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DIGITAL GUIDE

**Radio Technology
In The '90s**

Broadcasters Set For Digital Spree

Exclusive R&R survey results inside

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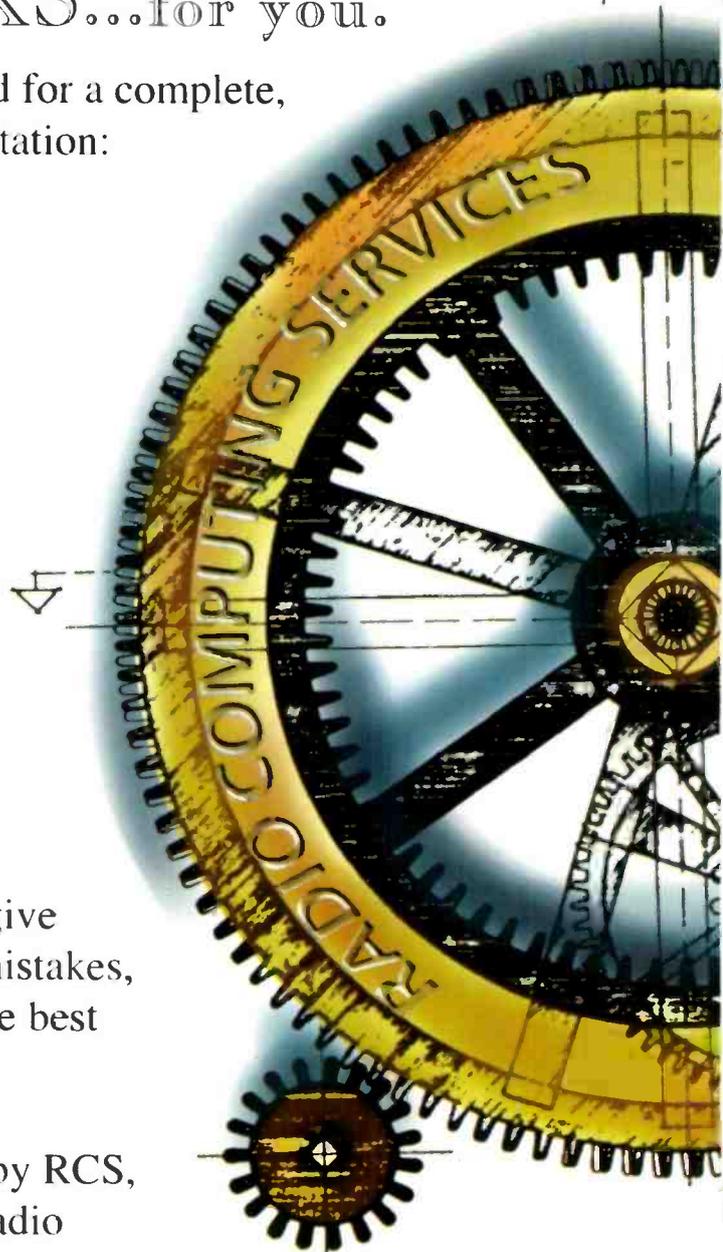
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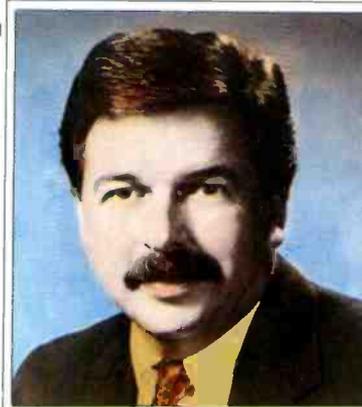
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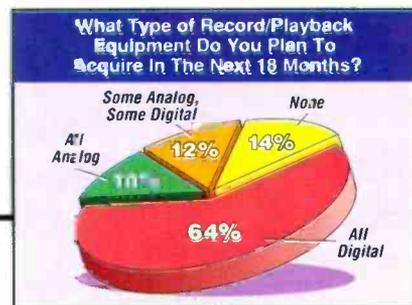
NAB technology expert **John Abel** has been encouraging radio stations to find new ways of making money with their unused spectrum space. But, Abel says, don't expect the proceeds to cover your mortgage. **Page 4**



