 5605.

Producer/Writer/Engineer w/14 yrs syndication & broadcasting exper, available for any area, will relocate for good offer. B Ranes, 718-526-6501.

Programmer/Engineer, 4 yrs exper as Chief, willing to relocate. P Jensen, 905B 46th, Niceville FL 32578. 904-678-6765.

Design engineering position w/broadcast equip mfg looking ahead to a digital future. Digital logic/systems and/or firmware/software development. A Melnyk, POB 127, Kanona NY 14856. 607-583-4117.

General or station mgr/operations director quality announcer avail, seeking job with quality owner, intending to stay around and serve comm, small medium large mkt background. J Banks, POB 2031, Sylvania GA 30467. 912-564-2922.

FCC Gen/RT lic, 30 yrs exper AM/FM all phases, strong construction, studio & xmtr maint, FCC R7R, will relocate. D Walrod, 1245 Tower Dr, Logansport IN 46947. 219-722-1695.

Production director w/14 yrs writing/producing/engr exper avail for your station or network. B Ranes, 718-526-6501.

CE, FCC General Class Lic, 30 yrs exp AM/FM bdcsting, stong on FCC R&R, construction, RF & studio/xmitter maintenance. D Walrod, 1245 Tower Dr, Logansport IN 46947. 219-722-1695.

Energetic, young, fast-learning DJ w/2 yrs on-air exper wants to improve himself & you, southeast FM AOR preferred, but all accepted. B Fredette, POB 642, Newport TN 37821.

Entry level position in LI NY area wanted for college freshman, 1 yr exper in announcing, engineering, post-prod, seeking challenging/creative opportunity. D Rothstein, 516-431-2928.

Bell System RF engineer w/28 yrs exper, PE, 1st phone, w/Mt Washington exper seeks mountain-top station engineering position. G Pugh, 89 Trumbull Rd, Manhasset NY 11030. 516-627-2153.

Looking for Music Director, programming or engineering position, wide music knowledge from Classical to Modern Rock, exper in LA & SF. Bruce, 415-388-8368.

Experienced announcer/degreed eng/SBE w/great top market voice seeks small/medium AC/CHR/Oldies station in New England area needing prof, reliable, mature announcer at reasonable rate. G.P. Brefini, 508-543-4213.

Enthusiastic female seeking on-air position, music programs, news, traffic, also comfortable w/production, music research & programming. Tracey, 708-852-1049 or 309-792-3956.

Humble on-air, great voice, production, timing, charisma, excel study, sports background, news, seeks South Carolina FT midlands position. AC, Urban, CHR. Herb, 803-534-8285.

Personality w/4 yrs exper. seeks on-air position in small or medium mkt, MD & background in AOR, CHR & AC formats, will relocate. N Adams, 97 N 100 W #4, Logan UT 84321. 601-752-1907.

Chief engineer w/big production voice & over 15 yrs of hands-on engineering exper, seeks CE pos w/production in a competitive top 100 mkt. G Morgan, 704-563-8676.

EMPLOYMENT SECTION

HELP WANTED: Any company or station can run "Help Wanted" ads at the flat rate of $25 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 $5. 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 $5 fee which must be paid with the listing (**there will be no invoicing**). Responses will be forwarded to the listee, unopened.

Mail To: BROADCAST EQUIPMENT EXCHANGE
PO Box 1214, Falls Church, VA 22041

REMOTE & MICRO . . . WTS

Marti RPT 15 dual freq UHF xmtr; Marti CR-10-2 dual freq UHF rcvr, 450.700 & 450.925 MHz, used on only a few remotes, like new, $1700/both plus UPS. G Jones, POB 229, Uvalde TX 78802. 512-278-1545.

Moseley PCL 505 STL stereo system, w/manual, excel cond. J Arzuaga, POB 980, Quebradillas PR 00742. 809-895-4198.

Moseley 1600, like new, $1950/BO. T Cranford, KMTY, POB 1465, Grand Island NE 68802. 308-381-3697.

Potomac remote meter panel for ant monitor, BO; Moseley TRC-15AW xmtr unit only, BO. J Stanford, WYLD, 2228 Gravier, New Orleans LA 70119. 504-822-1945.

Moseley TRC-15, CRL audio processing APP-300A & PMC-300A, Pacific Recorders Multimax MX/AM audio compressor/limiter, Belar AM-2 mod mon. C Mandel, KAMP, POB 1018, El Centro CA 92244. 619-352-2277.

Harris/Gates M5862 RDC-10C w/manual, works, but better used for parts or rebuilding, $100/BO. J Durall, WJNZ, POB 494, Greencastle IN 46135. 317-653-9717.

Moseley PCL-505C STL system on 947.00 MHz, $3750. C Leavens, 412-241-2985.

Gates RDC-10 remote control unit in gd cond, spare Gates RDC-10 for parts, w/plenty documentation, $250/both. N Beaty, 2116 Osman Lane, Greenfield IN 46140. 317-326-3620.

Wegener Panda II & satellite switcher. B Hearst, WWCH, POB 688, Clarion PA 16218. 814-226-8600.

MCI digital remote control; MCI 450 M, 10 W, return link. J Phillips, WZOM, 408-1/2 Clinton, Defiance OH 43512. 419-782-8591.

