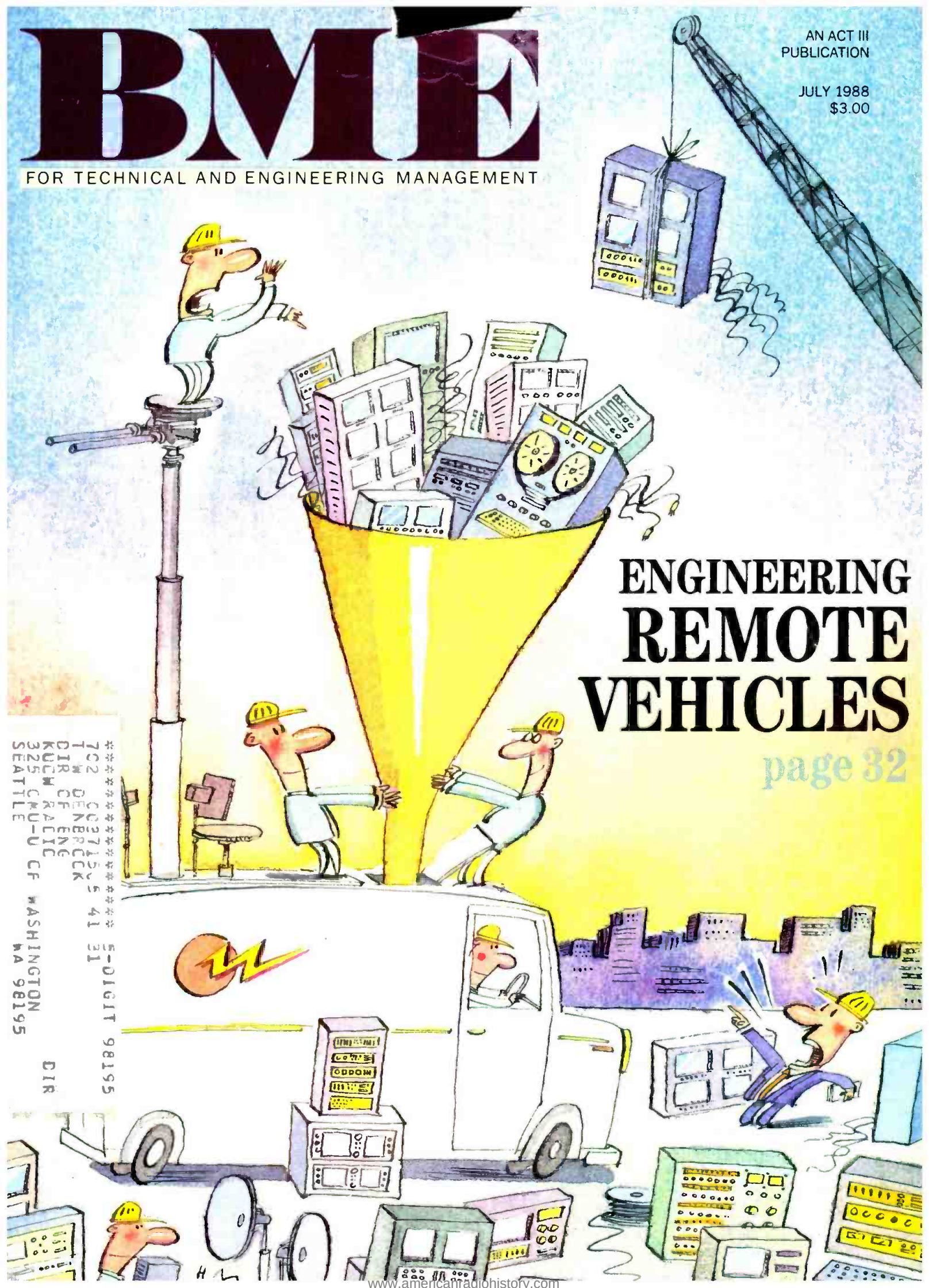
BME

FOR TECHNICAL AND ENGINEERING MANAGEMENT

AN ACT III PUBLICATION

JULY 1988
$3.00



ENGINEERING REMOTE VEHICLES

page 32

********** 5-DIGIT 98195
702 003715 5 41 31
T W DENBROCK
DIR OF ENG
KUCW RADIO
325 CMU-U CF WASHINGTON
SEATTLE WA 98195
DIR

www.americanradiohistory.com

"Absolutely the most affordable fully professional recorder on the market."

A bold statement. But no exaggeration.

Here's why . . . No 2-track machine available today—at *any* price—offers the same level of advanced technology, plus Studer audio performance and renowned Studer quality. Only the A807.

With the A807, Studer defines a new price point. If you don't believe us, check out the competition . . . It won't take you long, because there isn't any.

Broadcast, post production, or studio—in whatever audio environment you operate—make it your business to check out the Studer A807. Start with price . . .

High Tech, Low Price

Anyone who thinks "Studer" always means "expensive," please take note. With the A807, your dollars actually buy *more* now than they did five years ago—more technology to help you do your job better and faster.

Agile and Easy to Use

The Studer A807 is a fast, full-featured machine for making quick work of your production tasks.

Features include: • tape shuttle wheel • reverse play • right hand edit • tape dump • varispeed • multifunction tape timer and autolocator with programmable "soft keys" • digital setting of audio alignment parameters for 3 tape speeds and 2 tape types • phantom powered mic inputs on portable version • RS 232 port • optional 1/4 track playback head • a variety of portable and console configurations, including a 4 channel ½" version.

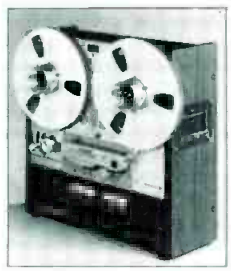
Studer Audio Performance and Reliability

Advanced phase compensated audio-electronics and Dolby HX Pro™ ensure that this compact Studer delivers full-sized Studer sonics.

A massive, die-cast chassis and headblock, rugged AC spooling motors and new brushless DC capstan motor, remind you that the A807 is built with the same quality and precision that have been synonymous with the Studer name for four decades.

So—if "affordable" is not the first word that comes to mind when you think of Studer—think again.

Ask us about the A807. The most affordable fully professional recorder on the market.



Portable version of the A807 with wood side panels

Timer-autolocator-control panel

Available from Studer Revox Full-Line Dealers. Or contact us directly: Los Angeles (818) 780-4234 / New York (212) 255-4462 / Chicago (312) 526-1660 / San Francisco (415) 930-9866 / Nashville (615) 254-5651

STUDER REVOX

STUDER REVOX AMERICA INC.
1425 Elm Hill Pike • Nashville, TN 37210

Circle 100 on Reader Service Card page 59

www.americanradiohistory.com

DYNAMAX CTR12 and CTR14 shown

The DYNAMAX® CTR10 Series

Why it's number one

Our competitively priced CTR10 Series comes complete with features that cost extra in other machines. Like automatic fast forward, three cue tones, built-in audio switcher and multiple machine mixing capability.

In the first 24 months of production, Fidelipac delivered over 4000 CTR10 Series cartridge machines, making the CTR10 Series the most popular cartridge machines in the world today.

Operators work faster and smarter with the CTR10's rapid audio search, programmable repeat play lockouts, flashing "played" indicators, front panel 1 kHz defeat and audio status monitors.

Engineers love the CTR10's easy-to-service straightforward design. Gold-plated, fully removable solder-masked circuit boards. Built-in diagnostics. 15-volt RF-immune simple CMOS logic. Full function remote control. They also love our 2-year warranty and our super service.

And your listeners will love the sound.

There are many more reasons why the CTR10 Series is number one. Get them all. Call Fidelipac or your authorized DYNAMAX distributor.

DYNAMAX®
BROADCAST PRODUCTS BY FIDELIPAC®

Fidelipac Corporation ☐ P.O. Box 808 ☐ Moorestown, NJ 08057 U.S.A. ☐ FAX: 609-235-7779 ☐ TELEX: 710-897-0254 ☐ 609-235-3900 ☐ Toll Free 800-HOT TAPE

DYNAMAX products are designed and manufactured in the U.S.A.

Circle 101 on Reader Service Card Page 59

www.americanradiohistory.com

Pick up a new Sony ED Beta and get bette

It's the kind of definition that gets second looks from everybody.

The kind you've always wanted.

Because the new Sony ED Beta™ VCR format (E for extended, D for definition) produces a picture of incredible clarity.

A picture that could only result by shifting from 5.6 MHz to an astounding 9.3 MHz in the luminance carrier signal. A signal-to-noise ratio improved by 3 db over SuperBeta.™ And an eye-opening 500 lines of horizontal resolution.

Making it a picture unsurpassed for home off-air recording. Vivid, lifelike and highly detailed. Like you're used to seeing in a broadcast booth.

Besides improving what you see, the ED Beta VCR improves what you hear. With Beta Hi-Fi* sound. A dynamic range of more than 90 db. And a frequency response of 20 to 20,000 KHz.

What's more, to insure what you record has the best possible video and audio, ED Beta uses our newly developed, metal particle tape. Which allows for extremely high-density recording.

In short, ED Beta is a format best appreciated by those of you with a very well-developed sense of video.

The machine made for home workouts.

Everything we mentioned above and more is packed into the new Sony EDV-9500 ED Betamax* Professional Editing VCR.

It has our exclusive tape stabilizer system, so time-base error can be reduced significantly.

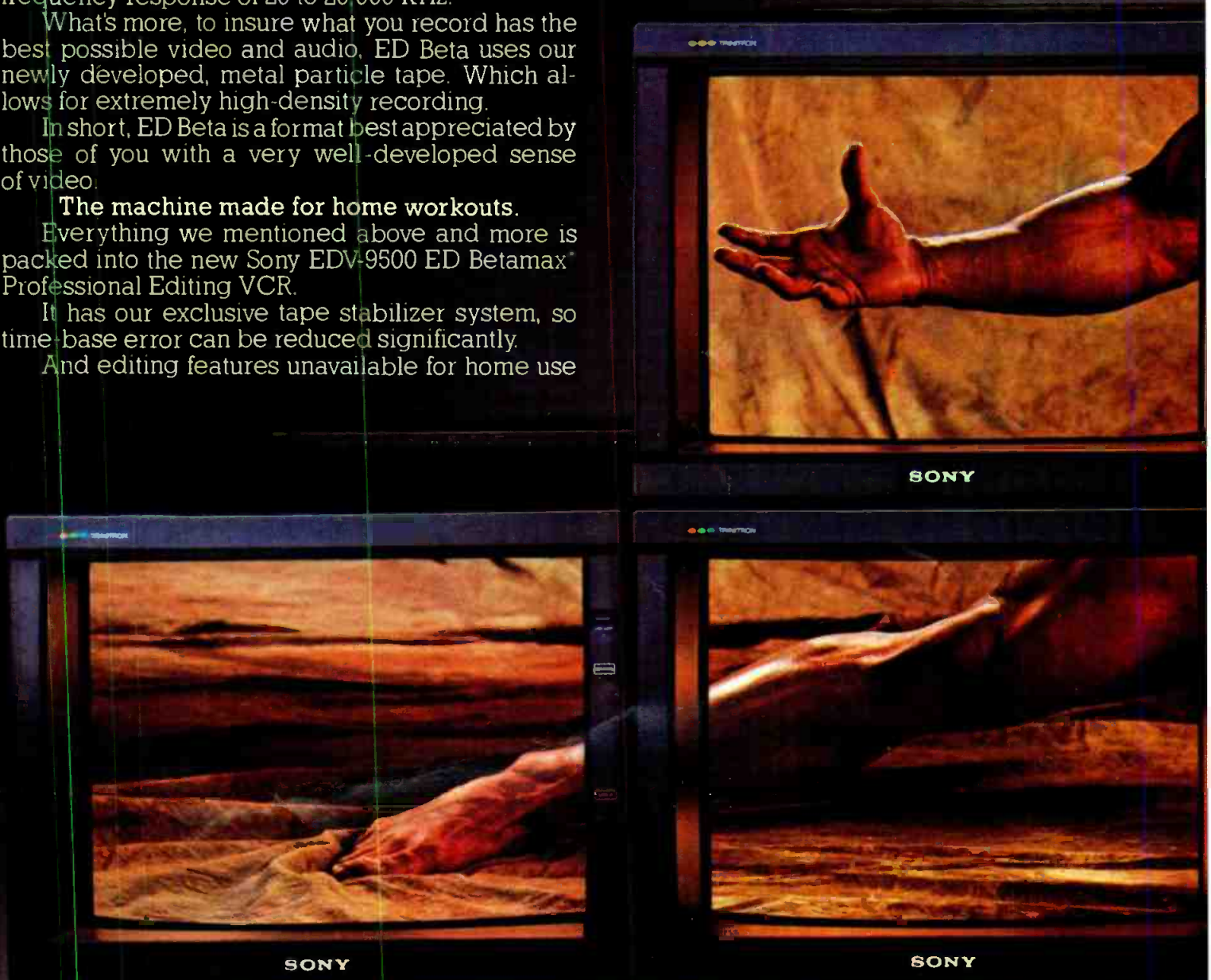
And editing features unavailable for home use until now. Like pre-roll editing accurate to within ± 3 frames. An 8-segment programmable assemble edit with random sequence capability. And a direct Jog/Shuttle dial with digital freeze-frame for jogging the tape while in play.

We've also included dual Flying Erase™ heads. An on-screen linear time & frame counter. 2 S Video inputs and outputs. And 2 sets of Video/Audio inputs and outputs for easier editing and use with any camcorder.

There's only one format like ED Beta. Which means there's only one machine like the EDV-9500 ED Beta VCR.

And only one place you'll find it. Call 1-201-930-7669 for the ED Beta dealer nearest you.