JOHN ABEL

RADIO SET FOR DIGITAL SPREE

As digital technology moves into its second generation, an exclusive **R&R** survey concludes that radio will be taking the big plunge into the digital arena in the next 18 months. But many broadcasters still say it's not time to throw out the analog equipment . . . yet. **Page 8**



DIGITAL BITS

Most radio stations have computers scattered throughout their offices. **Radio Computing Services** has come up with a system (pictured) that ties the air studio, traffic, management, production, research, and more into a unified whole . . . Digital trailblazer **Sony** introduces pro MiniDisc decks . . . **Arrakis** unveils multitrack digital recorders. **Page 14**



DIRECTORY OF DIGITAL SUPPLIERS

A comprehensive address and phone number listing of digital hardware and technology suppliers. **Page 17**



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EXECUTIVE VP/GM: Dick Krizman
EXECUTIVE VP/SALES & MARKETING: Erica Farber
SENIOR VP & EDITOR: Ken Barnes

VP/EXECUTIVE EDITOR: Gail Mitchell
ART DIRECTOR: Richard Agata
MANAGING EDITOR/DIGITAL GUIDE EDITOR: Ron Rodrigues

ASSOCIATE EDITORS: Jeff Axelrod, Randall Bloomquist, Jack Messmer

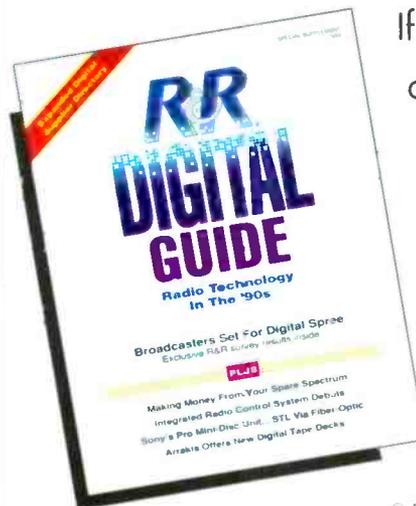
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Washington Bureau: (202) 783-3822, National Press Building, 14th St. NW, Suite 975, Washington, DC 20045 Fax: (202) 783-0260

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Assessing The Impact Of Data Broadcasting

RR
DIGITAL
GUIDE

NAB's John Abel outlines the opportunities — and limitations — of RBDS and its offshoots

Later this year, Radio Broadcast Data System (RBDS) receivers will debut in the United States. For some time, RBDS and the broader field of data broadcasting — a system of distributing news, stock quotes, or other information via the airwaves to computers and other wireless “data receivers” — have been touted as potentially lucrative technologies for broadcasters.

But will radio really benefit from these services? And if so, when will their impact affect the industry's bottom line? In this interview, **NAB** Exec. VP/Operations **John Abel**, the trade group's resident techno-visionary, offers a frank assessment of the opportunities — and limitations — of RBDS and data broadcasting.

R&R: *RBDS offers many captivating features — allowing listeners to tune by format, displaying call letters on the dial, etc. But does this technology have the potential to actually generate new revenue for radio broadcasters?*

JA: Honestly, I'm not sure the revenue opportunities are real high, and they certainly aren't high for the next six months to a year.

One of the major reasons — and this goes back to the whole issue of data broadcasting in general — is because the data transmission rate is very low: 1187 bits per second. You're talking about basically the same rate as a 1200 baud modem, which isn't really state-of-the-art technology. The reason for that limitation is that we're piggybacking the digital signal onto an analog signal with limited bandwidth capacity.

NHK is now working on a higher data rate of about 48 kilobits per



JOHN ABEL

second. But this application can't be used in a mobile environment. Obvi-

“

The same [RBDS] technology can be used to send messages to both receivers and electronic signs, which . . . could either enhance radio spot advertising or become a separate advertising sale.

”

ously, the major advantage of RBDS is mobility.

R&R: *So is there any payoff for investing in RBDS technology?*

JA: There are probably two or three applications that are related to revenue. One is the ability to put information on the LCD display: not just your call letters or your slogan, but also the sponsor's name — to have the word “Pepsi” or “Coke” flash on the dial at the same time you're running the audio spot for the product.