Harris 70-L upconverter mdl 8220; L-Ku upconverter mdl 8221; LNC pwr supply mdl 6312; (2) Ku-band LNC mdl 6312; (2) IF conditioning panels, one for parts; ITT amp; travelling wave tube mfg 20948; PTS 160 freq synth mdl 160-54010, $15,000/all. E Welch, Welch Media, POB 1455, Moncks Corner SC 29461. 603-761-7585.

Subcarrier gen card 67 kHz for MRC-1600, $150; 6 kHz subcarrier demod card for MRC-1600, $150; 2 pole 100 A manual pwr transfer switcher, $50; Comex Bleepmate 6 second digital delay, $600. W Blackwelder, KNUE, POB 7935, Tyler TX 75711. 214-581-0606.

Harris 6550 satellite receiver chassis w/PS & down-converter, no demod cards, mint cond, $400. D Igou, KGNB, 1540 Loop 337 N, New Braunfels TX 78130. 512-625-7311.

Moseley TRC-15; CRL audio processing APP-300A & PMC-300A; Pacific Recorders Multimax MX/AM audio compressor/limiter; Belar AM-2 mod mon. C Mandel, KAMP, POB 1018, El Centro CA 92244. 619-352-2277.

Wegener 1601 mainframe cards for SMN formats rock & star station 1621, 1645, 1646, 1605-03, 1646, 1610-01, 1610, 1689-05, $300/ea. D Crisp, 302-629-6636.

Want to Buy

Marti RPT 30 or RPT 15 15 W or greater, must be in 455 MHz band, solid state, balanced input. K Scheffel, 9 Cougar Rd, Edwardsville IL 62025. 618-692-9798.

Marti RPT 25/40, BR10/150 RPU remote pickup xmtr & rcvr on 161 MHz. S Hess, KDUC, 29000 Radio Rd, Barstow CA. 619-256-2121.

Satellite receiver for Transtar's Nitche 29 format. B Hearst, WMCH, POB 688, Clarion PA 16218. 814-226-8600.

Marti remote equipment 160 or 450 band recvr & tran. S Jeffries, Hwy 14 East, Mankato MN 56001. 507-345-4537.

Television satellite uplink, C-band or K-band, fixed or mobile, incl exciter, HPA, dish, etc. Ugly George Satellite TV, 314 W 52nd St, NYNY 10019. 212-677-2200.

STL electronics, dishes, hardware & Marti RPU xmtrs, receivers, antenna, repeaters on 161 & 450 bands. L Maierhofer, 101 Armory Blvd, Lewisburg PA 17837. 717-523-3271.

Marti STL-8 or 10. J Stanford, WYLD, 2228 Gravier, New Orleans LA 70119. 504-822-1945.

STATIONS

Want to Sell

FM CP, class C3, 25 KW ERP, Pine Bluff AR, $55,000 or sell percentage. M Gottesman, Box 1957, Pine Bluff AR 71613-1957.

FM 100,000W station in Utah, for more info: Fax 1-801-673-1546.

LPTV CP's & troubled stations, buy, trade or joint venture, send details w/price & terms or call. J Worrall, 4618 Gabriel Dr, New Orleans LA 70127. 504-241-6634.

AM/FM combo in mountain area, 580 kHz, 2.3 kW day, 310 W night, ND, Class A FM, C1 applied for, 17 acres, 2 story building, positive cash flow, owner financing avail, would consider aircraft in trade, $260K/BO. Tracy, 605-745-3797 (evenings).

AM & or FM radio station in Central Arkansas, good area, excellent potential. Ask for Vivian, 501-470-1525 or 501-568-5448.

Class A soon to be C3 in Pacific Northwest, signal in large market, for info call Larry at 404-460-6159.

Partner/Investor for licensed FM start-up, Class C2 radio station for Taos & northern New Mexico. Scheduled November on air date. Francis, 505-377-6450.

AM construction permit 880 kHz at Moneta, Smith Mountain Lake VA, tower site firm, studios avail, great area potential, will work w/buyer to build. L Williams, Rt 1 Box 314, Wirtz VA 24184. 703-647-1530.

Receiver's sale: KESP Santa Barbara accepting offers cash or terms to qualified 1/3 down, 1988 gross $411,000, 1989 gross $508,000, for information call G Erway, 407-283-6871.

AM daytimer, early sign on, 1000 W, bldg & residence & 4.59 acres. LaVerne McBeath, KJBC, 1903 S Lamesa Rd, Midland TX 79701. 915-684-5152.

Financing needed for 10 kW AM, 50 kW FM, located between major Montana markets, take lien or corporate shares, excel opportunity. M-R-S, 110 N 2nd Ave #39, Chula Vista CA 92010.

Southern California daytimer in high growth area, $1.5 mil/negotiable. M Sadacca, POB 1317, Crestline CA 92325. 714-882-2575.

Make More Money At Night. Offer our books on per-inquiry basis. 1-800-582-4381.

Want to Buy

FM or AM/FM, gd terms, financially qualified, in NY, PA, Ohio, MD or IL or KY. E Stanley, Standey Bdctg. Box 161X, Jeffersonville NY 12748. 914-482-3158.

LPTV CP's & troubled stations, buy or trade or joint venture, send details w/price & terms. J Worrall, 537 Ridgewood, Louisville KY 40207. 502-896-4513.

Seeking existing AM or CP in eastern or central North Carolina. L Afflerbach, CTC Media, 5550 Sterrett Pl, Columbia MD 21044. 301-621-5045.

AM fulltime near metro or AM daytimer in small town or LPTV. B Turner, 1000E 3rd, Del Rio TX 78840.