Ask for the Sony ED Beta. The ½" VCR with muscles. ED Beta



TV picture simulated.

www.americanradiohistory.com

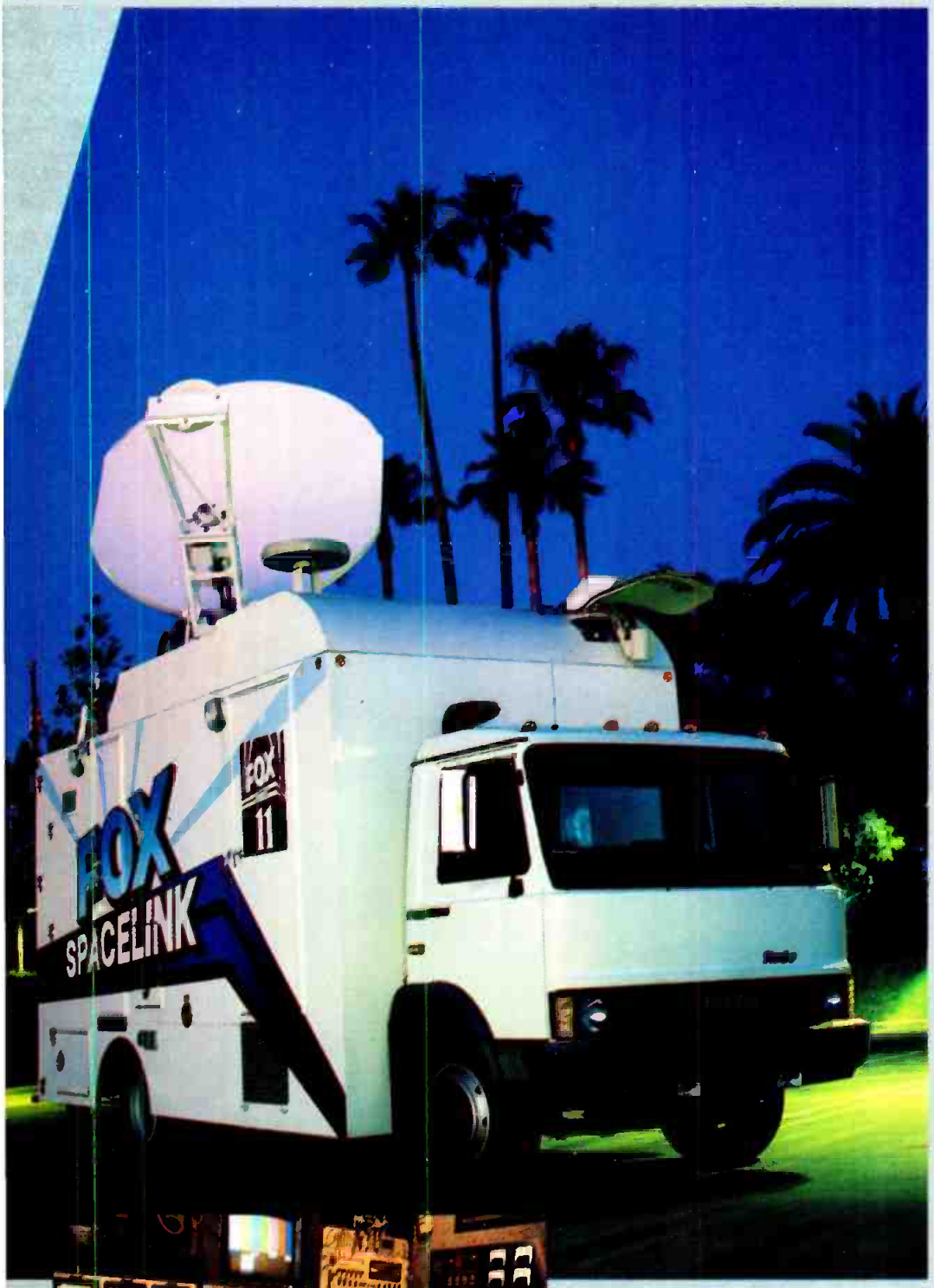
© 1988 Sony Corporation of America. Sony, ED Beta, SuperBeta, Beta Hi-Fi, Betamax, Flying Erase and The One and Only are trademarks of Sony.

Circle 102 on Reader Service Card Page 59

www.americanradiohistory.com

the SOURCE

Midwest Links Fox Network to the World

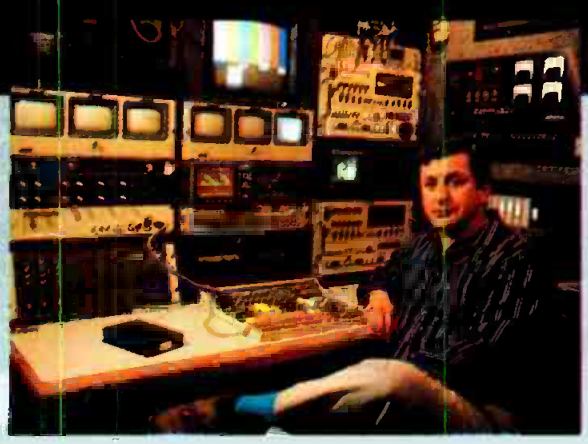


Why did management at KTTV, flagship station for the FOX broadcasting network in L.A., go to Midwest Communications for their new S-23?
Because Midwest is number one, worldwide, in mobile satellite communications design and integration. The results were outstanding!

"With our Midwest built mobile satellite communications truck, we no longer have any limitations to our coverage area. That is very important to a news station in the L.A. market. It is also important that Midwest brought the truck in on time and in budget."
Bob Morse,
VP/General Manager KTTV

Steve Blue, KTTV News Director, continues:
"The ***Spacelink*** gives *Fox News* an advantage our competition can't top... Midwest was prompt with delivery and prompt with support."

Make Midwest the Source for all your mobile satellite communications needs. For more information on the S-23, contact your Midwest representative today.



KTTV VP/Director of Broadcast Operations, Steven H. Steinberg, sums it all up with this comment:
"This is the second S-23 that I have purchased from Midwest. It is not often I can say this, but in both cases, there were no problems."

MIDWEST
Communications Corp.

One Sperti Drive/Edgewood, KY USA 41017
(606) 331-8990

Circle 103 on Reader Service Card Page 59

www.americanradiohistory.com

BME
FOR TECHNICAL AND ENGINEERING MANAGEMENT

JULY 1988
VOL. 24, NO. 7

On the cover:
Illustration
by Hal Mayforth

70
DAWs
in Radio

54 *Automated Election Packages*

Features

32 **Remote Vehicle Engineering**
An inside look at the design of remote broadcast and production vehicles reveals engineering considerations that are often overlooked.

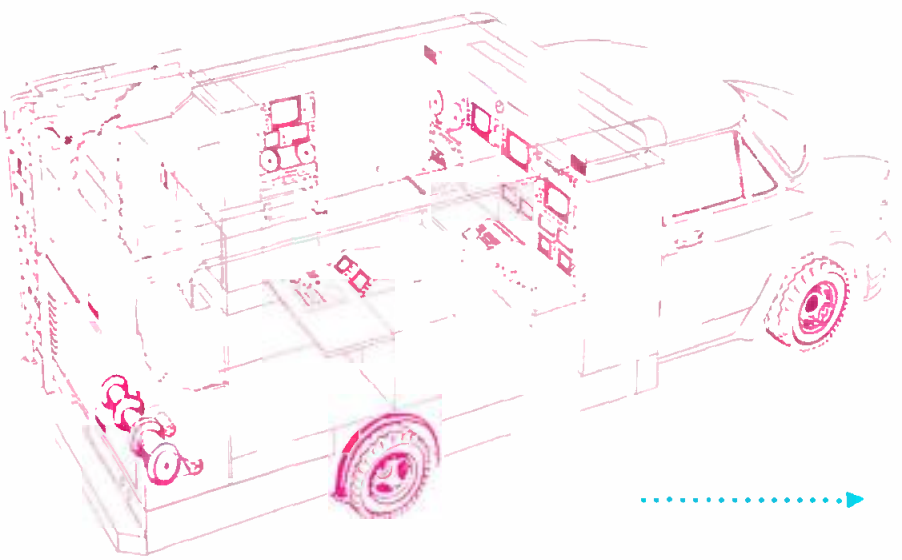
45 **Summer Olympics: High-Tech Design**
Preparations for NBC's remote operation at the Seoul Olympics have spanned three continents with CAD and communications.

54 **The Election Connection**
When the final returns are in, your station will be a winner with automated election reporting.

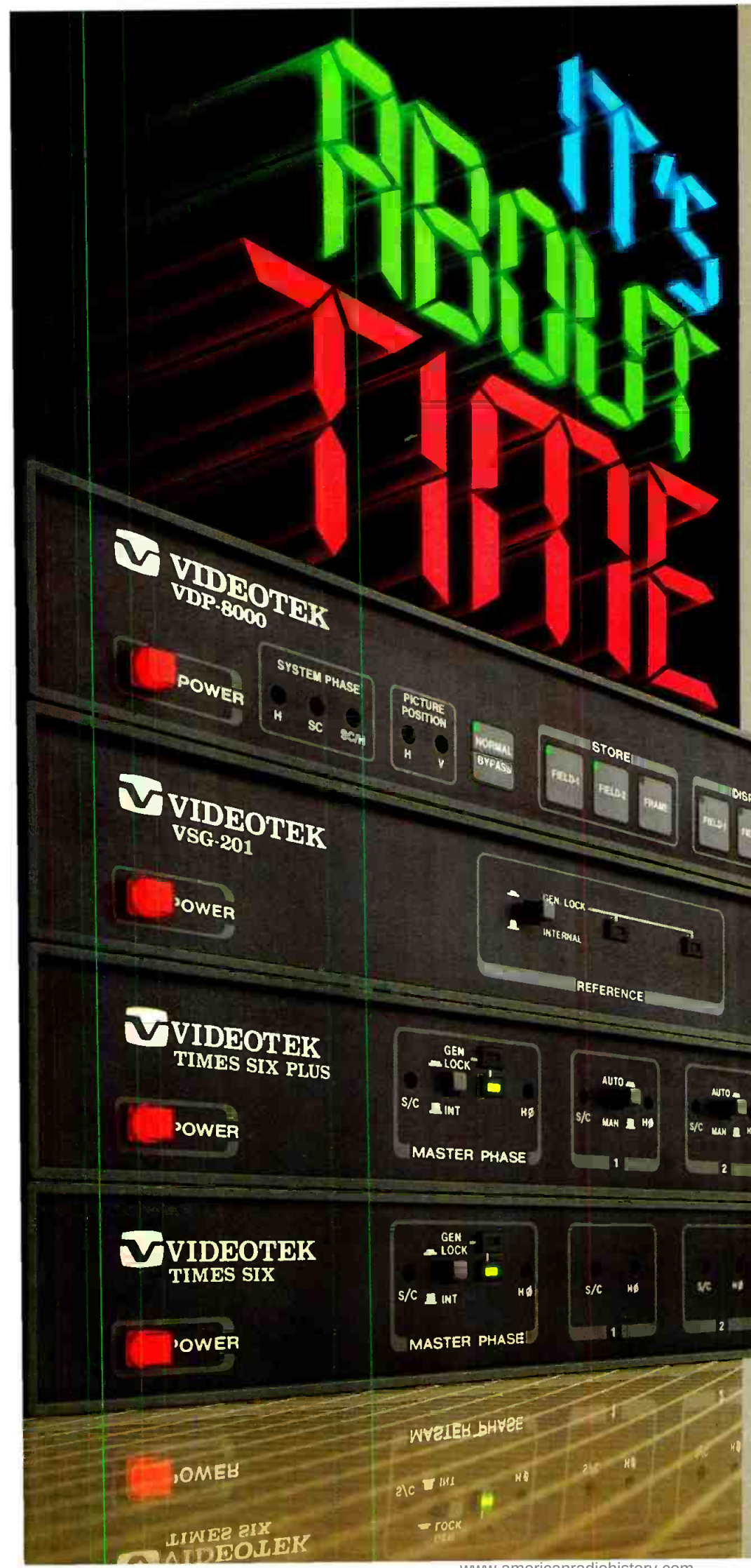
63 **New Ideas in TBCs**
Once thought to be a dying breed, standalone TBCs are coming to play a vital role in integrating diverse tape formats.

70 **Coming Soon to a Station Near You—Digital Audio Workstations**
Radio broadcasters are asking for mass-storage technologies and magnetic, optical and hard-disk media that can do it all—but at the right price.

32
Remote Vehicles



www.americanradiohistory.com



Get in sync with Videotek's versatile team of timing devices.

No matter what your application, Videotek has a range of feature-rich timing devices to suit it—and your budget.

Take our new **VDP-8000 Frame Store/Synchronizer** with independent Freeze Field capability. Or our two blackburst generators—each with individual horizontal and subcarrier timing correction for up to six sources. The **Times Six Plus** model offers manual or automatic operation and automatically compensates for cable length and equipment drift.

Our new drift-free **VSG-201 digital sync generator** with six isolated blackburst outputs, audio test tone and "textbook" SMPTE color bar outputs can drive the whole show. And all units feature front-panel gen lock input loss/presence indicators.

Don't waste any time! See your Videotek dealer for details!

VIDEOTEK INC.
Designed for real needs.
Priced for real budgets.