The second application is the ability to send information to electronic signs in shopping malls or other stationary locations. You can change and update that sign message, and you'll have a lot more characters than what you'll have on the RBDS receiver.

R&R: *For example, a station could offer an advertiser a radio spot package plus related messages on electronic signs in high traffic areas?*

JA: Right. The same technology can be used to send messages to both receivers and electronic signs,

CONTINUED ON PAGE 6

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CONTINUED FROM PAGE 4

which would have a display where the [message] crawls across. The signs could either enhance radio spot advertising or become a separate advertising sale.

R&R: *How many characters are available for displaying messages on RBDS receivers?*

JA: Right now, eight characters

“

RBDS might allow broadcasters to set up their own paging systems, either a local operation or one that's compatible with a nationwide system.

”

are standard. Theoretically, it could be more than eight — and maybe some receiver manufacturers will go beyond eight.

The only reason they've limited it to eight characters is the cost and size of the display. In an automobile, we don't want huge radios. And the display is a fairly expensive item.

R&R: *Are there any other potential bottom-line RBDS benefits?*

JA: The ability to link stations together could enhance revenue. For example, in LMAs or duopolies where you have a couple of stations simulcasting, RBDS could switch a listener from the weaker signal to the stronger signal as he drives across the market. The line between the stations becomes transparent to the listener, who doesn't have to keep tuning the radio to get the signal.

It would be similar with any kind of network . . . whether it's **NPR, Westwood One**, or an ad hoc network of stations cooperating on a network program — a football game or whatever. As you drove across the country, the RBDS receiver would automatically search for another station carrying that particular program's ID code. In effect, it would make single-frequency networks viable. This feature also would be of real value to stations with multiple translators.

R&R: *You've mentioned that the establishment of an open network architecture standard for RBDS may prompt entrepreneurs to devise innovative uses for the technology. Have you seen any examples of that?*

JA: One that's been announced is called Coupon Radio and would use RBDS to allow radio advertisers to issue discount coupons.

It's possible this could be a printed coupon. You could put a thermal printer in a home that would receive the RBDS broadcast. So then you'd push a button on your receiver when you heard the ad offering the discount and print out the coupon.

Coupon Radio is proposing a credit card-sized "smart card" that would be inserted into the radio. If you want the coupon, you hit a button that activates a coupon already stored on the card. To use this coupon, you take the smart card to the store and it issues the discount.

“

If the broadcasting industry pursues [data broadcasting] aggressively, you might have 5%, 10%, or 15% of a station's revenue coming from [this market] by the year 2000.

”

Another long-term possibility is the navigational application of RBDS for locating stolen vehicles, providing listeners with traffic alerts, or even giving listeners directions to an address from their present location. This would be a navigational device separate from the radio. But it would use the RBDS transmission to receive information to update the navigational system.

I saw one of these in Japan using FM subcarriers. It was a Honda that had a CRT in the center console. You could dial in where you wanted to go, put the cursor where you were, and it fed you a string of directions: turn right here, turn left here, go straight ahead for two miles.

This isn't something broadcasters would program themselves. But they would be able to perhaps generate income by leasing their subcarrier to do that.

RBDS might also allow broadcasters to set up their own paging systems, either a local operation or one that's compatible with a nationwide system.

R&R: *When might broadcasters be able to take advantage of some of these potential revenue opportunities?*

JA: Obviously, there isn't going to be a real immediate advantage because we've got to get a lot of these receivers out there to make a significant impact. There's nothing here that's going to make a difference in six months. In three to five years, maybe.

The receiver industry is definitely interested in this. Remember, the RBDS standard we adopted in this country is something that has been in Europe — where it's known as

RDS — for about 10 years.

Since we're in a worldwide market for receivers, most of the manufacturers have been making RDS receivers for a decade. With a slight modification, they can make them compatible to the U.S. RBDS standard, and they're anxious to do this. **Delco**, for example, sees a big market in geo-positioning.