AM/FM/LPTV, owner financing, monthly note plus percentage of gross. Norm, 904-892-4038.

First time buyer looking for small market AM or FM w/little or nothing down & owner financing in NJ, PA, OH & DE. M Gehring, 7 Crestview Dr, Oil City PA 16301. 814-676-3077.

AM or FM East of the Mississippi w/nothing down & owner financing, will consider small cities. Rev P Fleming, POB 1792, Torrington CT 06790. 203-482-9355.

STEREO GENERATORS

Want to Sell

Harris STX-1B & STM-1B AM stereo gen & monitor, both modified for Motorola C-Quam, excel cond, $7500/BO. B Bailey, KJEF, POB 1248, Jennings LA 70546. 318-824-2934.

Moseley 20A234 26 kHz subcarrier gen, $30; Moseley 20A2345 26 kHz sub-carrier demod, $30, cards only in an aluminum box on both. B Umberger, WNLT, 813-446-0957.

Want to Buy

CCA FM 10DS stereo generator. T Barnes, KRIL, 2735 E 8th Ste 45, Odessa TX 79761. 915-332-6870.

SWITCHERS (VIDEO)

Want to Sell

Panasonic WJ 540 P 6-input B/W switcher w/2 25 " multipin cables, $200. D Hurd, Box 853 Station A, Searcy AR 72143. 501-279-4658.

Vital VIX-114-4A 3-M/E switcher w/all options & spare parats, built-in blackburst & color background, $3500. D Brichetto, 4700 Coster, Knoxville TN 37912. 615-688-3151.

3M 1174 w/4 busses, mix to wipe, direct buss, take bar, ext, int keys, $850. R Jensen, Telecable Corp, 5812 21st, Racine WI 53406. 414-632-3131.

CEL Model P169V 4×8 routing switcher, local or remote control, full instructions, mint cond, $1475. Chief Engr, Vidcom Consultants. 412-327-1333.

CoHu 9501 w/manual & broadcast sync generator model TSG3000 GL, $1000. D Garcia, 69 Pine, Waterberry CT 06710. 203-574-4857.

Sigma Electronics VSS-120 (4) like new, 12×1 w/stereo audio follow, $100 ea. P Russell, Bowdoin College, Sills Hall, Brunswick ME 04011. 207-725-3066.

Want to Buy

Bdct school needs non-working Vital 114 switcher &/or Vital Squeezezoom for parts to keep existing system running, partial systems OK, can give tax receipt if donated. B Hodges, OSV Journalism Bdctg, 206 Paul Miller, Stillwater OK 74078. 405-744-8273.

TAPES, CARTS & REELS

Want to Sell

Fuji T30 1/2" videotapes, approx 400, ea w/blk hard-cover case, $3.45 ea. D Murray, Murray Video Prod, 1918 Sloan, Latrobe PA 15650. 412-539-0465.

Audiopak A-2 carts (250), new & almost new. 40's & 70's. G Jablonski, WHMI, POB 887, Howell MI 48844. 517-546-0880.

Audiopak AA-2, AA-3 & AA-4, like new, 70 sec lengths & music lengths, BO. R Thomson, KDKR, 1167 W Javelina, Mesa AZ. 602-897-9300.

Tascam 32, 7.5-15 ips stereo up to 10" reels, very little use, $1200 pls shpg (firm). B Coleman Jr, WIST, POB 460, Lobelville TN 37097. 615-593-2978.

Ampex 642 1 mil tape, 100 reels, bulk erased, plastic reels, in boxes, $5/reel. T Moore, WBCO, POB 789, Bucyrus OH 44820. 419-468-2326.

Ampex 406 10 1/2 " metal reels (10), new in sealed factory shpg carton, $100 ea UPS. G Jones, POB 229, Uvalde TX 78802. 512-278-1545.

Audiopak AA-4 hundreds of music lengths, like new, $2.25/ea. R Thomson, 1167 W Javelina, Mesa AZ 85202. 602-897-9300.

Twelve hours of music & life of Elvis, gd cond, 7" reels, BO. G Erway, 3450 SE Martinique, Stuart FL 34997. 407-283-6871.

Audiopak AA-4, music lengths, like new, $2.25 ea. R Thomson, KDKB, 1167 W Javelina, Mesa AZ 85202. 602-897-9300.

Easy listening music reels, 10.5", no dupes, all in vgc w/play sheets (250), $10 ea. J Wenstrom, Wynne Bdctg, 503-882-4656.

Beta & 3/4" cassettes, sometimes 1", both large & field size avail, 1/2"'s are BC(T)5s, 5 min commercial or 1 hr at Beta 3 speed. P Dowie, Good Sound, 171 Drexel, Lnsdn PA 19050, 215-626-9322.

Fidelipac carts (530), brown/clear shell, $500; Audiopak AA-3 carts (300), blue/clear shell, $450. W Blackwelder, KNUE, POB 7935, Tyler TX 75711. 214-581-0606.

Want to Buy

Vintage 7" tape cards & reels, tape not important, Scotch, Audiotape, Irish, Soundcraft, etc. Boxes must be clean & usable, prefer Pre-1960. Especially wanted are audio tape colored reels from 1950's. B Leslie, Pro Recording Srvs, 13709 Maple Leaf Dr, Cleveland OH 44125. 216-662-1435.