243 Shoemaker Road, Pottstown,
Pennsylvania 19464 • (215) 327-2292
TWX 710-653-0125 • FAX (215) 327-9295

Circle 104 on Reader Service Card Page 59

www.americanradiohistory.com

BME

Editor-in-Chief
ROBERT RIVLIN

Editor
TIM WETMORE

Senior Editors
EVA J. BLINDER
BETH JACQUES

Associate Editor
RON MARANS

Production Editor
MICHAEL D. ESPINDLE

Art Director
RICK STARK

Associate Art Director
FRANK TAGARIELLO

Designer
RAYMOND WONG

Production Director
NICK TARTAGLIA

Assistant Production Manager
MARGOT SUYDAM

Group Publisher
KEVIN J. CONDON

Vice President, Publishing Services
DJUNA Z. SCHAUB

Associate Publisher
PATRICK J. MOLONEY

Northern Regional Sales Manager
GENE KINSELLA

Southern Regional Sales Manager
MICHAEL S. DAHLE

Western Regional Sales Representatives
DAVID M. ADRIAN
JAY LEWIN

Controller
JOSEPH M. PANNULLO

Executive Assistant
SHARON PORGES

Act III Publishing

President
PAUL DAVID SCHAEFFER

Senior Vice President,
Technical Division
KEVIN J. CONDON

Senior Vice President,
Corporate Development & Planning
MARTHA LORINI

Vice President,
Finance & Administration
BRONNA A. BUTLER

Act III Publishing, Technical Division
295 Madison Ave., New York, NY 10017
(212) 685-5320 Telex: 64-4001
Fax: (212) 679-0919
Also publishers of:
World Broadcast News
Corporate Video Decisions

ABP VBPA

BME (ISSN 0005-3201) is published monthly by NBB Acquisitions, Inc. BME is circulated without charge to those responsible for station operation and for specifying and authorizing purchase of equipment used in broadcast facilities in the U.S. and Canada. These facilities include AM, FM, and TV broadcast stations, CATV systems, ETV stations, networks and studios, audio and video recording studios, teleproduction facilities, consultants, etc. Subscription prices to others: $36.00 one year, $50.00 two years. Foreign: $50.00 one year, $75.00 two years. Air Mail rates on request. Copyright 1988 by NBB Acquisitions, Inc., New York City. Second class postage paid New York, NY, and additional mailing offices.

POSTMASTER: send address changes to BME, P.O. Box 6056, Duluth, MN 55806.

Columns & Departments

13 Viewpoint
The Engineering Outlook for HDTV

15 Feedback
Good old days... Network Ties... More Excellence... HAATS Offer

17 Update
FMX Expands... ATV Beat Goes On... TV Receiver Manufacturers Support IDT... Siggraph to Convene in Atlanta... Transatlantic Digital Now Operating Audio Link

23 Crosstalk: An Engineering Management Journal
Big Plans for MII... S-VHS vs. U-matic Editing ... FCC Log-Jam May End

29 Tech Watch
"Smart Fluids" Respond to Electrical Stimulation

76 Compute
Audio Pads and Attenuators

78 Spectrum: The Regulatory Environment
The Whole Truth for FCC License Renewal

82 New Equipment
Delta Splatter Monitor... Master Control Console from Wheatstone... New Leader Signal Generator... and more new products from NAB '88

86 Business Briefs
Sunset Sound's New Studios

88 Currents: A Guest Editorial
Digital Audio in Radio Broadcasting

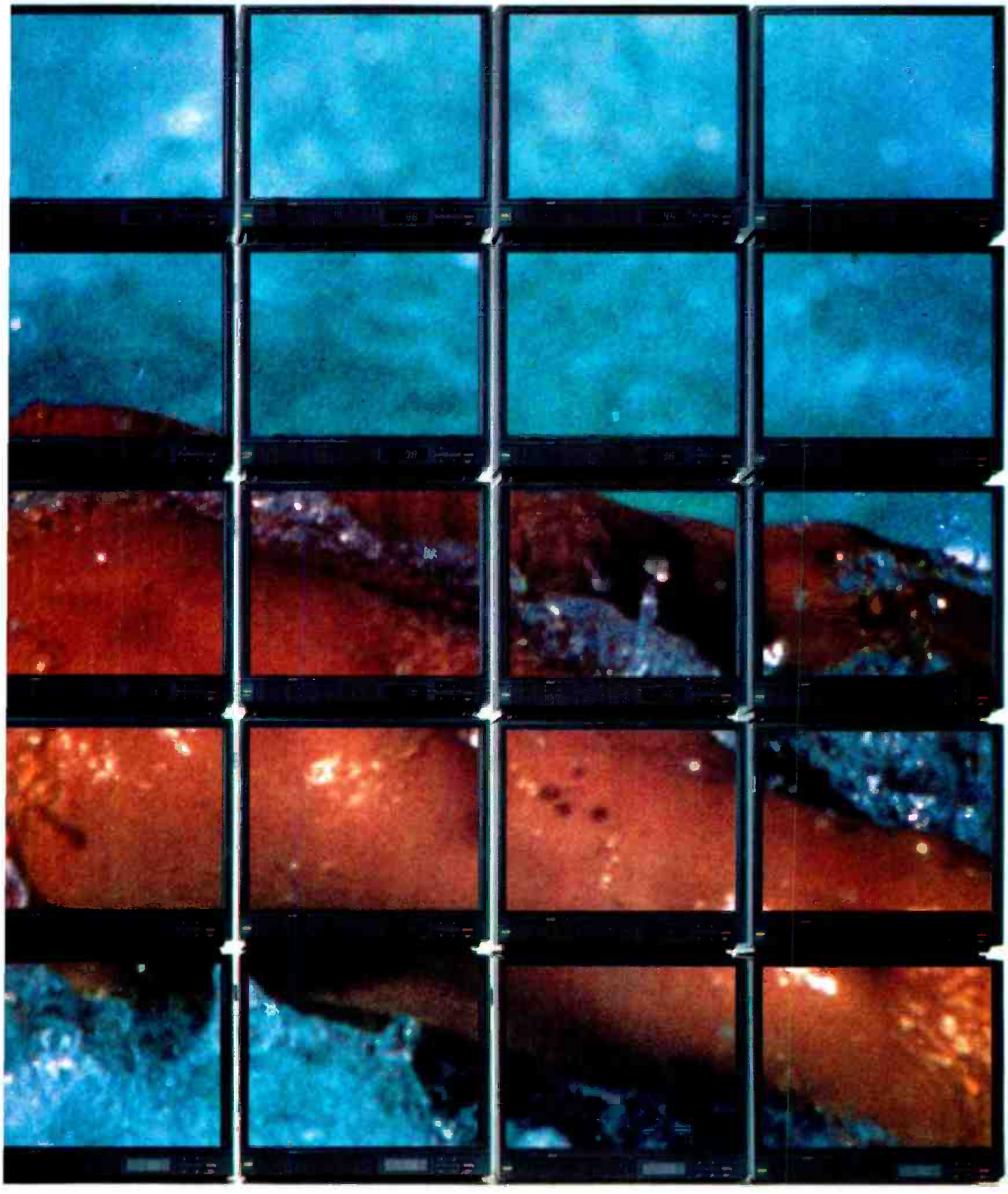
89 Advertisers Index

17 *ATV Updates*

www.americanradiohistory.com

Seoul Commitment.

www.americanradiohistory.com



NBC needed to pick a routing switching and machine control system for their coverage of the 1988 Summer Olympic Games in Seoul, Korea. The winner: 3M.

We've been a major player in the broadcast equipment business for the past 25 years. To find out more about the system we're supplying to NBC, or about any of the other video switching or control systems we've provided to major networks, call 1-800-328-1008.

Broadcast and Related Products Department/3M

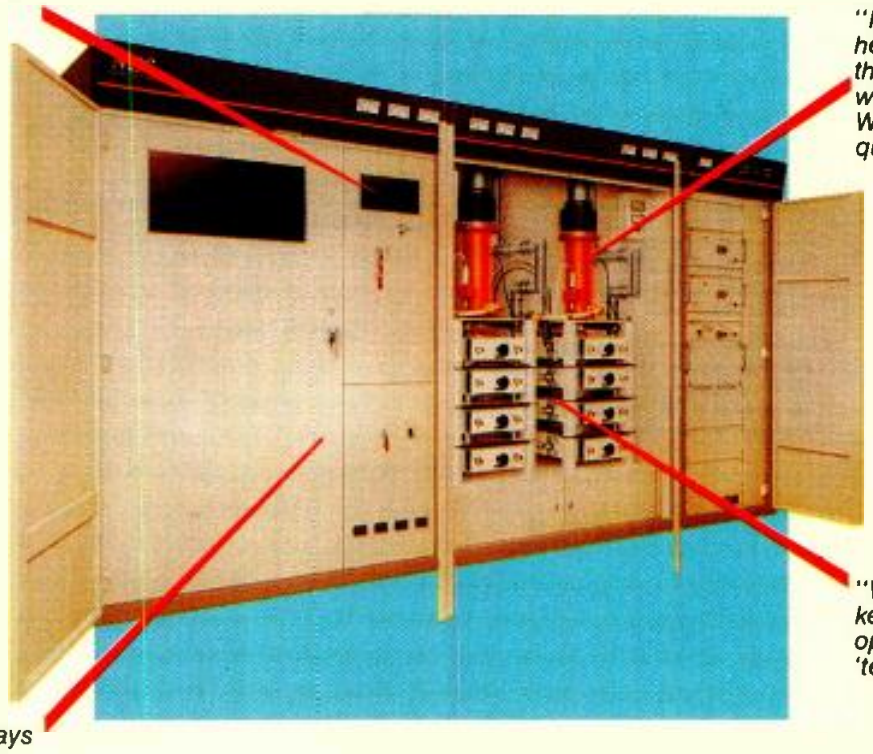
3M

www.americanradiohistory.com

WE'RE RELIABLE. YOU'VE GOT THEIR WORD ON IT.

"This transmitter has stood the test of time (nearly 9 years). We're very satisfied with its reliability."

Joe Alvin, Chief Engineer
WNNE-TV
White River Junction, VT



"NEC has bent over backwards to help us with any questions about the transmitter. We've had a wonderful association with them. We're very impressed with NEC quality."

Karl E. Paulsen, Chief Engine
KTZZ-
Seattle, W

"We were impressed with its 'turn key' performance. It's easy to operate and doesn't require any 'tender loving care.' It's reliable."

Bob Hollinger, Assistant Chief Engine
WQEX-T
Pittsburgh, P

"Their technical support is always there. You can just call Chicago and get the information you need. And the transmitter's good. We're very satisfied with its performance."

Phil DeLorme, Dir. of Engineering
WTKK-TV
Manassas, VA

If you want a clear picture of just how good an NEC UHF transmitter is, take a look at what people who use them are saying. They're talking about reliability. Stability. Excellence in design. Low cost operation. And there's no comparison when it comes to maintenance. They require very little attention.

They're also saying that NEC people are always there when needed. With suggestions. Ideas. Answers to questions. Replacement parts. Or whatever it takes to keep a transmitter running smoothly.

What they're telling us is what we'd like to tell you. If you need a transmitter that's built to be reliable year after year, that's known for stability, and that's not power hungry, take a look at what NEC is offering. Better yet, take a user's word for it.

Here's why there's no comparison:

- 100% solid state construction
- Highly efficient Amperex, EEV, or Thorn EMI klystrons
- Power ranges from 10 kW to 240 kW (parallel running)
- 30% reduction in exciter parts for 50% increase in MTBF (to 30,000 hours)
- Diagnostics throughout transmitter
- Water or vapor-cooled — as you choose

PCN-1400 Series VHF Transmitters also available. Power sizes 1 kW to 100 kW (parallel running).

- External (oil) or dry, internal power supply — as you choose
- ATS ready
- Ready for stereo without modification
- Ion pump to increase klystron life

Emergency parts are available 24 hours a day, 365 days a year in Wood Dale, IL, 30 minutes from O'Hare Airport. Simply call 1-800-323-6656.

For more information about NEC transmitters, contact NEC America, Inc., Broadcast Equipment Division, 1255 Michael Drive, Wood Dale, IL 60191. Phone: 312/860-7600.

NEC

Circle 106 on Reader Service Card Page 59

C&C
Computers and Communications

© 1987 NEC America, Inc.

650-099

www.americanradiohistory.com

VIEWPOINT

It is time for station engineering to make some points of its own and to give the viewer a more realistic outlook on the future of HDTV.

Perhaps not since the advent of color television has the attention of the American public been so focused on broadcast technology as it is now on HDTV. As was evident at the recent Consumer Electronic Show, TV set manufacturers are telling their retailers that advanced television is about to happen. And the retailers are telling their customers the same thing.

As true as the predictions are, however, it will be consumer demand rather than broadcasters that will determine the future of the industry. The set manufacturers appear to be taking an upper hand in the development of a technology that requires the equal participation of broadcasters. And it is time for station engineering to make some points of its own and to give the viewer a more realistic outlook on the future of HDTV:

1. There is still a major difference between HDTV as a production system and HDTV as a method of program distribution. As a production standard for the TV program and TV commercials industry, the 1125-line/60-field imaging and recording system proposed by the Japanese manufacturers is a de facto standard. Indeed, Sony, Matsushita, Hitachi and Ikegami have formed a consortium to urge the acceptance of this de facto standard.

Yet the means of producing material on HDTV is entirely different from the means of transmitting it—where there is no standard at all at this point. While most broadcasters will probably never have the need to produce program material in an HDTV format, almost all will be involved in transmitting it within the next five years.

2. There is a big difference between what can be accomplished by the consumer TV set and what needs to be done to deliver HDTV pictures to it. It's perfectly possible for the set manufacturer to immediately begin shipping HDTV home receivers; but what can be seen on them? HBO is due to begin sending HDTV pictures down the line by the end of this year; there may be some difficulty, however, in simply "lashing together" two or more cable channels to make one super-bandwidth HDTV service.

3. Broadcasters are not being selfish in holding out for a full-bandwidth HDTV service—they are fighting for the future of the medium. There is a tendency to think that broadcasters should somehow "go with the flow" when it comes to HDTV transmission, and accept one of the proposed NTSC-compatible, almost-as-good-as-HDTV transmission systems that have been proposed recently.