CONTINUED ON PAGE 13

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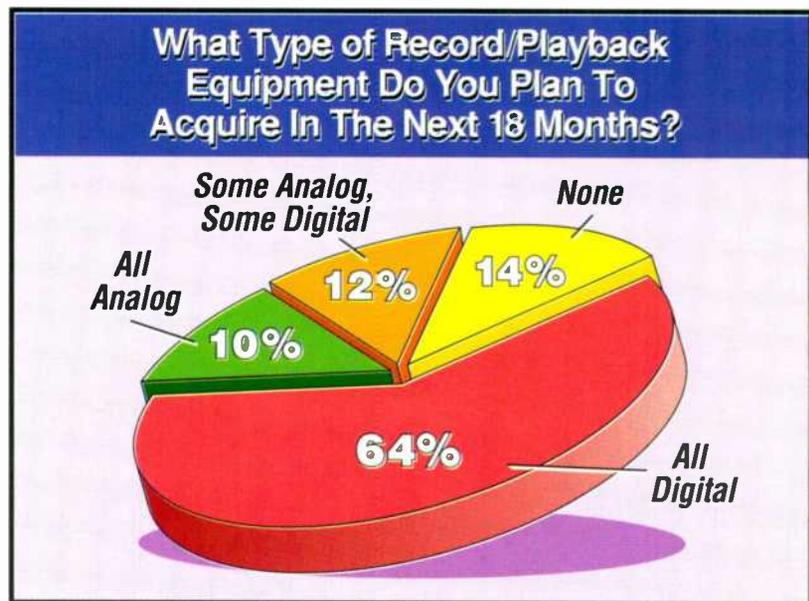


Radio Set To Embrace Digital Audio Storage



After broadcasters sit out digital's first generation, lower costs and improving technologies pave way for radio's digital boom

Hard to believe, but it's been 10 years since the CD introduced the world to digital audio. In the beginning, prohibitive pricing and a scarcity of hardware and software made the technology a novelty of sorts. Now the figures speak for themselves: More recordings were sold in the CD configuration last year than all other formats combined.



Radio Enters Digital Domain

An overwhelming majority of radio stations plan to acquire digital record/playback equipment in the next 18 months, according to an exclusive R&R survey of 1000 general managers and chief engineers.

More than three-fourths of the respondents (76%) plan to acquire digital equipment, while just 10% say they'll buy only analog gear.

Thanks to plunging PC prices, digital hard disk and digital workstation prices became affordable to a lot more stations last year, and nearly seven out of ten stations (69%) plan to install them in the next year-and-a-half.

DAT never caught on as a consumer item, but stations are using them for mass storage, logging, and delayed broadcast purposes. Nearly 40% plan to buy DAT equipment in the next 18 months.

Now that high-capacity hard drives have become more affordable, stations apparently believe they don't need cart machines — digital or analog —

CONTINUED ON PAGE 10

Over the course of the decade, radio has embraced the CD as a primary means of digital music playback. The next phase of radio's digital audio revolution is now taking shape with the advent of digital cart machines, PC-based hard disk storage systems, and digital signal processing. Although some broadcasters entered the digital domain early, high initial cost and lack of a track record have made widespread acceptance a slow process.

CONTINUED ON PAGE 10



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CONTINUED FROM PAGE 8

But as digital technology becomes more advanced, more commonplace, and less expensive, a digital audio explosion appears imminent. According to R&R's exclusive digital equipment survey, 76% of responding stations plan to buy some type of digital record/playback gear in the next 18 months.

The Next Generation

The skepticism encountered by the first generation of digital devices was understandable, according to **TM Century** President/CEO **Craig Turner**. "Dependability is an extremely high consideration for a product that results in your radio station going off the air when it fails to work properly. A year ago, there were still some real technical hurdles to be cleared in making a fully integrated system. Now we've gotten there on a highly reliable basis. There was a lot of struggling to get to that point."

ITC Marketing Communications Manager **Bruce Helling** concurs: "A lot of the early reservations were about the products' newness, quality, and the ability to expand later on. People don't want to simply replace existing analog media with digital media. They want more of a central location/large-scale storage library. The early boxes said, 'I can record, I can play back. That's all I'm going to do.'"