TAX DEDUCT EQUIP

College station seeks cart machines, TT's, mics & consoles & R-R's for on-air & production. K Fulk, WLHA, Holt Commons, Madison WI 53706. 608-262-1206.

Front line Christian TV station on US-Mexico border needs all types of video/audio equip. S Frahm, KSCE, 614 E Yandell, El Paso TX 79902. 915-542-0038.

Educational station seeks donation of automation equip for training program, will pick up & provide tax letter, need Brain, racks & accessories, repairable's OK. H Espravnik, WVCP, 1360 Nashville Pk, Gallatin TN 37066. 615-451-1640.

Need mics, cart machines & consoles. C Riddle, World For Christ Radio, 6046 Greenway Ct, Manassas VA 22111. 703-670-7764.

UPS/Battery back-up generators needed by university amateur radio club, willing to pay shipping for working/useable gear. J Bondon, 10318 Missouri, Los Angeles CA 90025. 213-338-7356.

VHF/UHF/HF/CB amateur & comm equip desired, also packet controllers, remote based antennas/tower, etc. J Bondon, 10318 Missouri, Los Angeles CA 90025. 213-338-7356.

Alabama A&M Univ seeks donation of radio equip for starting a non-commercial FM station, will issue tax deductible receipt. C Haygood, POB 324, Normal AL 35762. 205-851-5227.

Ohio University campus station seeks audio equip of any kind for use in studio & prod room, will pay shipping & send tax deductible receipt. D Harlett, WNWG, West Green Office, Athens OH 45701. 614-597-5885.

High school station in need of cart machines, consoles, R/R, TT's, etc. J Kelly, SSCS High School, Ovid NY 14521. 607-869-9636.

Eng student desiring donation of old bdct equip (anything)in repairable cond, will pay all shipping charges, EE student at Purdue. C Gill, POB 371, Indianapolis IN 46206. 317-923-2800.

Monte Vista Christian School, would appreciate any donations of used TV broadcast equipment. T Quinn, 408-475-0423.

TEST EQUIPMENT

Want to Sell

Senior Voltohmist RCA w/AC-DC-ohms probe WC98C, $100/BO; Precision 660 tube & transistor tester, $50/BO; Heathkit IM-4160 FM deviation meter w/NiCad batteries & charger, $50; Heathkit 10-30 5" oscilloscope, needs work, CRT gd, $35; Heathkit IB-1103 freq counter, needs work, BO; Heathkit IM-21 ACVTVM, $35. L Wilson, 409 Hillaire, Hopkinsville KY 42240. 502-886-1678.

Tek 453 50 MHz oscilloscope w/book & probes, $300; Cushman CE-24A freq selective voltmeter, $1975/BO. R Nelson, Tropical Bdct, 14903 SW 142 St, Miami FL 33186. 305-238-5024.

Sencore VA-62, NT64, VC-63, PR-57, all like new, $2500. L Clinton, KARN, POB 4189, Little Rock AR 72214. 501-661-7500.

Potomac FIM-21, $1800; Potomac AM-19 4 tower, $2300; Delta RG-3, $2900; (2) ITC 3 deck mono w/tones, $500-700; Belar AMM-1, $450; Belar AMM-3, $550; GR 1931A mod mon, $400. E Burkhardt, WLEE, 121 Wyck, Ste 300, Richmond VA 23225. 804-232-0300.

Leader LDM 171, highly accurate, AC voltmeter/dist analyzer, brand new cond, less than 4 hrs use w/manual, $695. G Finerman, Fintronics, 18 W Maple, Suffern NY 10901. 914-357-5419.

TFT 760-04, 01, 03, very little use, tone generator/decoder, AM rcvr, works perfectly, $700. T Coucke, KNLS, POB 475, Anchor Point AK 99556. 907-235-8262.

B&W 410 tube type dist meter, $25. B Umberger, WNLT, 813-446-0957.

HP 205AG audio signal gen, BO; International Instrument 600 ohm T network analyzer, BO;HP 325B noise dist analyzer, BO. T Liston, WOBL, Box 277, Oberlin OH 44074. 216-774-1320.

RCA WO-91B oscilloscope; Hickok 600A tube tester. E Nearman, KUMU, 441 N Nimitz Hwy, Honolulu HI 96817. 808-531-4511.

Tek 520A vectorscope, new tube & recalibrated, excel cond, $4200. M Mehalko, 201-361-1917.

Want to Buy

Motorola R2001 or R2400 communications system analyzer. C Hoffman, 251-174 St, Ste 404, Miami Beach FL 33160.

Motorola R2001 or R2400 communications system analyzer. C Hoffman, 251 174th St # 404, Miami Bch FL 33160.

Bird 4712 in-line wattmeter, 5 kW element, 1 5/8" line. L Maierhofer, 101 Armory Blvd, Lewisburg PA 17837. 717-523-3271.

Used field intensity meter; Nems Clark 120 series or RCA WX series; Potomac FIM-21 or 41; used Delta Electronics Operating Impedance Bridge, OIB-1 or OIB-3. N Beaty, 2116 Osman Lane, Greenfield IN 46140. 317-326-3620.

McCurdy 14023 extended range audio meter, will consider other devices. J Beahn, 4001 Brandywine St NW, Washington DC 20016. 202-364-3868.

GR Telephone CG-3 service instructions/schematic for counter-generator, buy or pay for copy. M Kaplan, Puget Snd, Naval Shipyard, Bremerton WA 98314. 206-476-7419.