Anxious to avoid the problem faced by AM Stereo, TV broadcasters are wise to enlist the early help of set manufacturers. But equally important is the need for broadcasters to take an active role in the process that will eventually lead to ATV broadcasting. ■

Robert Rivlin
Editor-in-Chief

www.americanradiohistory.com

LEADER™ = Election Results!

"The LEADER Election System enabled us to stay thousands of votes ahead of our competitors on Super Tuesday. The difference became so obvious that one competitor cancelled their coverage midway through the night. The key is adequate advance planning and organization. Do that and LEADER will take care of the rest."

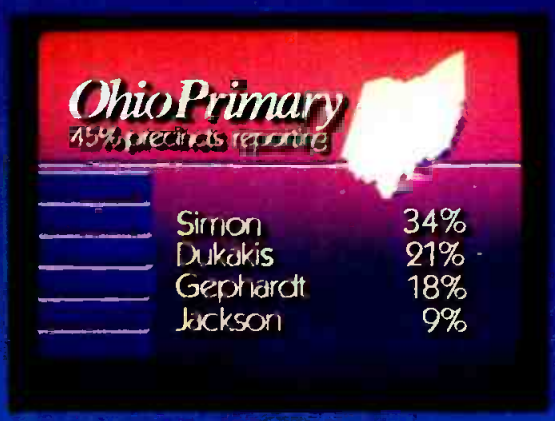
Lynn Walker, News Director
Joe Sherrill, Production Manager
KAMR-TV, Amarillo, Texas

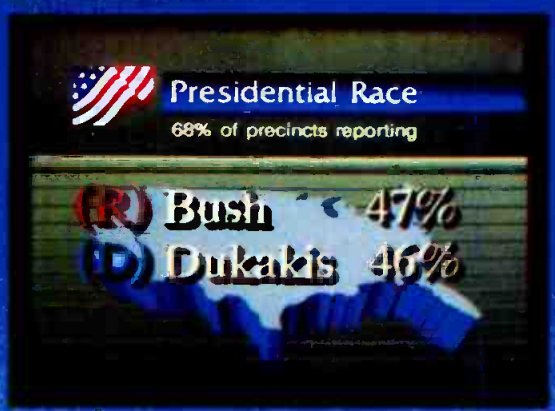
"LEADER is absolutely the best, most effective program I've ever seen or used. The bottom line is: it works. Other systems force the user to adjust the station's program to suit the software; LEADER allows you to adjust its software to suit your program. The system has been proven in our station—we began using it several years prior to its acquisition by Dynatech NEWSTAR."

Elden Hale, President & General Manager
WNEP-TV, Scranton, Pennsylvania

"Just an official letter to tell you how pleased we were with the performance of the LEADER election package on March 8th. Not only did we 'smoke' our competitors...(but)...I'm told by people who have talked to the other stations in town that their reporters stood speechless by a TV set as we ran numbers consistently ahead of their own. We also ran many more races. This was easy to do and our normally frantic Chyron operator sat calmly in the booth looking at LEADER do the typing. Thanks for helping us stay number one."

Mel Martin, Vice President/News Director
WJXT-TV, Jacksonville, Florida





SCRIBE graphics courtesy of Chyron Corporation

Dynatech NEWSTAR

DYNATECH Broadcast Group

6400 Enterprise Lane • Madison, WI 53719 • (608) 274-8686

For more information on today's top selling election management system, call Dynatech NEWSTAR: (608) 274-8686

Circle 107 on Reader Service Card Page 59

www.americanradiohistory.com

FEEDBACK

Good Old Days

I was amazed to find April *BME*'s Compute column ("The Resistor Color Code System," p. 91). In the days when broadcasting was fortunate enough to have people who held first-class Radiotelephone licenses, the resistor color code was known by heart. But today's breed of "engineer" apparently needs a computer for this once basic task.

It is indeed unfortunate that in 15 short years we have evolved to the point where those involved in the technical operation of broadcasting stations need a PC to "read" a resistor.

Perhaps a good topic for a future column might be Ohm's Law.

Vern A. Weiss
Valpariso, IN

Network Ties

The very interesting "Profile: Ira Goldstone" (*BME*, February 1988, p.60) by Ric Gentry gives the impression that KTLA was always an independent station. This is not quite the case.

KTLA in its early days was owned by Paramount Pictures. Paramount had a 25 percent ownership in Allen B. Dumont Labs, which operated the Dumont television network. And it was KTLA that was the Dumont affiliate in Los Angeles until the network's demise in the mid-1950s.

It wasn't until 1964 that Gene Autry came into the picture, when his Golden West Broadcasters paid Paramount $12 million for the station.

KTLA is a great independent, but it does have a network affiliation past.

Alan Barclay, Pub. Affairs Dir.
WFLN, Philadelphia

More Excellence

During my tenure as chief engineer at WSYT-TV, detailed in your Excellence in Engineering issue ("Breaking New Ground in Television," January, 1988, p.60), I designed the layout of the studio-technical area. On my recommendation, computer-type wired ground outlets, redundant HVAC, and computer flooring were installed. I worked closely with the contractors to ensure that my concept and the company's best interest were being carried out.

I designed the facility with efficiency in mind. The traffic office is located next to the tape storage room and master control area for easy information flow. The production studio rear entrance opens directly across from the loading dock/freight elevator. There is also a front entrance for clients and talent. The integral machine room/master control was laid out ergonomically for easy operations.

The sign-off staff of WSYT-TV can take pride in their contribution to this new station construction project.

Rick Finnie, Ass't CE
WUHF-TV, Rochester, NY

HAATs Offer

I read and find most interesting the Compute section of *BME* and have a program that I would like to share with you and your readers.

This program calculates, files, and plots the curves for HAAT as is required for FM and TV filings. Enclosed is a copy of the printed curve.

If any readers would be interested in obtaining the source code for this program, or want more detailed information about it, they can contact me at: N. Mont. Broadcasters, P.O. Box 7000, Havre, MT 59501

Rob Yaw, CE
North Mont. Broadcasters

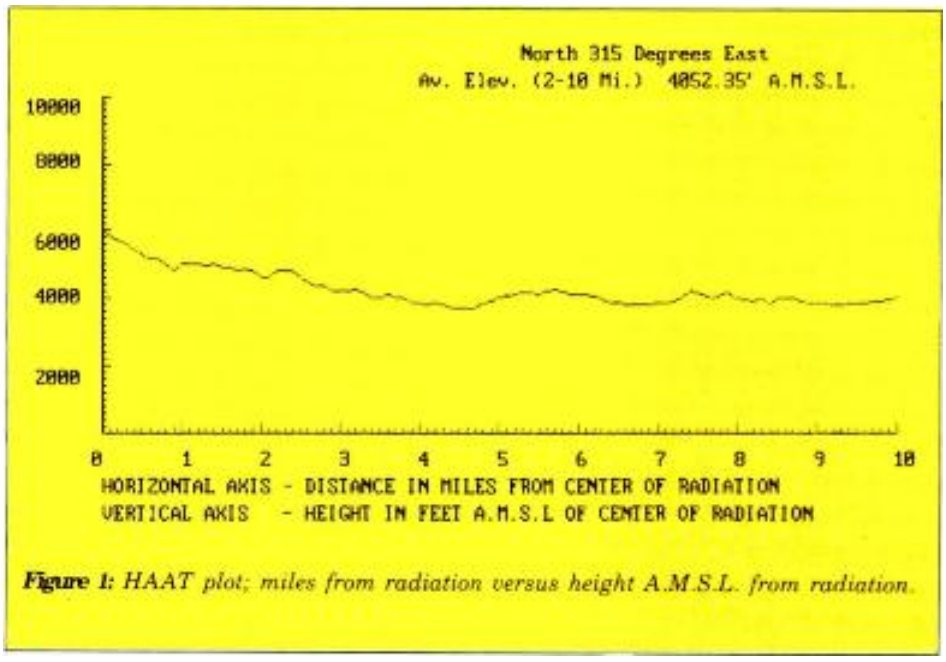


Figure 1: *HAAT plot; miles from radiation versus height A.M.S.L. from radiation.*

www.americanradiohistory.com

MULTI-FORMAT INTEGRATION

JVC DISPELS THE RUMORS OF FORMAT WARS

The video world is alive with talk about formats, old and new. Editors write about "the new age of video". Trade show attendees pack the booths to see the newest formats.

It makes great conversation. But it's making the people who buy and use video equipment uneasy, and confused.

The trouble is that all the formats—3/4-in., S-VHS, and MII are being perceived as little islands unto themselves, with no connecting bridges, and no transitions.

It's time someone told the real story about multi-format integration, because the truth is that these formats can work together. They can be complimentary, not confusing. And they can offer more than the individual parts alone can provide.

How can this be? It takes a commitment to create a bridge between formats, so that the production suite is a place of harmony. Not hostility.

JVC has made that commitment. Our 3/4-in., S-VHS, and MII products work together. They will also work well with equipment from other manufacturers. The result is a production suite that links yesterday's technology with today's innovations, and today's innovations with tomorrow's technology.

It didn't happen by accident. We planned for it. Rather than beat our chests about the "exclusivity" of our formats, we committed our company to products that ease the transition from MII to S-VHS to 3/4-in. to VHS. And even to 1-in.

Imagine the benefits: The field production crew brings S-VHS footage to the production suite, where it is edited in the most desirable manner—at the component level. The material can be integrated with existing libraries of 3/4 in., VHS, or *any* other tape, and it can be alternately monitored in component form, or in any format, on a single monitor. The end result can be S-VHS, 3/4-in., MII, 1-in. or VHS.

So much for exclusivity.

And so much for the belief that a multi-format world must also be confusing and expensive. While our competition is boasting the benefits of one format over the other, JVC is integrating the benefits and applications of *all* the formats to make life easier, less confusing, and less expensive.

Let JVC show you that there really is such a thing as multi-format integration, and how it can make your production suite complimentary—not confusing.

JVC®

ALWAYS A STEP AHEAD...
TO KEEP YOU A STEP AHEAD.

www.americanradiohistory.com

UPDATE

FMX Gains New Industry Support...ATV Beat Goes On...Receiver Manufacturers Support IDT...Siggraph to Convene in Atlanta

FMX Gains New Industry Support

Reception for FMX at the SCES in Chicago June 4 through 6 was trending up, as Broadcast Technology Partners (BTP), which acquired the FMX license from the now-defunct CBS Labs, mounted a technology demonstration and bid to woo receiver manufacturers.

FMX removes the FM noise penalty and therefore helps eliminate multipath distortion and provides significantly improved stereo separation and expanded coverage when the signal is received through an FMX receiver. Eleven CBS O and Os are preparing to transmit FMX starting this summer.

Over nine major car stereo manufacturers and four home tuner manufacturers have developed FMX prototype units, which Broadcast Technology Partners demonstrated with live broadcasts from Chicago classical music station WNIB-FM (the country's only FM-FM simulcast broadcaster). The station transmitted 24 hours per day throughout the four-day show. WNIB received no complaints, and management was delighted with the results. The station will continue FMX transmission as long as equipment remains in place. Chicago station WBBM-FM also transmitted in FMX throughout the event.

High-end audiophile manufacturer NAD has modified its FMX-capable 4300 tuner and reintroduced it for sale now, according to BTP. Sansui demonstrated a prototype FMX receiver, and Luxman and Canadian audiophile company Magnum Dynalab are also developing home receivers. Car stereo prototypes were supplied by Technics, Clarion, Sanyo, Alpine and Eclipse (Fujitsu-ten).

In related news, Buckley Broadcasting Corp. (nine FM) and Gannett Broadcasting (10 FM) will adopt the format, it was announced at SCES. Also, Motorola has joined Sanyo and Sprague as a supplied of FMX ICs, the company says. Sanyo chips will be available in July, Sprague ICs will be available in the autumn of 1988 and Motorola chips will be available in September 1989. Broadcast Technology Partners says FMX consumer products are ramping up and are expected to be available for sale in January of next year.

On the other hand, old memories of initial test FMX transmissions generating complaints when unsuspecting listeners—primarily in cars without phase lock loop radios—found their signal shredded, died hard. Some receiver manufacturers like Akai are adopting a "let's wait and see if they've fixed it" approach.

ATV Beat Goes On

As activity increases in advanced television technologies the industry awaits official word from the groups and committees researching the impact such advancements are likely to have.

The FCC is still gathering information from the various entities that compose its Advisory Committee.

In a report, the Spectrum Use and Alternatives group said that a station will have a greater chance of getting more spectrum for HDTV when the spectrum isn't contiguous to the existing channel.

The Alternative Media Technology and Broadcast Interface group said the best way to determine transmission format is to let the technology influence the decision.