Radio Enters Digital Domain

CONTINUED FROM PAGE 8

anymore. Just 13% plan to acquire cart decks in the near term. (Sony Corp. hopes to change that attitude when it introduces a pro MiniDisc unit this spring. See Digital Bits, Page 14).

About half of the small group of digital disbelievers said they're avoiding the new generation of gear because of price. Managers and chief engineers say the gear is priced too high for their budgets or else they don't see the same value analog equipment returns to them.

Others among the naysayers are waiting for manufacturers to get together and form standards among various brands. They're also giving digital more time to establish long-term reliability. And there's even a group that believes that analog provides all the quality they need.

What Kinds Of Digital Equipment Will You Acquire?*

**Hard Disk/
Digital Workstation** **69%**

DAT **39%**

**Digital Cart
Machine** **13%**

**Digital
Reel-To-Reel** **7%**

(*Figures exceed 100% because of multiple responses).

But the technology has come a long way since then. And Helling says we're dealing with a whole new generation of machines. "One- and two-gigabyte drives becoming available at reasonable costs . . . gives

broadcasters the space, storage, and operating system necessary to run a true digital audio management system rather than just a record/playback device. A lot of broadcasters aren't looking for just a digital recorder/player. That's paying an awfully steep price just to say digital.

"[The technology's] about as good as it's going to get right now. This is truly second generation and what broadcasters want right now. It might not be what they want next year. But it's capable of growing into what they want next year, whereas a lot of the earlier products are stuck where they're at."

Spurring New Interest

The introduction of these interactive systems — which are capable of

CONTINUED ON PAGE 12

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If you don't have an Eventide® VR240 Digital Broadcast Logger, you're missing the easiest, most efficient way to keep track of everything that goes out on your air, and more. There's no bulky, high maintenance, hard-to-use hardware, because Eventide has compressed a complete 8-to-24 channel digital broadcast logging system into one easy-to-use three-rack-space device. There's no need for a tape warehouse, either—the VR240 records up to ten days worth of audio on a single ultra-compact DAT cassette. With the dual-drive option, total unattended logging time stretches up to three weeks. And yes, you can search and play a tape on one deck while simultaneously recording audio on the other.

Without an easy, practical, multi-channel logging system, you're missing what's going on with your crosstown competitors, what your talent (and call-ins) *really* said on the air, when that commercial *actually* ran, who called your contest lines, what the police and fire

dispatchers said. The VR240 even records modem, fax, and transmitter remote control telemetry transmissions. The advantages of logging have always been clear. Now the Eventide Digital Broadcast Logger gets rid of the disadvantages.

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CONTINUED FROM PAGE 10

managing a station's complete audio inventory (from scheduling to recording and playback) — has piqued the interest of a new group of potential buyers. **Jim Hauptstueck**, Digital Products Manager for distributor **Harris Allied**, notes, "We've seen an increase in inquiries. We're starting to see more people look at digital and understand that this is something that can save money and increase profitability."

"People are buying it because it represents value and an economic solution to a problem," remarks **Harris Allied Studio Products Manager Tom Harle**. "It allows them to reduce their operating costs significantly and frees up people to work on other things."

Resistance Lowered

Economics and affordability are obviously major factors when stations decide to replace equipment. "We've seen computers and computer hard drives become so inexpensive that anyone contemplating any new method of audio storage has to take a serious look at what's out there," says **KMGZ/Lawton, OK VP/Director of Engineering Fred Morton**.

"By the end of this decade, I see people leaving the cartridge format in droves," Morton adds. "Within the next year, I anticipate you'll be able to buy the equivalent of a stereo cart

recorder at a computer store for less than you would've paid for the cart recorder alone."

With digital equipment prices falling and reliability on the rise, more broadcasters are looking forward to making the conversion. One is **KFBK**

& **KGBY/Sacramento** Chief Engineer **Dale Harry**, who notes, "Cost is probably the reason we haven't invested in digital machines. And we'd also had an experience that left a bad taste in our mouths about jumping into something too soon."

Why Are You Buying Analog Equipment?*

Waiting for digital to get cheaper **47%**

Waiting for dominant format/standard to surface **28%**

Analog is good enough for our station **22%**

Digital equipment still unproven **13%**

(*Figures exceed 100% because of multiple responses).