Tektronix 520 vectorscope, working or not. B Gentry, KA21VY, 622 Plymouth, Mattydale NY 13211. 315-455-7257.

Yamaha DX-27 synthesizer, FM pro model, programmable, MIDI compatible, excel cond, $375. M Osborne WKSQ, POB 9494, Ellsworth ME 04605. 207-667-7573.

TRANSMITTERS

Want to Sell

RCA BTA-5G, 15 yrs old, supr cond, stable ampliphase, 5 kW AM, $10,000; Collins 21-E 5 kW AM, $4500. Smokey, KMMC, 1703 Allondale, Amarillo TX 79106. 806-355-9777.

Rockwell Intl 528-0629-001 400 MHz RF amp, new, 60 W, uses 4631-S tube, less pwr supply but otherwise complete, $50. J Cunningham, KEOR, Rt 2 Box 113B, Stonewall OK 74871. 405-265-4496.

CCA FM 10 DS power supply; CCA FM 10 DS equip rack for exciter & power supply. T Barnes, KRIL, 2735 E 8th, Ste 45, Odessa TX 79761. 915-332-6870.

CCA FM40E exciter, freq programmable, $1600. M Maciejewski, WMUS, 3565 Green St, Muskegon MI 49441. 616-744-1671.

TTC XL-102 FM translators, BO; CSI 100 W amp, BO. Howells Audio, POB 6184, Kingman AZ 86402. 602-753-4915.

Collins 831 1 kW FM, hybrid exciter, 4 tubes, excel cond, w/manuals, $7500. W Waldron, KSOS, Layton Hills Mall, Layton UT 84041. 601-546-1722.

Bauer 607A 1 kW w/660 exciter, needs work, complete gd spare xmtr, BO. K Kushnir, Empire Comm, 2120 Bluebell Dr, Santa Rosa CA 95403. 707-545-8300.

QEI 645, 7 mos old, avail after 5/20/90, bdct exciter, changeable freq, built-in mod-monitor, mod-control & composite clipper, $4195. K Fitzgerald, WKGB, POB 792, Great Bend PA 18821. 717-879-9925.

Collins 830-D 1000 W, in service w/spare parts, stereo gen to be replaced this month due to pwr increase, $4500. J Anderson, WKCU, 2192 Hwy 72 East, Corinth MS 38834. 601-286-8451.

RCA 50 kW BTA-50H excel condition, PCB free, $16,500. C Stone, 234 E Meadow, Eden NC 27288. 919-623-9966.

Versa-Count V-322 FM translator, 10 W output, tuned for 99.5 MHz input, 92.1 MHz output, AM code identifier built-in, uses F connector on receive input & N female on RF output, gd cond, $1800. TX Valley Translator, 6903 Spring Garden Dr, San Antonio TX 78249. 512-696-5615.

GE 50 kW AM, small size, 3 cabinets mdl BTC-50-C in super clean cond, 1510 kHz, well maintained. J Perez, 315-673-1070.

TRANSMITTERS . . . WTS

Harris FM3.5K exciter, on air, excel cond, one spare tube, spare semiconductor parts kits, SOLA constant voltage transformer built-in. J Beatty, WOKZ, 1070 Market Tower, 10 W Market St, Indianapolis IN 46204. 317-236-1040.

Harris MS-15 exciter, $2500; TTC X exciter, new, $4500; TTC FM-300J solid state 300 W FM, new, $7500; Sintronic 10 W solid state FM exciter, $850. G Gaskey, KWHO, 261 Main, Ste 6, Weed CA 96094. 916-926-5946.

Bird Termaline 8745-677 20 kW water cooled dummy load w/3 1/8" EIA flange, $750. G Liebisch, POB 29521, Raleigh NC 27626. 919-876-0674.

210/240 V Pri-3000 V 1 A sec plate transformer, $250/BO; 240 V Pri-3000V sec George Sturley plate transformer, BO. M Johnson, KGAL, POB 749, Albany OR 47321. 503-451-5425.

Harris MW-1 1 kW AM in excel cond, on 1300 kHz. M Ripley, KOZE, POB 936, Lewiston ID 83501. 208-743-2502.

RCA 10 kW BTA-10H PCB free, completely rewired, $11,000. C Stone, 234 E Meadow, Eden NC 27288. 919-623-9966.

Energy-Onix 25 kW excel cond avail in 90 days, 25 kW only 2 yrs use; Energy Onix FM xmtr tuned to 100.7, ready to sell at a good price, new final tube included. J Bahr, 154 Guajataca St Crown Hills, Rio Piedras PR 00924.

Sintronic SI-F-5 5 kW FM w/10 W Sintronic exciter, used 5 yrs, exciter gd, xmtr PA cavity needs work, on 103.5 MHz, you ship, BO. G Savoldi, WCOL, 195 E Broad, Columbus OH 43215. 614-221-7811.

Harris MW5A 10 yr old AM xtmr, new spare final, mint cond, tuned to 1420 kHz, $21000. H Connellan, WACT Radio, 3900 11th Ave, Tuscalousa AL 35402. 205-349-3200.

Elcom Bauer 605C 5 kW FM, one tube, single phase, brand new, minor shipping damage, $27,000/BO. V Michael, WHTO, 575A Montgomery Pike, S Williamsport PA 17701. 717-323-8200.

CCA FM-10D 10 W FM complete w/pwr supply, metering & instruction book, worked when removed, $1000. R Franklin, Super Snd Stds, 211 Virginia, Norristown PA 19401. 215-277-7112.