Hitachi's HDTV system. Photo: Karen Kent.

www.americanradiohistory.com

UPDATE

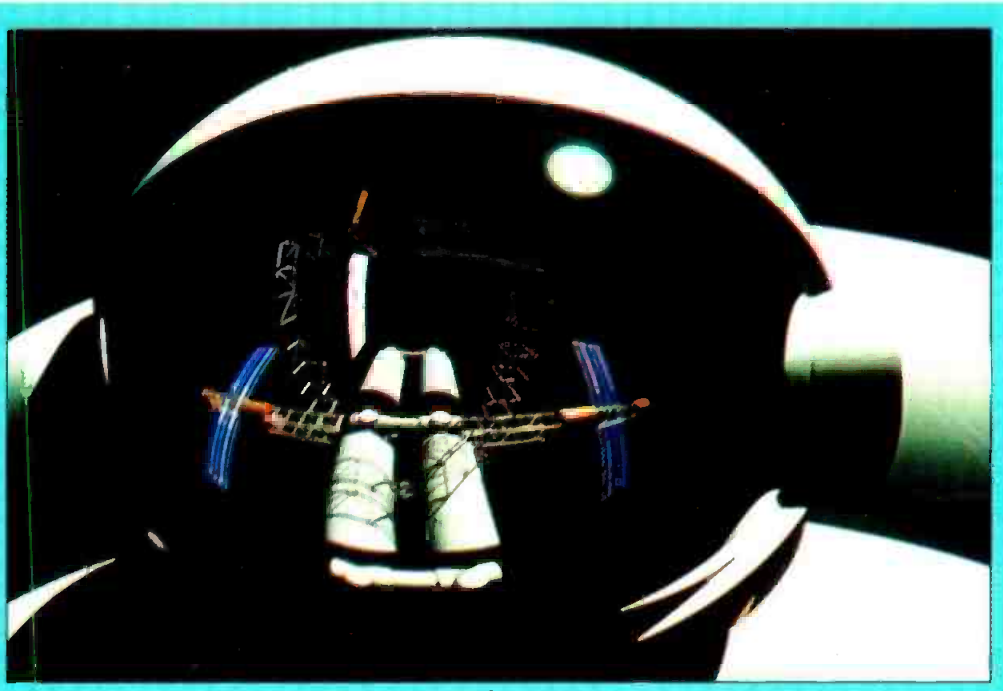
TV Receiver Manufacturers Support IDT

International television manufacturers talk a good game about High Definition Television systems (HDTV), but the Summer Consumer Electronics Show held June 4 through 6 in Chicago revealed what they soon plan to sell in the U.S. are 525-line NTSC-compatible IDT (Improved Definition TV) models. The systems are generally based on digital memory doubling a non-interlace scan line.

MUSE-format 1125 line HDTV systems were demonstrated there by Toshiba and Panasonic, but not, suprisingly, by Sony. Sony, Toshiba and Panasonic also displayed IDT systems. None would reveal immediate plans to market these products in the United States, but Toshiba said that both its ITV and HDTV systems would be available in Japan, within the year.

Philips Consumer Electronics Co. will sell two models of its own IDTV (Improved Definition Television) system in the U.S. this fall. The 27-inch and 31-inch models carry suggested retail price tags of $1,500 and $2,600 respectively.

"This is a real world product compatible with NTSC as it is broadcast now," said August 'Gus' Spencer, section leader for the IDTV project at Philips. The swing to ITV is widely seen as an industry attempt to supply im-



"Shuttle Stop Space Station" image by Randy Bradley.

Siggraph to Convene in Atlanta

Siggraph '88 is the 15th Annual conference on computer graphics and interactive techniques sponsored by the Association for Computing Machinery's Special Interest Group on Computer Graphics in cooperation with the IEEE Technical Committee. The conference will be held August 1-5 at the Georgia World Congress Center in Atlanta and will offer displays of advanced hardware and software along with technical papers and panel discussions. In addition, 28 educational courses will be available along with an art, film and video show.

Exhibitors are expected to number approximately 250 at this year's show. Along with vendor exhibits and technical papers there will be industry experts hosting press conferences. At the press briefing on August 2, Carl Machover, an industry consultant, will speak about, among many other things, the growth in the computer graphics industry from its current $9.1 billion to its projects 1993 figure of $26.8 billion.

Machover will also explain his research that reveals business graphics will grow at a 50 percent faster rate than CAD/CAM to occupy a 52 percent market share.

Other industry leaders will offer their predictions in areas such as Executive Information Systems and Workstations.

One of the highlights at this year's conference will be the addition of three invited papers on applications of computer graphics. They are: "Getting Graphics in Gear: Graphics and Dynamics in Driving Simulation"; "Applications of Computer Graphics to the Visualization of Meteorological Data"; and "A Hand Biomechanics Workstation." The session is chaired by Hank Christiansen of Brigham Young University.

More than 1,000 computer graphics products will be displayed using close to 110,000 feet at the Congress Center.

www.americanradiohistory.com

GET A FREE MOTOROLA U.S. OLYMPIC TEAM GYM BAG

just for calling the Motorola Direct Order Center to find out how you can win with Motorola 2-way radio!

[ ] **YES!** Please have a Motorola Direct Representative call me – without obligation – to find out how Motorola 2-way radio can help me be a winner in my field…and to arrange for my FREE Motorola U.S. Olympic Team Gym Bag!

☐ I am not interested in speaking with a Motorola Representative at this time, but please send me more information on Motorola 2-way radio. I understand I will not receive a FREE U.S. Olympic Team Gym Bag.

Name _____ Title _____
(please print)

Company/Organization Name _____

Address _____

City _____ State _____ Zip _____

Day Phone (_____) _____ Type of Operation _____

CALL MOTOROLA DIRECT TOLL-FREE AT 1-800-247-2346, EXT. 498

or mail this card.

Olympic Gym Bag limited to one per business and is available only through this offer. Offer valid from 7/1/88-12/31/88.

MOTOROLA

1301 E. Algonquin Road
Schaumburg, IL 60196
Dept 14531

BME-JY

www.americanradiohistory.com

PRIORITY REQUEST–
HANDLE IMMEDIATELY!

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 333 SCHAUMBURG, IL

Postage will be paid by addressee

Motorola Communications
and Electronics, Inc.
Attention: B. Bennett
1301 E. Algonquin Road
Schaumburg, Illinois 60196-9905

www.americanradiohistory.com

Go For The Gold

Now You Can Be A Winner With Motorola 2-Way Radio

...the radios used to coordinate the 1988 U.S. Olympic Team!

In the Olympics–and in business–you need to perform at your best to stay ahead of the competition.

And that's why you need to team up with a winner. The Motorola line of 2-way radios.

Motorola knows a lot about what it takes to succeed. As a proud sponsor of the 1988 U.S. Olympic Team, we're helping our dedicated athletes reach for success.

MOTOROLA

Proud Sponsor of The 1988 United States Olympic Team

U S A

MOTOROLA

PORTABLES STARTING AS LOW AS $9.28 a month!*

These high performing individuals rely on high performing Motorola 2-way radios for effective coordination. And now you can rely on the same Motorola quality to contact your key people quickly...coordinate vehicles and workers...and get a lot more done in less time. With portables starting as low as $308...just $9.28 a month!*

Our 1988 U.S. Olympic Team wouldn't settle for anything less than Motorola. Why should you? Call Motorola Direct toll-free at 1-800-247-2346. And go for the gold!

Get a Free Motorola 1988 U.S. Olympic Team Gym Bag

just for calling Motorola Direct

Toll-Free 1-800-247-2346

to find out how you can team up with Motorola 2-way radio!

*$308 HT50 price based on 1-watt, VHF, 2 channel, carrier squelch portable. Prices vary based on band, power and options selected. FCC license required. Payments based on 20% down with a 21% APR paid over 36 mos. through Motorola financing for qualified applicants.

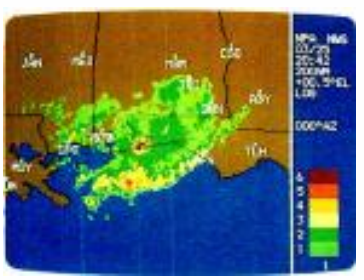
© Motorola, 1988. ®, ™, Motorola, HT50 and MaxTrac 50 are trademarks of Motorola, Inc. Finance rate, prices, payments and offer subject to change without notice.

O-7-88

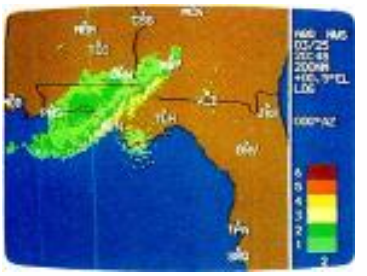
Circle 109 on Reader Service Card Page 59

www.americanradiohistory.com

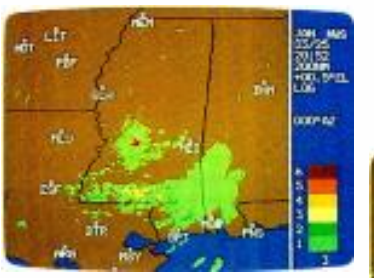
Four Radars



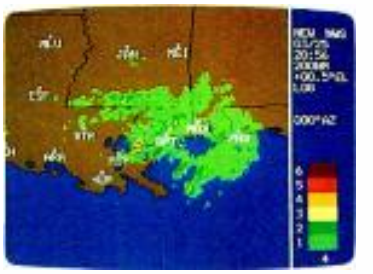
Pensacola, FL



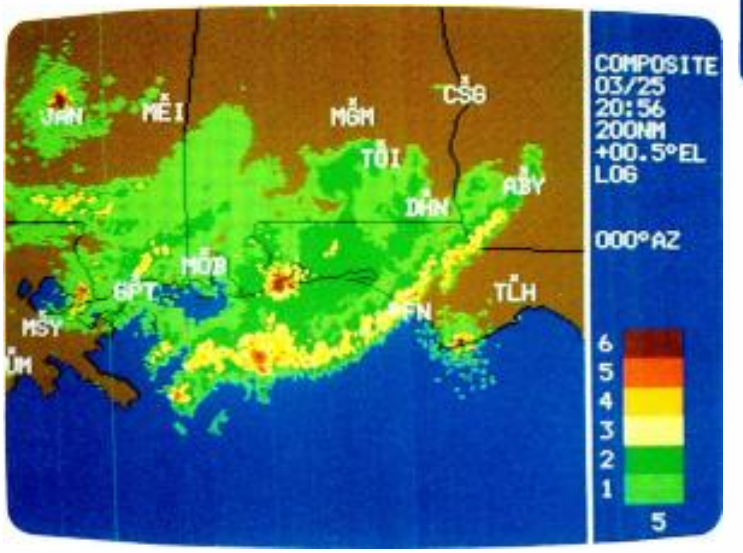
Apalachicola, FL



Jackson, MS



New Orleans, LA



Individual radar displays can only show you part of the picture. This composited image, centered in Pensacola, FL, combines echoes from four different radar sites and shows the true magnitude of the storm.

In One

When the real weather story is outside the range of conventional radar, you need Alden's new radar compositing feature.

Compositing combines the echoes from multiple radar sites and displays them on a single screen. You can specify the radar sites you want, or automatically gather echoes from all the sites in your region–up to 16 in some areas!

The result is a display that's dramatically different from conventional radar. Instead of simply showing the weather that's here, compositing adds the weather that's on its way.

In addition to compositing, Alden's Weather Radar System offers a full range of standard features, including zoom, time-lapse looping, customized backgrounds, and auto-dialer. Yet the cost is thousands less than other systems.

For more information on Alden's Weather Radar System, contact Alden Electronics, 46 Washington Street, Westborough, MA 01581 (617) 366-8851.

ALDEN ELECTRONICS

Circle 110 on Reader Service Card Page 59

www.americanradiohistory.com

UPDATE

proved NTSC-compatible receivers as a holding action for the three to five years it is expected to take before agreement on an HDTV standard here.

The Philips system doubles the scan line of a picture from 262.5 lines every 1/60th of a second to 525 lines. Philips uses an algorithm system which takes the median of the scan line above and below it and the prior line, memorizes it and then uses a median filter to select the most appropriate line information to "fill in" the visible spaces between the scan lines.

Philips claims a 40 percent improvement in vertical resolution. Adjustable video noise provides up to 10 to 12 dB reduction in video noise. NTSC interference is reduced by a digital comb filter.

Broadcasters can supply prefiltered comb filter material in order to maximize IDTV reception further, Spencer said. The system as designed splits chrominance and luminance channels to eliminate crosscolor mix in Faroudja-design systems. Live studio broadcast will also illustrate the system's sharper video image capability, and transfer and transmission of film for broadcast at 30 or 60 frames per second —instead of the standard 24 fps— would further reduce motion artifacts and smear already cut by the system, according to Spencer.

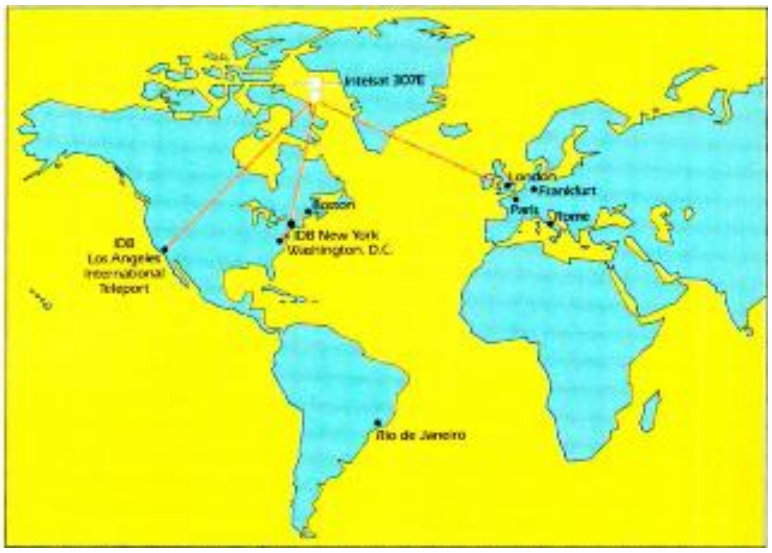
In common with other manufacturers at SCES, Spencer expects further improvements to ITV before the introduction of HDTV. "IDTV is an interim step," he said. "The system can be improved further while allowing us to retain the present broadcast standard."

He also feels that the current standard will be retained longer than the industry anticipates, and added that ITV developments in the American broadcast market will be "viable and appropriate for transfer to HDTV if and when it is approved."