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Group W Radio Engineering Manager Glynn Walden says it's just a matter of time before his chain jumps into the digital arena: "We're looking for digital audio. We'd like to say we're not going to build any analog studios, but we really haven't found the magic bullet yet.

"I don't see us spending money to replace analog just for the sake of replacing analog. But the future's not very far away. We're looking at implementing digital at one or more of our stations this year."

Analog's Last Gasp

Although digital appears to be emerging as the wave of the future, it may be too early to put analog *completely* out to pasture. After all, radio still must deal with source material originating outside the radio industry.

"Even though there have been rumblings about digital delivery [of agency spots], it's not happening yet. And that conversion probably won't [occur] for some time to come," explains **KSON-AM & FM/San Diego Chief Engineer John Bufaloe**. "So you're going to need

some analog playback equipment just to get these things into your spot system, whether it's analog or digital.

"But computers are the future. If you're not computer-literate, you're going to have a hard time in broadcasting. It's only a matter of time before everything — spots, music, jingles, etc. — will come off a centrally based computer somewhere. Computer production tools are emerging all over the place. Those of us who know computers, like computers, and have learned to live with computers will be fine."



DATA BROADCASTING

CONTINUED FROM PAGE 6

R&R: *Is there a real limit to what radio can do with RBDS and other forms of data broadcasting?*

JA: What I've been talking about here is RBDS on FM. There really aren't any RBDS applications for AM. Radio's ability to capitalize on the broader data broadcasting market is, again, limited by the fact that the data transmission rate isn't high enough to send huge amounts of information. And the reason we can't get a higher data rate is that we have quite narrow bandwidths in both the AM and FM [bands] — it's 20 times greater in FM than it is in AM, but that's not enough.

Radio and television occupy 42% of the spectrum below one gigahertz, the most desirable spectrum. But 40% of that is television, and just over 2% is radio. We just don't have the bandwidth until we go to another form of transmission — digital, for example. Until then, we aren't going to be able to do a lot of the more sophisticated digital wireless communications because we're stuck with analog transmission.

RBDS is a breakthrough because we were able to get a standard es-

tablished for data broadcasting, and we achieved a higher data rate than we've had before on subcarriers. But it's not 256 kilobits per second or one megabit per second.



Radio's ability to capitalize on the broader data broadcasting market is limited [because] the transmission rate isn't high enough to send huge amounts of information. We just don't have the bandwidth until we go to another form of transmission — digital.



With digital high-definition television, we're using six megahertz of bandwidth to send transmissions, and we're talking about 20 megabits per second. In three seconds, you could download the entire *Encyclopedia Britannica*. This is all possible because of bandwidth.

R&R: *Will data broadcasting services ever provide radio operators with significant revenues?*

JA: I don't think any data broadcasting application will be very big unless you have a system of nationwide distribution.

Radio was successful [in its early days] because of networks, which drove a national market for advertising, programming, and receivers. For data broadcasting to take off, you need a national market for the product and an inexpensive data broadcasting receiver in the household. The receiver can have an output to a fax machine, a computer, or maybe a game machine. For that to happen, a standard has to be selected. But at that point, there will be a big market for data broadcasting.

R&R: *Could data broadcasting eventually account for 10% of a radio station's revenue?*

JA: According to [consulting firm] **Frost and Sullivan**, data broadcasting will be a \$3 billion market by the year 2000. If the broadcasting industry decides that it wants that market and pursues it aggressively, you might have 5%, 10%, or 15% of a station's revenue coming from data broadcasting by the year 2000.



RCS Works Creates 'Paperless' Studio

Digital signals are now used in every department at most radio stations. It's another giant leap, though, to assemble all of those bits and bytes into a single system. That's what Scarsdale, NY-based **Radio Computing Services** has done with its RCS Works system.

"It's going to change the way radio is done," RCS President **Andy Economos** told **R&R**. RCS Works allows the free exchange of information between the air studio, production, management, traffic, music, sales, promotion, research, and any other department. RCS calls it "a totally integrated audio and information machine."