Energy-Onix MK 15 FM, 15000 W, single phase pwr, 2 yrs old w/CSI EX 20F exciter tuned to your freq, $20,000/BO. P Moore, KXFX, POB 2158, Santa Rosa CA 95405. 707-523-1369.

Sparta 680 FM exc ter w/681 meter panel, not working, $200. B Umberger, WNLT, 813-446-0957.

Homebrew 50 W AM, 19" rack mount style, 8-3/4" by 11", 32 lbs, $700. J Cunningham, KHKC, Rt 2 Box 113B, Stonewall OK 74871. 405-265-4496.

Gates AM BC1G, excel cond, $2500/BO. WRDN, Box 208, Durand WI 54736.

FOR SALE

Harris FM-3.5K w/MX-15 Exciter & SCA Gen & many spares, like new, 3-yrs old.
1060' 6-1/8" Andrew rigid line, vgc, $4.20/Section
ERI antenna, 2-Bay, 200-Series Rototiller, like new.
Moseley STL PCL-606/C, excel.: 325' coax, 1-5/8" air line, like new.
Moseley MRC-1600 remote control, new w/full warranty.
PRICED TO SELL
(816)-635-5959

RCA BTA-50H 3-plate transformers & complete set of schematics, you pick-up at site, non-PCB. D Niccum, KCKN, POB 670, Roswell NM 88202. 505-622-6450.

Harris MS-15 exciter, $2500; TTC Mdl X exciter, new, $4500; TTC FM-300J solid state 300W FM xmtr, new, $7500; Sintronic 10W solid state FM exciter, $850. G Gaskey, KWHO, 261 Main, Ste 6, Weed CA 96094. 916-938-3828.

Collins 20V-2 completely rebuilt solid state lower deck. Dale, 503-774-0459.

CCA 10,000D AM 10 kW, gd cond on 1210, BO. J Stanford, WYLD, 2228 Gravier, New Orleans LA 70119. 504-822-1945.

Elcom Bauer 605C 5 kW FM single phase, one tube w/exciter, new, $25,000/BO. V Michael, 575A Montronery Pike, Williamsport PA 17701. 717-323-8200.

Harris FM-40K (2), center cabinet, (2) MS-15 exciters, combiner, reject load, etc, on air now at 101.3 MHz, avail late June, will split into (2) 20 kW's, $60,000 complete/BO. J Buckham, KIOI, 700 Montgomery, San Francisco CA 94111. 415-956-5101.

RCA-50H 50 kW in great cond, $15,000. V Stone, WWMO, POB 81, Cascade VA 24069. 804-685-3128.

RCA BTE-15 w/SCA gen & stereo gen w/crystal. Dale, 503-774-0459.

Bext Demos, sale, full warranty: 20W exciter & 500W amplifier. Bext, 619-239-8462, Fax: 619-239-8474.

Upgrade your McMartin BF-3.5K/M to a BF5K/M in the field (5500W). Goodrich Ent, 11435 Manderson St, Omaha NE 68164. 402-493-1886, Fax: 402-331-0638.

LPB TX2-20, LA 2-20 complete carrier current system w/20W xmtr, 20W linear amp, includes limiter board, T-8 power line interface, manuals, 600kHz, excel cond, $900/BO. T Wood, 404-791-3782.

Want to Buy

TOP DOLLAR
For Your Old Transmitter, STL or Exciter !
Call for a quote
We arrange quick dismantling & removal
PCB's? No Problem Call Us.
ARMSTRONG TRANSMITTER CORP.
5046 Smoral Rd
Syracuse, NY
(315) 488-1269
FAX (315) 488-1365

FM 20 or 25 kW. E Moody, KJEM, 216 N Main, Bentonville AR 72712. 501-273-9039.

AM, 2.5 kW in gd cond, will consider 5 kW. A Terry, WODY, Box 545, Bassett VA 24055. 703-629-5900.

FM xmtr, 250 W or less or FM RF amp w/100 W output, exciter/stereo gen not needed. M Ross, Box 550369-101, Dallas TX 75355. 214-348-2618.

Any 40-200 W VHF or 1-2 kW UHF xmtrs, top prices, finders fees. J Worrall, 4618 Gabriel Dr, New Orleans LA 70127. 504-241-6634.

FM 3-5 kW, grounded grid, McMartin or CCA preferred. E Sutton, WOKI, 1900 Winston, Knoxville TN 37919. 615-531-2000.

Harris/Collins 5 kW AM, must be in gd cond. R Merrill, WZKY, POB 2639, Gulfport MS 39505. 601-832-5111.

FM 500-1000 W w/wo exciter, stereo solid state preferred. L Maierhofer, 101 Armory Blvd, Lewisburg PA 17837. 717-523-3271.

RCA BTA-1R or equiv AM 1 kW xmtr. L Afflerbach, CTC Media, 5550 Sterrett Pl, Columbia MD 21044. 301-621-5045.

WANT TO BUY: TV Transmitter CH 9 20/25 kW, Visual Power, Ext. Duplx. Antenna & Tx. Line Complete. 1980 or newer. TV Studio Equipment in Gd Wrking Condition.
International Broadcast Supply, Inc.
1771 N. Powerline Rd.
Pompano Beach FL 33069
TEL (305) 977-9111
FAX (305) 977-0488

Spare parts for Gates BC-1T xmtr & parts for Rust model OC and IC remote control units. Jim or Dale, WXEE, 304-436-4191.