Meanwhile, Thomson Consumer Electronics, Inc. has been promoting its two-phase NTSC-compatible Advanced Compatible TV systems through RCA. ACTV1 is compatible with current NTSC transmission; ACTV2 requires additional bandwidth. Consumer products capable of receiving ACTV are at least three years away, according to Joe Clayton, vice president of product management for Thomson. Thomson/RCA ITV-type products may be brought to market in the meantime, he said.

RCA also said that tape-based digital video equipment for home use is in development, although marketable products are likely to be some 10 years away.

Matsushita demonstrated a 135-inch. HDTV projection TV under the Technics brand name. It also displayed a Panasonic ITV receiver based on a noninterlace double scan and line lock system. Like the Philips system, the receiver uses a digital comb filter.



Transatlantic Digital Operating Audio Link

Los Angeles based satellite transmission service provider IDB Communications and British Telecom International (BTI) have announced a new full-time digital audio link between the U.S. and Europe. Dubbed International Digital Audio Transmission (IDAT), the service is the first full-time transatlantic digital audio link available for broadcasters' use via satellite.

IDAT features occasional as well as full-time services bridging North America with the U.K. and Europe, via IDB's teleport facilities in Los Angeles and New York and BTI's Sound Program Center at Mondial House in London. The company claims studio quality sound and a 35 percent reduction in international transmission costs, providing a 15 kHz audio signal at 11 dollars per minute.

The two companies have targeted applications for the service that include radio station remotes, concerts, special events, news and even data and compressed video. Transatlantic remotes have been accomplished before by many companies, including events such as IDB's carriage of WQXR's June 1987 broadcast from atop Tower Records in London, but the flyaway earth stations and personnel involved had to be transported to the remote locations incurring great expense and involving delicate logistics. IDAT will eliminate at least that part of the difficulty of international transmission while bringing digital audio quality to the end user.

Gateway rates are available from IDB in Los Angeles and include simplex end-to-end service, simplex half circuits and U.S. and/or U.K domestic extensions of the circuits. IDB plans to expand its digital audio links to other countries in the near future offering full digital audio transmission on a worldwide scale. ■

www.americanradiohistory.com

Finally.

Professional DAT is here. And it's called the Sony PCM-2500. Sony's considerable know-how in digital audio recording brings you a superb sounding DAT recorder with the special features that professionals need.

It has 32kHz, 44.1kHz, and 48.0kHz sampling rates plus 3 separate digital input/output interfaces (AES/EBU, SDIF-2 and S/P DIF). Features that make the PCM-2500 a natural for direct interface to CD mastering systems and a variety of digital studio equipment.

Consistently superior sound quality is ensured by newly developed Sony digital LSIs including independent A/D and D/A converters for both audio channels (left and right). And the D/A section employs 4x oversampling digital filters.

Other special features include a built-in error indicator, switchable emphasis and a wired remote control.

For an ear-opening demonstration of the new PCM-2500, see your Sony Professional Audio representative or call Sony at 800-635-SONY.

SONY.

Professional Audio

Sony Communications Products Company, Professional Audio Division, 1600 Queen Anne Rd., Teaneck NJ 07666.

© 1988 Sony Corporation of America. Sony is a registered trademark of Sony Corporation.

Circle 111 on Reader Service Card Page 59

www.americanradiohistory.com

CROSSTALK
AN ENGINEERING MANAGEMENT JOURNAL

Big Plans for MII...S-VHS vs. U-Matic Editing Potential...FCC Log-Jam May End

Big Plans for MII

A wide variety of formats for recording digital video information have evolved over the years, culminating in the current D-1/D-2 component/composite scenario. Industry rumors persist, however, that at SMPTE this year Panasonic will unveil a new version of its MII half-inch recorder, capable of laying down PCM composite video.

Panasonic is not alone in its search for a small-format digital recorder, but it appears to be the most advanced. Many had believed the company would show a prototype of its system at NAB, but it failed to materialize. Nonetheless, Panasonic presented a formalized statement on its thinking at a March meeting of the Small Format subgroup of the SMPTE Television Recording and Reproduction Technology committee.

"It is our intention," it said in part, "to utilize direct recording with no bit rate reduction for composite NTSC/-PAL signals (4x fsc sampling). The approach to component (525/625 line standard) and HDTV recording is still open."

The new format would, of course, mean yet another addition to the growing number of both analog and digital choices available (currently a dozen). Yet Panasonic offers the position that the new digital recorder, because it is based on the existing MII format, would enable the industry to actually reduce the number of format choices available.

"One of the reasons why we believe that the reduction of standards is possible," its report to the SMPTE group read, "is the basic difference between analog and PCM recording. In the case of analog recording, the demodulated FM S/N varies as a function of the C/N of the playback signal. As a consequence, several formats were developed, responding to different required performasnce levels. The recording densities were set to yield appropriate C/N levels.

"However, in the case of PCM recording the S/N level remains constant regardless of the C/N level after a certain threshold level has been reached."

In the Panasonic philosophy, presumably to be reflected in its product development, improvements in areas such as amorphous, laminated recording heads and improved metal particle tape will make it possible to develop a half-inch digital tape recorder that can deliver a C/N levels that are the equivalent of D-1 with a packing density three times that of D-1.

As for the potential use of a similar

Comparison Of D-1 And Small-Format Digital Recording

	D-1	"Digital MII"
SOURCE	Component	NTSC
DATA RATE	216 Mbits/s	115 Mbits/s
TAPE	Metal oxide	Metal particle
TAPE WIDTH	19.01 mm	12.65 m
PROGRAM AREA	16 mm	9.64 mm
TRACK PITCH	45 μ	20 μ
PACKING DENSITY	100 %	±300 %
TAPE THICKNESS	13 μ	13 μ
TAPE LENGTH	1622 m	496 m
RECORDING TIME	94 min.	>90 min.

www.americanradiohistory.com

Sachtler Hot Pod...fastest ENG tripod in the world.

Fast breaking news and the Hot Pod are made for each other.

Simply extend the legs and level your ENG camera on any surface. In just a few seconds you are shooting while others are still setting up. If you find yourself at the back of a crowd, simply raise the center column to as high as 6.5 feet and shoot over everyone else's head.

Don't be late with the late news. Use the lightweight, action tripod that is faster than fast breaking news. The Hot Pod is perfect for every ENG camera.

Sachtler is so confident of the performance of its equipment that it has extended the normal usage warranty from **1** to **3** years and guarantees its leak-proof fluid modules for **5** years. It's the best warranty in the business and comes only with the best camera support systems in the world.

Call or write today for more information and the location of your nearest Sachtler dealer for a hands-on demonstration.

sachtler®
corporation of america

55 North Main Street
Freeport, NY 11520
Phone: (516) 867-4900

West coast:

3316 West Victory Blvd.
Burbank, CA 91595
Phone: (818) 845-4446

Circle 112 on Reader Service Card Page 5

www.americanradiohistory.com

recording format for HDTV, both Panasonic and NBC/Sarnoff have explicitely stated that they are looking towards Matsushita/Panasonic for the development of a recorder such as MII to record the newly-developed ACTV higher-definition signal.

"The same format [as used for the digital MII] and many of the same signal processing circuits can be common regardless of the standard, 525, 625, composite or component or even HDTV," the Panasonic report concludes, paving the way for a possible co-development arrangement between Matsushita and RCA/GE/-Sarnoff of both broadcast and consumer ACTV systems.

S-VHS vs. U-Matic Editing Potential

Considerable controversy has been stirred up over the introduction last year of Super-VHS, a higher-quality version of the VHS format used in consumer and some professional applications.

The controversy over S-VHS is not so much over the presence of yet another VTR format on the market, but whether it is truly suitable for applications that demand multi-generation editing. For while some TV news operations will take an S-VHS shot by a spectator at an unscheduled event, anything beyond simple dubbing to 3/4-inch or one-inch masters for editing may prove to be a technological problem.

Now a recent independent study by Communications Engineering, Inc. (CEI), sponsored by Sony, seems to indicate that assertions by its manufacturers about S-VHS's editing abilities are overstated.

CEI, an independent, privately-held company based in Alexandria, VA, performed its tests in November 1987. The company stresses in its report of the study how important third-generation copies are to production, since the original and master edit tapes are rarely seen by actual viewers.

In the study, three machines were tested, the Panasonic AG-7500 S-VHS recorder/player, the Sony industrial VO-5850, and a high-end BVU-850 U-Matic SP recorder/player. The best results were achieved by the BUV-850 in SP, followed by the same machine in normal, and then the VO-5850, which was comparable to the former without SP.

The findings conclude that S-VHS gets the highest marks for horizontal resolution in the first generation; this is something we've known for some time. The claims of 400 lines resolution went uncontested and this category dissolved little in multigenerations.

In the report, CEI's VP Lawrence Brody points to measurements of other impairments in the first pass: Luminance signal-to-noise ratio was 2 dB better on the BVU-850 and 4 dB better on the VO-5850. Similar differences were found in chrominance S/N, but by the fifth generation, S-VHS scored 10 dB lower than U-Matic SP.

All three systems provide a variety of dub modes; similar modes were chosen for comparison. In all, 12 objective tests were conducted for the first, third, and fifth generations in both modes. Audio tests were also done.

Yet, the JVC display at NAB is fresh on the minds of those in the industry. In this display JVC, developer of the format, had three monitors exhibiting three generations. The first generation came from an MII source, recorded in component; Ray Fester, video production manager at JVC, explains that this was meant as a replacement for camera. The second and third generations were constructed from 7-10 Y/C cable with no "tricks" such as time-base correction.

Fester can't say what a fourth or fifth generation would look like but stresses that the third generation as shown is high-enough quality for news style, and certainly for corporate uses.■

FCC Log-Jam May End

An almost universal complaint among radio engineers is the long delay in getting construction permits from the FCC for even the most minor changes to existing stations. "It's taking at least six months to get a Form 301 through," one CE told us, "and it's very frustrating."

Many licensees are experiencing a similar delay with Form 302—normally not a problem except for stations with a directional problem that must wait up to nine months for program test authority.

Especially annoying is the wait experienced by station groups that acquire a new property and then have to wait a half-year or longer for a CP.

Much of the problem with the 301s, according to the Commission, is that some 40 percent of them contain errors, wasting valuable staff time. But seasoned engineers observe that even if the FCC concentrated on the 60 percent that are error-free, the wait might be equally long.

Help is on the way, however, as early as September or October. That will mark the time when 12 FCC staffers will be released from the 80-90 project and hopefully assigned to reviewing CP applications. More staff may become available once the Commission actually stops its type acceptance program (being replaced by a manufacturer documentation system).

The net result will be that the wait should be cut down to only four months.

www.americanradiohistory.com

Spec-tacular!

daVinci™— Spectacular Color Correction.

Results can be spectacular with daVinci's extremely sensitive color manipulation capabilities—any color in any scene (or designated area of any scene) can be manipulated independently with full 16 vector control of hue, chrominance, luminance, and luminance threshold. Full saturation . . . or desaturation.

Film-to-tape or tape-to-tape. Turn day into night . . . night into day. Make the picture warmer . . . or cool it down. Give it some "mood." Make the product pop . . . kick back the background. Snap the reds . . . make it hot.

daVinci is a client pleaser. It helps you make all those "individual" changes your clients want.

daVinci will operate with all major telecines and VTRs, and provides a unique digital interface to the Rank Cintel Digiscan. And, daVinci offers remote controls for everything, including the ADO.

daVinci's many exclusive features help make the colorist's job easier and the final product better. The spectacular possibilities are limited only by your imagination.

Get the true picture—learn why expert colorists around the world use the daVinci Unified Color Correction System.

UTAH SCIENTIFIC
DYNATECH Broadcast Group

Utah Scientific, Inc.
1685 West 2200 South
Salt Lake City, Utah 84119
(801) 973-6840
Toll Free: 1-800-453-8782
New York: (212) 685-2667

Circle 113 on Reader Service Card Page 59

www.americanradiohistory.com

"Smart Fluids" Respond to Electrical Stimulation

By Tim Wetmore

It's quite possible that there may be some form of electro-rheological fluid being used in many stations in the future, the very near future. These fluids are already being used in advanced design prototype automobiles at Chrysler. The extent to which this discovery will affect all sorts of electrical and mechanical products is not yet known, but what is sure, is that there will be so-called "smart fluids" in everyday use, soon. What, then, are electro-rheological fluids?

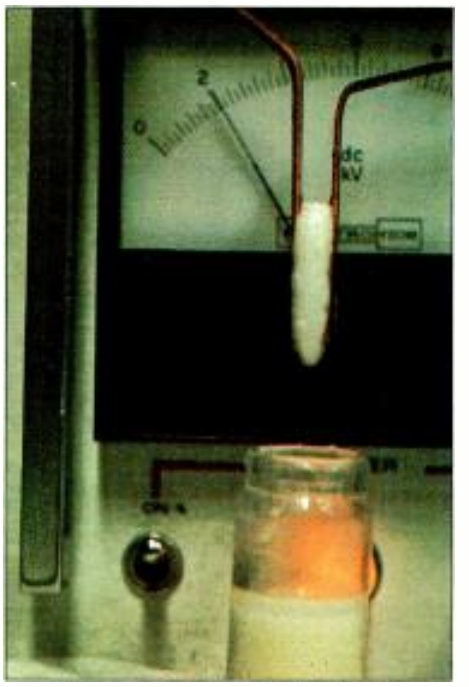
Rheology is the science dealing with the deformation and flow of matter. In this case it pertains to the inducement and control of that flow and deformation by an electric field, i.e. voltage. As the electrical field is increased, the fluid thickens. With the control of the electrical field there is very precise control of the thickness of the fluid.

Recently developed electro-rheological fluid adjacent to electrodes used to create electric field for solidifying the fluid.