All of the systems come together in the air studio's Master Control unit, where air personalities have every element needed for their show displayed on three computer screens. The center screen contains the log, showing all scheduled music, spots, jingles, and live reads.

The left screen displays "audio status," showing the time remaining in the current element. The screen also has a menu of jingles, jock shouts, and each jock's own special



Radio Computing Services RCS Works system

bits and sound effects — all instantly available from hard drive.

Current music is also stored on hard drive, which adds an advantage not available with carts or CDs: A song's ending can be previewed while the song itself is playing on the air!

CONTINUED ON PAGE 16

Sony Unveils Pro MiniDisc Deck

Sony Business and Professional Group will be introducing a host of new radio station gear at the **NAB** convention in Las Vegas.

At the forefront will be the **PMD-C1P** and **PMD-C1** MiniDisc cart machines. Stations will be able to randomly access up to 74 minutes of

near-CD quality audio on a rewritable optical disc. The company claims that the MDs can be rerecorded at least a million times with no signal degradation. The machines themselves resemble conventional cart machines but have additional features such as text editing/storage and alphanumeric display.

CONTINUED ON PAGE 15

Fiber-Optic STL Systems

BEC Technologies of Orlando has developed a modular, digital fiber-optic STL system that can transmit up to 64 channels of full-bandwidth, bidirectional audio.

Maximum transmission distance is two miles multi-mode with a standard LED driver, or 25 miles single mode with an optional laser driver. Frequency response is 10Hz-22.5kHz.

Sony Unveils Pro MiniDisc Deck

CONTINUED FROM PAGE 14

Why "near-CD" quality and not the real thing? Sony says the compression algorithm it uses to squeeze all that sound onto the little platter requires some sacrifice in fidelity — but they insist it's not nearly enough for most users or listeners to notice.

Sony is also unveiling its CDK-3600 disc changer, which will store 360 CDs. The unit features a dual transport system that autocues and crossfades between songs. Up to 28 CDK-3600 machines can be chained for on-line management of up to 9999 discs.

Among other products Sony will show off at the NAB: its first all-digital broadcast console and a dual-deck DAT editing system.



Sony's PMD-C1P and PMD-C1 MiniDisc cart machines



Arrakis Systems Trak*Star multitrack recorder

Trak * Star Production System Debuts

Arrakis Systems has taken the wraps off Trak*Star, a lower-cost multitrack digital worksta-

tion designed for radio station use. The equipment comes in two- and eight-track models.

CONTINUED ON PAGE 16

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RCS Works Creates 'Paperless' Studio

CONTINUED FROM PAGE 14

The basic hard drive stores 1000 minutes of compressed digital audio; additional units can be added in a chain. An option for stations with large music libraries is the Pioneer CAC-V3200 jukebox, which stores 300 CDs and uses two players (so any two CDs can be played back-to-back).

The third screen is used for live copy and moves in tandem with the log screen, unless you want to check something manually. The computer can also retrieve and insert news and weather updates, eliminating the need to clear the wire machines.

Access is simple — everything can be manipulated with a trackball and three buttons. The keyboard need

only be used for typing copy changes and cart labels. No liner cards, no three-ring binders, no papers taped all over the console — it's a true paperless studio.

Meanwhile, in another part of the building, the PD can check tomorrow's music rotation. The system

can not only schedule music, but also preview music and listen to segues directly from the hard drive.

RCS's basic Master Control setup to equip an air studio and production begins at \$22,000. Full networks capable of serving all departments of a radio station start at \$30,000.

Trak*Star Production System Debuts

CONTINUED FROM PAGE 15

Trak*Star includes a rack-mounted digital hard disk controller with a 120mb drive, color VGA monitor, keyboard, and trackball. The unit is capable of eight-track editing and playback of four stereo-mono pairs, two-channel audio input and output, nondestructive real-time editing, and

loop scrub for precision location of edit points.

Trak*Star is a family of single function systems that is compatible with Arrakis's Digilink multifunction system, which functions as an integrated production/on-air unit.

All Arrakis products are available through Harris Allied.



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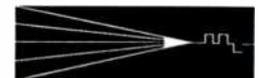
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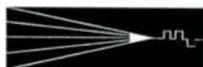
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