Wanted late model 1 kW UHF LPTV xmtr, close to VHS channel 43. J Bahr, 154 Guajataca St Crown Hills, Rio Piedaas PR 00924.

3K or 6K xmtr for Class A station, STL link, remote control, other related equipment. A Stevenson, 312-975-9882.

1 kW FM, complete, 103.7 M or near, call or write. V Danielson, HRVC Honduras, RR2 Box 2791, Arlington MN 55307. 612-964-2838.

Collins 1965 21M, 10/5 kW AM, new tubes. B Bie, 80 N Tillman, Memphis TN 3811. 901-323-2679.

Circle 61 On Reader Service Card

TRANSMITTERS . . . WTB

Any FM model & equip related to put up new 88.9 FM station in Lorain OH including 300' tower, ss or guyed. C Arroyo, Box 436, Arecibo PR 00720. 809-878-0070.

250-500 W FM xtmr or pwr amp for auxilliary, have exciter, hi miles ok if in gd wrking cond. K Browell, Box 808, Riverton WY 82501. 307-856-2922.

McMartin AM/FM xmtr, any model, exciter or stereo modules. Goodrich Ent., 11435 Manderson, Omaha NE 68164. 402-493-1886.

McMartin older B-910 FM exciter. C Goodrich, 11435 Manderson, Omaha NE 68164. 402-493-1886.

TUBES

Want to Sell

Eimac 4-500 A's for AM McMartin xmtr, 1000 hrs, $150 per tube; tube transformer for 4-500 A tubes in McMartin 1 kW AM, new. T Noordyk, WSHN, POB 190, Fremont MI 49412. 616-924-4700.

Eimac 4CX1000A, new in box, $500/BO. K Kushnir, Empire Comm, 2120 Bluebell Dr, Santa Rosa CA 95403. 707-545-8300.

Penta Labs Super Premium output tubes w/increased plate dissipation, new w/warr, individually tested, KT88, $18; EL34, $9, quantity discounts avail. R Katz, Allegro Snd, 15015 Ventura, Cherman Oaks CA 91403. 818-377-5264.

Various inventory of electron tubes including (2) 813; 845; OD3; (2) IR5; (4) IT4; 885; (3) 6J7; 5R4; (5) 5AR4; (2) 5V4; (2) 6J5 & many more, $2/ea. M Johnson, KGAL, POB 749, Albany OR 47321. 503-451-5425.

3CX1500A7, 4CX5000A, 6146B, 4CX2508, 4CX3000A & more. We carry large inventory all major brands, Eimac, Amperex, RCA, etc. Call Stew 1-800-842-1489.

Want to Buy

Information on a 5736 power tube, maximum ratings, pin out, etc. D Kerl, WHHI, 3319 W Beltline Hwy, Madison WI 53713. 608-273-6919.

Tubes wanted, 6072/6072A, no RCA, need 1000 pieces. R Katz, Allegro Snd, 15015 Ventura, Sherman Oaks CA 91403. 818-377-5264.

TURNTABLES

Want to Sell

Gates 16" TT w/16" Micro-Trak tone-arm, BO. J Sidote, POB 949, Welch WV 24801. 304-436-2131.

Technics SL-1200MK2 (2) stereo TTs w/needles/carts, perfect cond, $600/both. B Coleman, POB 460, Lobelville TN 37097. 615-593-2978.

Russco Cue-Master (2), 33/45/78 TT's, BO. T Liston, WOBL, Box 277, Oberlin OH 44074. 216-774-1320.

Russco Studio-Pro TT's w/arms, $225. W Blackwelder, KNUE, POB 7935. Tyler TX 75711. 214-581-0606.

Technics SH 10B3 TT base, $150. B Umberger, WNLT, 813-446-0957.

Want to Buy

Thorens TT plays 33, 45 & 78's, w/cart. J Gangwer, 942 32nd St Richmond CA 94804. 415-644-2363.

WE, RCA, others, arm pickups, TT's, recorders, amps, blank recording discs, literature, 16" transcriptions. R Van Dyke, Caffrey House, Squires Ave, E Quogue NY 11942. 516-728-9835.

Presto 6N cutter. A Weiner, 14 Prospect, Yonkers NY 10705. 914-423-6636.

TV FILM EQUIP

Want to Sell

16mm interlock system, B&H mag/optical projector, (2) 16mm mag R/P, Selsyn drive system & racks, $1500/BO. R Barwig, Barwig Recording, 5254 W Agatite, Chicago IL 60630. 312-283-2820.

B&H JAN 614 EVMS lightweight pedestal mount 16mm magnetic & optical sound telecine projector, complete w/manuals, vgc, $425. G Ormrod, GFO Prod, 432 East X St, Tumwater WA 98801. 206-352-8028.

Collectable/usable film snd recording equip including Pro 600 mag head, MA-11, orig mic, PS, cables & book; Auricon NR optical snd amp; Magnesync DR-1 monitor panel only w/book; Neumade film measuring machine mdl DS16D w/circular dial plus traditional footage counter; Frezzi pwr pack; Siemans interlock proj, BO. P Dowie, Good Sound, 171 Drexel. Lnsdn PA 19050. 215-626-9322.

VIDEO PROD EQUIP

Want to Sell

Zenith video projector w/10' motorized screen, Panasonic WV-F2 remote camera, $5500. B Hull, WDIX, POB 741, Mt Airy NC 27030. 919-786-4675.