When at rest, the fluid is approximately the consistency of milk; with increasing levels of electricity it begins to transform, going through a stage similar to heavy cream and then to a solid, about the consistency of a heavy gel. When the field is withdrawn, it returns to its original, liquid state. The transformation and return to form can occur within fractions of thousandths of a second.

It is the latter characteristic that has made the recent development in this science so attractive in the current stage of technological history. Electro-rheological fluids were discovered in the the 1940s but there were limitations on their practical use, the main one being the high water content in the formulation. A patent was granted in 1962 involving a form of the fluid, but it too contained water in its formulation. The problem with a high water content is that at high operating temperatures it boils.

Circumventing this obstacle, Dr. Frank Filisco, a physicist at the University of Michigan, invented a formulation that does not require water.



The fluid solidifies into a gel when the electrodes are activated with 2000 volts.

"In fact," he says, "a simple mixture of kerosene and cornstarch will work, but if you get it hot it turns into a biscuit."

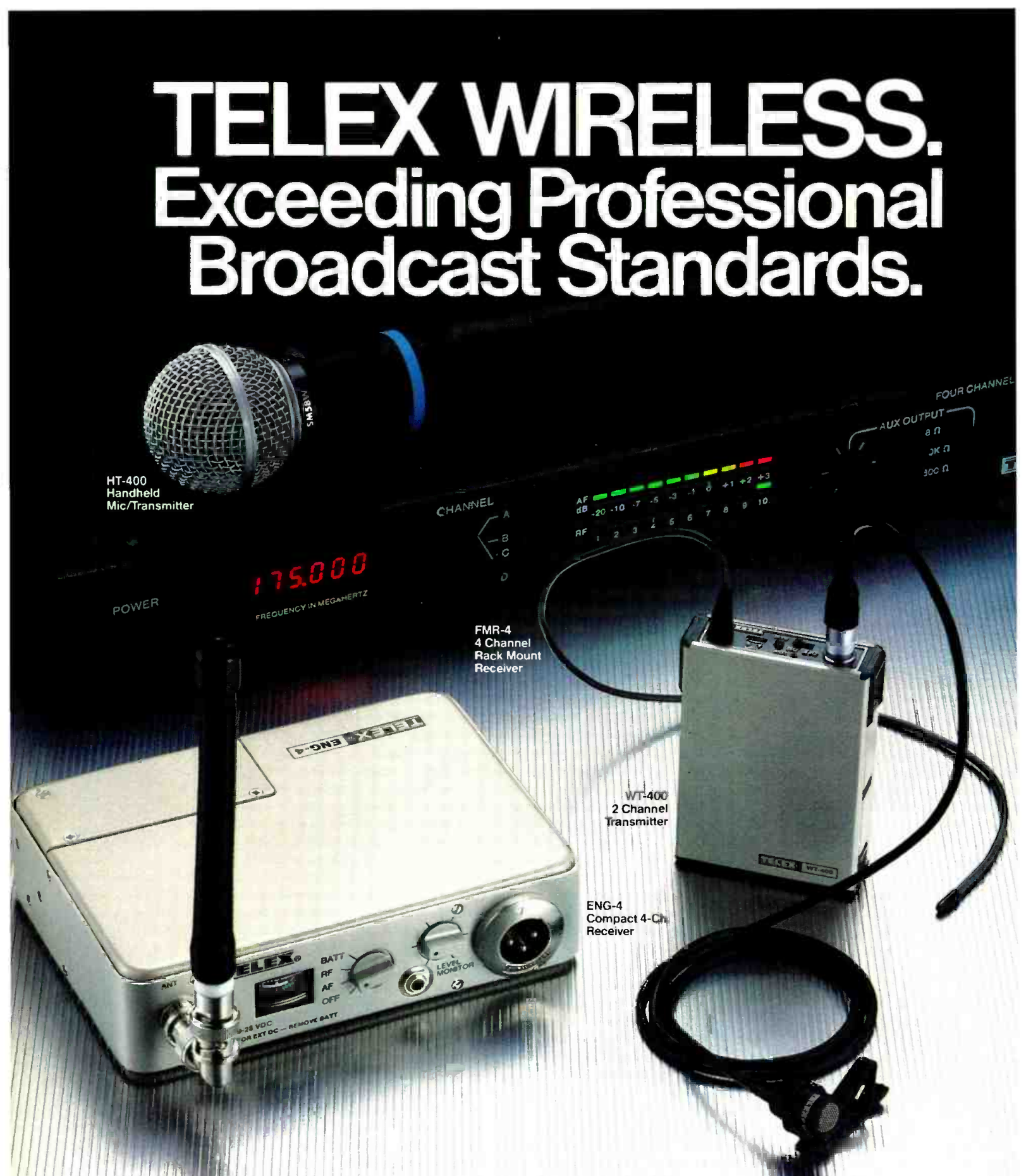
The basic formulation for Filisco's version of the fluid is equal parts of electrically nonconductive liquid and fine particles of a solid. Some expamles would be petroleum or silicon oil with particles such as baking soda, glass or silical gel dispersed within it.

Beyond his discovery of a formulation not requiring water, Dr. Filisco maintains that the quick-acting characteristics of the fluid have met with a time in our history when they can be exploited. Microcomputers now exist that can turn electric fields on or off in millionths of a second and the fluid can respond accordingly.

Wetmore is the editor of BME.

www.americanradiohistory.com

TELEX WIRELESS.
Exceeding Professional Broadcast Standards.



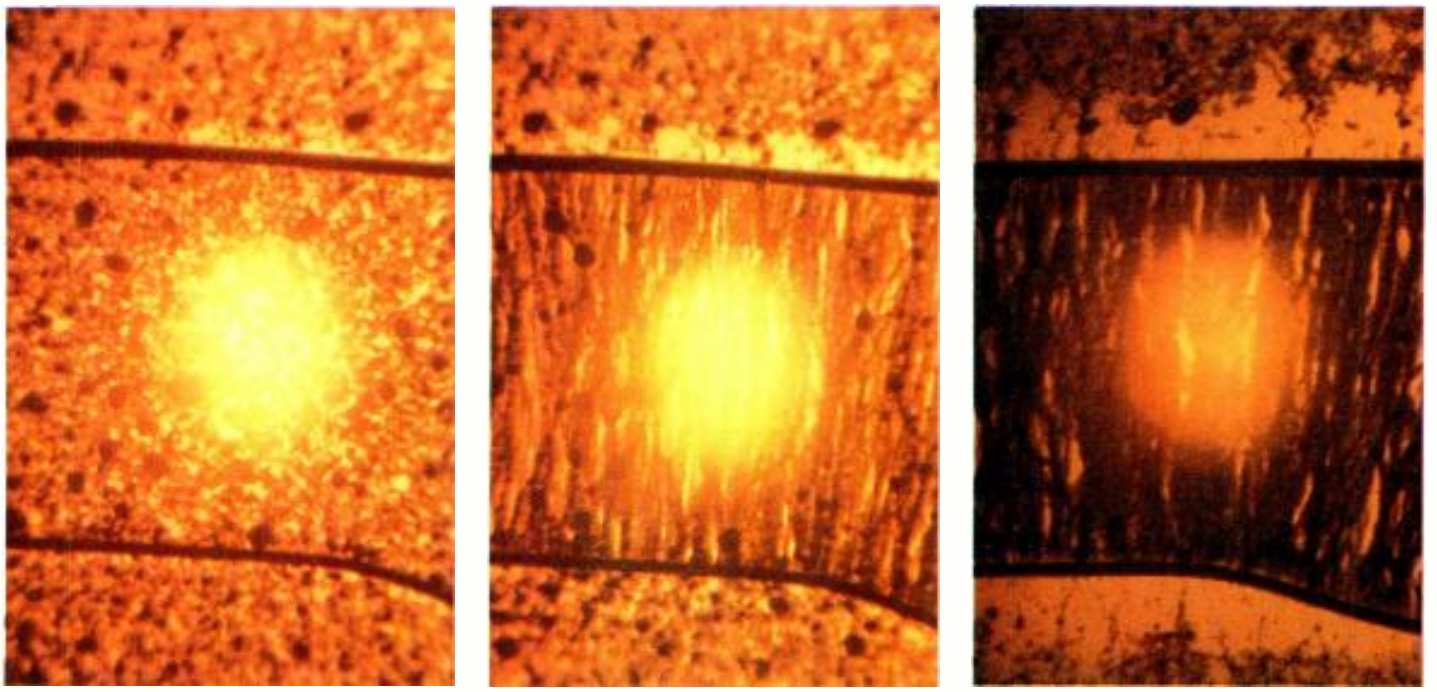
At Telex, we've always believed it to be wiser to exceed a standard than to meet it. We've been providing product to the professional broadcast and production industries for over fifty years and we know what it takes.

Our wireless microphone systems have been designed to stand up to the rigors of difficult remote ENG news assignments as well as the daily abuse of studio use. Call or write for detailed information. Telex Communications, Inc., 9600 Aldrich Ave. S., Minneapolis, MN 55420

TELEX®

Circle 114 on Reader Service Card Page 59

www.americanradiohistory.com



Stages in the transformation of liquid into solid as electricity is increased from 8 V to 2000 V.

Possible applications open up when materials, system configuration, voltage and computer control are applied to the design.

As previously mentioned, Chrysler has entered into an agreement with the inventor giving a subsidiary of the automobile company the right to design a revolutionary new transmission based on the fluid. Yet, it is in the area of robotics where the impact will be felt in television stations.

Robotics, of course, are hydraulically driven, with tubes carrying oil or fluid and partitioned by the use of valves or driven by pistons and cylinders that translate into mechanical motion. The drawbacks here involve the valves themselves which divert fluid through hoses, turning on and off, to drive the mechanism. Valves can be designed and built only so small because of the accompanying solenoids.

Obviously, size and extra bulk hamper designs that attempt to reduce the amount of space a device will take up. In addition, these factors cause the systems to be more complicated and thus more prone to breakdown and disruption of service. In a system envisioned by Dr. Filisco, and one that could eventually apply to station automation systems currently requiring hydraulics, there would be a simple design with no moving parts in the hydraulics themselves.

Simply put, the system would have a hose (or several) with electrodes on both sides of the hose. When the computer turns on the electric field, the fluid would "freeze up" preventing movement. For continuation of movement, the field would be shut off and the fluid would flow again, allowing the mechanics to resume motion. Reduction in size due to lack of valves, pistons, cylinders and solenoids is an immense side benefit to this kind of system.

Speed is something that should also be noted. With computer control and small, simple systems, extremely fast and precise robotics can be designed. In fact, it is speculated by some that development of electro-rheological fluid technologies will allow the first true human-like robot to emerge. If the very complicated mechanism known as the knuckle could be designed with no valves or solenoids (which are now required for this kind of design), a very smooth operating system could employ the new "smart fluids."

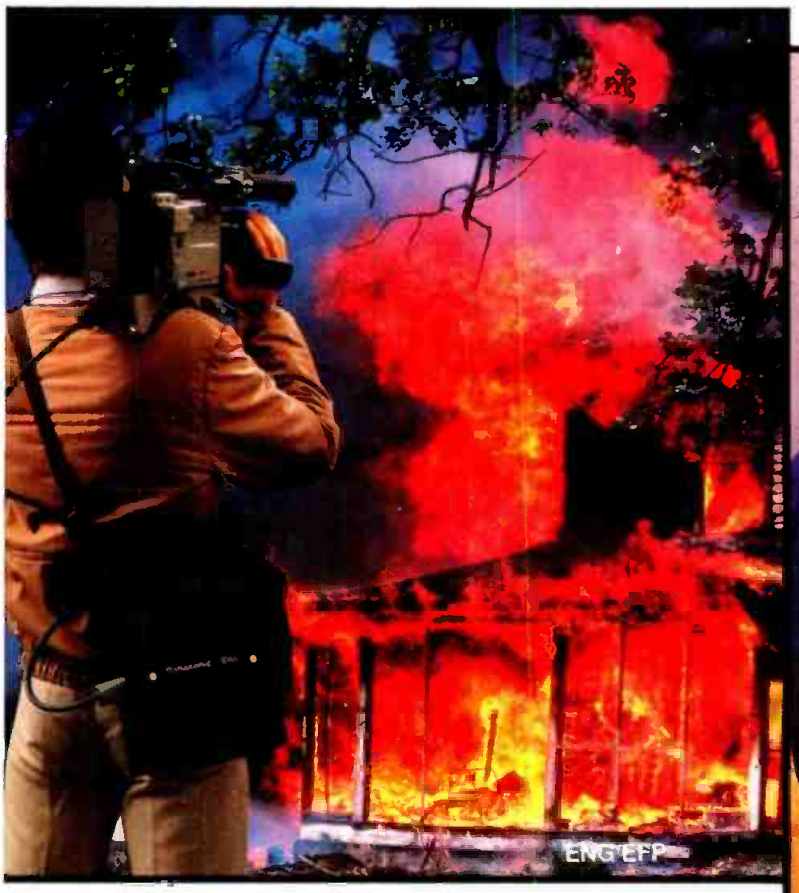
In fact, a sophisticated and small control mechanism is possible because designers can fit a very complex mobility inside something extremely small. Using computers hooked to miniature electrodes, control valves can be designed into something the size of a thumbnail.

Although nobody is predicting the replacement of engineers with humanoid robots yet, there is an immediate possibility for the redesign of automation systems or any hydraulically- or mechanically-driven system. Even Dr. Filisco acknowledges "there is infinite possibility with these fluids to revolutionize modern mechanically operating systems. We can't even conceive of the ways it will be used when industrial designers and others get their hands on it."

Chrysler is already designing clutches, torque converters, transmissions and shock absorbers using electro-rheological fluids. Robotics will soon feel the impact of this technology. And broadcasters will not be far behind. ■

www.americanradiohistory.com

Get a sharper image...