Chyron IIIB w/all avail fonts, many discs, gd cond, in service, $2000/BO. T Turk, Travis Turk Prod, 518 Maclie Ct, Madison TN 37115. 615-255-7787.

Panasonic Model WJ-810 time/date generator plus stop watch function, excel cond, $250. Chief Engr, Vidcom Consultants. 412-327-1333.

Panasonic AG-A750 editing controller w/cables & instructions, mint cond, used 5 hrs, $575. Chief Engr, Vidcom Consultants. 412-327-1333.

Convergence Model CI-90 time code reader & burn in unit, excel cond, $382. Chief Engr, Vidcom Consultants. 412-327-1333.

Quanta Microgen-100B-SIO video titler w/256 colors, 50 pg memory, 9 speed rolls, crawls, RS-232 I/O port, character edging & more, like new, $1195/BO. B Hines, Rd 1 Box 413A, Export PA 15632.

VTA Wiz color correction computer for Bosch FDL-60 B2 telecine, BO; Nagra/Ampex VPR-5 1" portable VTR, new $13,000; Stuart 8" floppy drive for Boxx/Alpha audio system, never used, $2000. D Schlegel, SSI, 7155 Santa Monica, Los Angeles CA 90046. 213-674-9344.

CBS 5500A color corrector, chroma keyer 7000, image enhancer 8000 MK III, plus 5500 sensor, BO. J Phillips, WZOM, 408 1/2 Clinton St, Defiance OH 43512. 419-784-1059.

JVC KA-3U component back adapter, Betacam or M format for KY series cameras, perfect cond, $495; Panasonic WV-6000, S1-System high resolution saticon, gen locable camera w/complete ENG package, like new, $795; JVC RM 70-U remote control unit for 3/4" systems, perfect cond, $295. D Brennan, Custom Video, 3596 Lorna Ridge Dr, Birmingham AL 35216.

Microtime 1020 TBC, w/manual, $1500. Dave, 17094 McGuffie, Salinas CA 93901.

Sony GSL-50 Editpak hi-band Beta edit system RM-50 edit cntlr, cables, like new, $3500. G Jackson, Clocktower 216, Nashua NH 03060. 603-883-7435.

CBS NTSC 5500A; CBS chroma keyer 7000; CBS image enhancer; CBS sensor-RC. J Phillips, WZOM, 408-1/2 Clinton, Defiance OH 43512. 419-782-8591.

Want to Buy

Solid state, rack mount color studio monitor, working or not. B Gentry, KA21VY, 622 Plymouth, Mattydale NY 13211. 315-455-7257.

VIDEO TAPE RECORDERS

Want to Sell

Sony VO6800 remote 3/4" w/Porta Brace case, excel cond, $1800. M Bacon, 216-467-3037.

JVC CR-850U (3) 3/4" broadcast recorders w/address trk time code, have time code readers for machines but not in machines, $6000/ea. A Baker, 804 E 38th St, Indianapolis IN 46205. 317-925-7371.

JVC CR6600U 3/4" recorder, feeder deck for JVC edit system, low hrs, nice shape, new drum, $950. J Kreines, 5330 Kennedy Ave, Millbrook AL 36054. 205-285-6179.

Sony VO-2610 3/4" R/P, w/RF pack $500; Panasonic NV9100A 3/4" player, $350; (2) Sony VO-2600 3/4" R/P, $450/ea, plus $25 shipping for ea item. N Mishaan, POB 335, Lynbrook NY 11563. 516-582-1338.

Sony VO-2600 3/4" R/P, audio dub, excel cond, $550. R Jensen, 5812 21st St, Racine WI 53406. 414-632-3131.

Sony VO-2610 3/4" R/P, audio dub, excel cond, BNC I/O, still adj, $550. R Jensen, 5812 21st St, Racine WI 53406. 414-632-3131.

Sony BVU-110, gd cond, $1000 ea; BVU-50, gd cond, $600/ea; BK-112 time code generators, $400/ea; blank tapes, all formats; Beta breakaway cables. Ugly George Satellite TV, 314 W 52nd St, NYNY 10019. 212-677-2200.

JVC CR-850U 3/4" w/address trk time code, $6000/ea. A Baker, 804 E 38th St, Indianapolis IN 46205. 317-925-7371.

Sony VO-5600 (3), $1200; Sony VP 7000 source player, $1000; Panasonic BT-1900N underscan monitor, $350; Tek 528A waveform, $1500, all like new. B Dorsey, 212-675-0477.

Sony VP700 3/4" video player, vg cond, BO; NSS-4 channel share switcher & 1 lil' moneymaker used for cable ad insertion, BO. D Staats, POB 1346, Parkersburg WN 26102. 304-863-3319.

Want to Buy

Panasonic AG-7400A S-VHS portable; JVC BRS-410U dockable S-VHS recorder; S-VHS A Series editing system; 16:1 lens for JVC BY-110 camera w/rear controls. R Lawrence, Moonshadow Video, 4280 Reston, Roseburg OR 97470. 503-679-8966.

RCA TR-4, Ampex VR-2000 to pick-up, East Coast area please. A Weiner, 14 Prospect Dr, Yonkers NY 10705. 914-423-6638.

Panasonic AG-2200 in gd cond. W Dalzell, 3033 Locust St, St Louis MO 63103. 314-531-3555.

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