The SVHS format behind the Panasonic® Pro Series will change the way you look at half-inch recording systems. Because it delivers over 400 lines of horizontal resolution. At an affordable cost. So you can get a sharper image even as you sharpen your pencil.

In the field, the Panasonic Pro Series offers you a host of benefits existing formats fall short on. Like two hours of recording time on a single cassette with Hi-Fi audio capability. In a highly portable package. To capture more action and sound on fewer tapes. Which means you'll have less to carry in the field and on your budget. And the Pro Series easily interfaces with a variety of existing component or composite cameras and VCRs. So you can easily integrate the Pro Series in your present field operations.

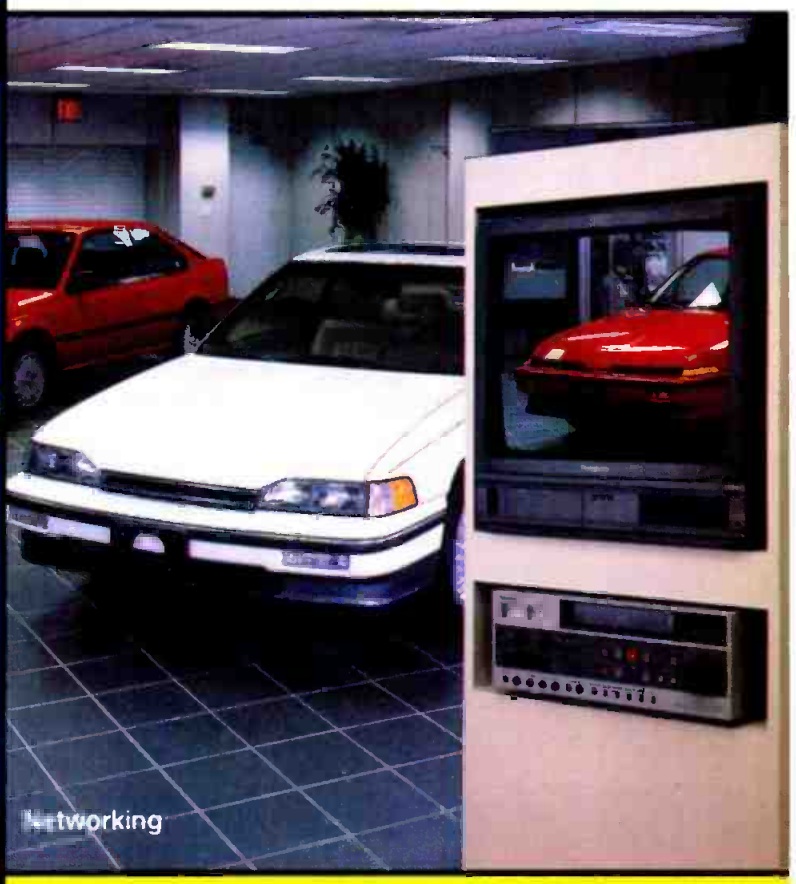
For editing and post-production applications, the Pro Series takes full advantage of the SVHS format as well. With easy to use features and high performance capabilities. Such as digital framing servo circuitry to provide highly stable edits. And time code input/output facilities for frame accurate editing. The Pro Series editing VCR also features 7-pin dub capability to maintain component signal integrity throughout the system.

For studio production, Pro Series components are designed with flexible operations in mind. With VCRs and monitors outfitted for total systems application. And cameras designed for use both in the field and in the studio. To help minimize your investment without limiting your capabilities.

For duplication, Pro Series monitors and VCRs provide you with the convenience and versatility of half-inch cassettes. And the performance of SVHS. When duplicating. you can maintain excellent picture quality thru component or composite signal transfer. And dub Hi-Fi audio simultaneously with the video signal. There's even a Pro Series cassette changer to help increase the efficiency of your duplicating system.

www.americanradiohistory.com

even as you sharpen your pencil.



Whether it be a small or large operation.

For video network applications, the Pro Series produces high quality images on both large projection systems and small screen monitors. With features like auto repeat playback for unsupervised presentations. And the system is upwardly compatible with standard VHS. So you can continue to use your existing library of recordings without any type of conversion.

Pro Series VCRs also incorporate a number of features designed for network automation. Such as video sensor recording. So you can transmit video programs to your network locations during off-peak hours. And save on both transmission and personnel cost. You can even interface Pro Series VCRs with computers for interactive training programs.

So whether you're looking for high performance field recording, post-production, studio, duplication or networking systems. The Panasonic Pro Series can sharpen your image while you sharpen your pencil.

For more information, call Panasonic Industrial Company at 1-800-553-7222. Or contact your local Panasonic Professional/Industrial Video dealer.

S-VHS

Panasonic

Professional/Industrial Video

www.americanradiohistory.com

REMOTE VEHICLE

www.americanradiohistory.com

ENGINEERING

BY F. KURT SHAFER

An interior view of a Midwest production vehicle.

An inside look at the design of remote broadcast and production vehicles reveals engineering considerations that are often overlooked.

How do you get 20,000 pounds of electronic gear in a 10,000-pound box? Just ask your favorite ENG, SNG or mobile production vehicle manufacturer. They get asked that question every day. Mobile facilities, whether for news, satellite communication or full-blown production, are in increasing demand. And one thing nearly every manufacturer of mobile equipment agrees on is that every user wants more equipment in a smaller space than ever before.

"Ergonomic design" is the key phrase in vehicle circles—the art of packing equipment in the smallest possible space, making it easy to use, and still making the vehicle act according to the laws of physics when being driven hundreds or thousands of miles between locations. There are a myriad of variables in each design category, whether small ENG vans or 45-foot truck-and-trailer units. Power generation, power distribution, power conditioning, vehicle weight, center of gravity, axle loading, balance, struc-

www.americanradiohistory.com

BUY MICROTIME AND GET BACK

$400
$300
$200
$100

Buy one or more of the Microtime video products listed below between June 1, 1988 and September 30, 1988, and receive cash back directly from Microtime. The payback is so easy:

Microtime Product	Cash Payback Per Product
Genesis 1/ACT 1 Digital Video Effects	$400
Tx2 Dual TBC	$300
Tx2 Single TBC	$200
T-320D TBC	$100
T-320 TBC	$100
T-300 TBC	$100

Purchase must be made through one of the many Microtime distributors/dealers within the U.S.A. territories and Canada.

Only the products listed above are eligible for the rebate. Quantities are limited. Proof of complete payment and a receipted invoice must be provided.

Take advantage of this special promotion soon. Offer expires *September 30, 1988,* 5:00 p.m. EST.

For more information, contact your Microtime distributor or Microtime directly.

MICROTIME

A Subsidiary of ANDERSEN GROUP

Microtime, Inc., 1280 Blue Hills Avenue, Bloomfield, CT 06002 USA
Telephone (203) 242-4242 • 1-800-243-1570
Telex: 4938290 MCRO UI • Telefax: (203) 242-9876

Offer void where prohibited by law.
Microtime distributors/dealers are not eligible for this rebate.

www.americanradiohistory.com

REMOTE VEHICLE ENGINEERING

tural integrity, vibration, noise, heating, cooling, RF emissions, EMI/RFI, and lighting are all important factors to be reckoned with when creating a reliable, comfortable, *useful* mobile facility.

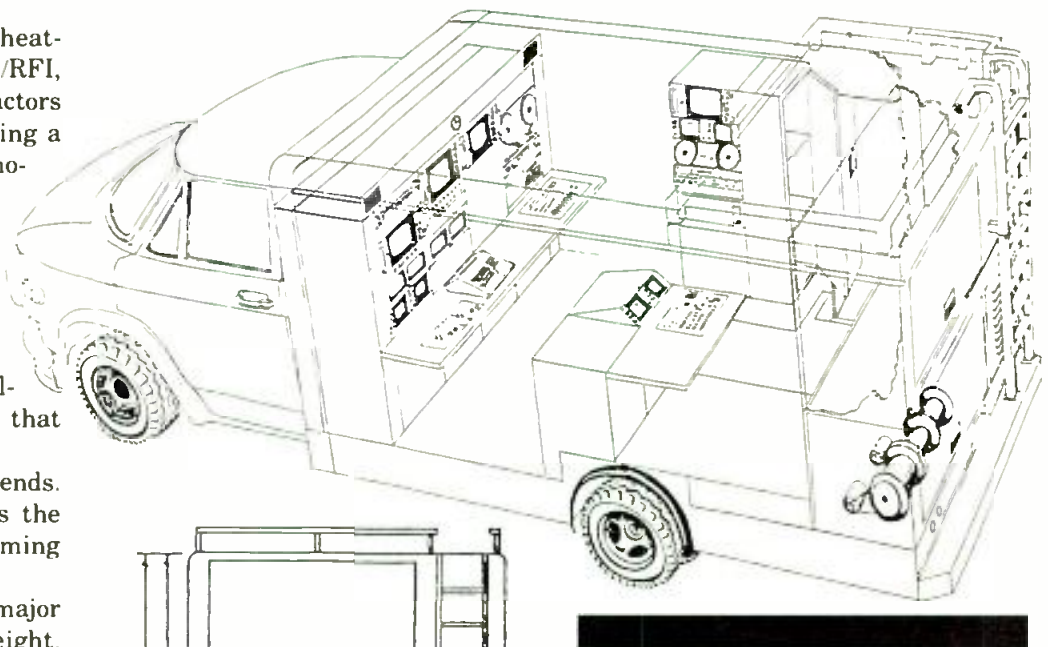
How, then, do the manufacturers cope with all these variables? And how can engineers decide whether the manufacturer has really done all that is necessary behind the walls, ceilings and floors and underneath that glossy paint job?

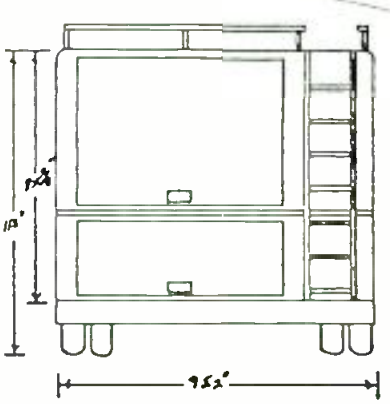
There are some reassuring trends. Certain design aspects, such as the basic vehicle chassis, are becoming nearly standard.

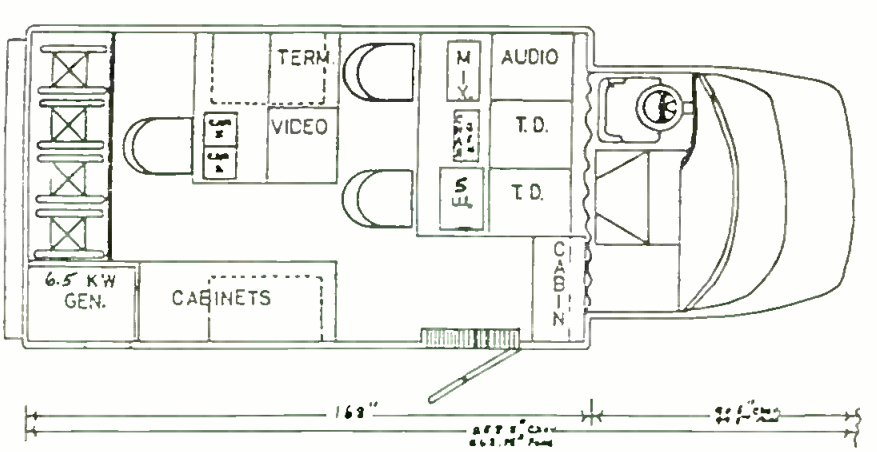
One design factor that has major implications is gross vehicle weight. GVW is being given more attention than ever because of some unlucky experiences at weighing stations with overweight vans and trucks. Chassis manufacturers such as Ford, GM, IVECO and the like publish guidelines for the maximum load capacity on each axle to ensure proper operation and handling of the vehicle. This guideline is usually specified as the maximum weight in pounds that each axle, front and rear, can take.

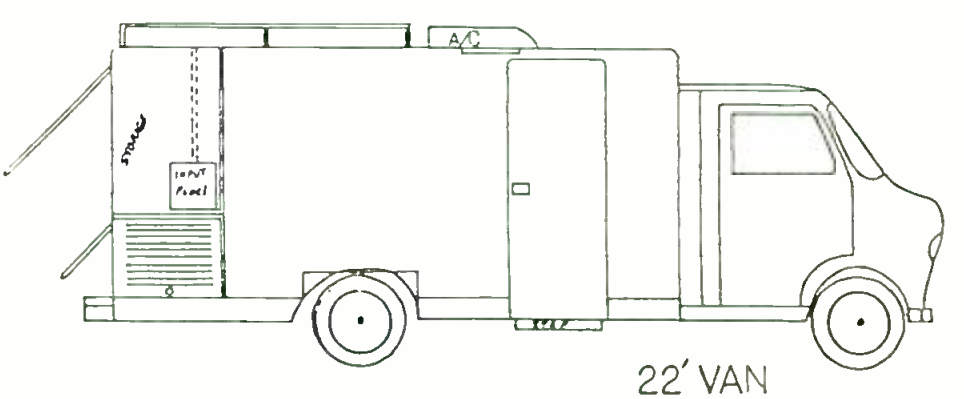
However, simple total weight calculations can sometimes let poor design slip by. For example, one vehicle was built with a large engine-generator mounted far to the rear. Total weights were within tolerance for the front and rear axles. But when the vehicle was driven, the front wheels seemed to 'float'. Analysis showed that the large mass of the engine-generator cantilevered the front end up, especially on bumpy roads.

Another weight factor closely associated with GVW is weight distribution, expecially when mounting large or heavy items such as generators, satellite dishes or communications antenna masts. The first decision is whether you can use one generator for all power or whether you should install two generators.





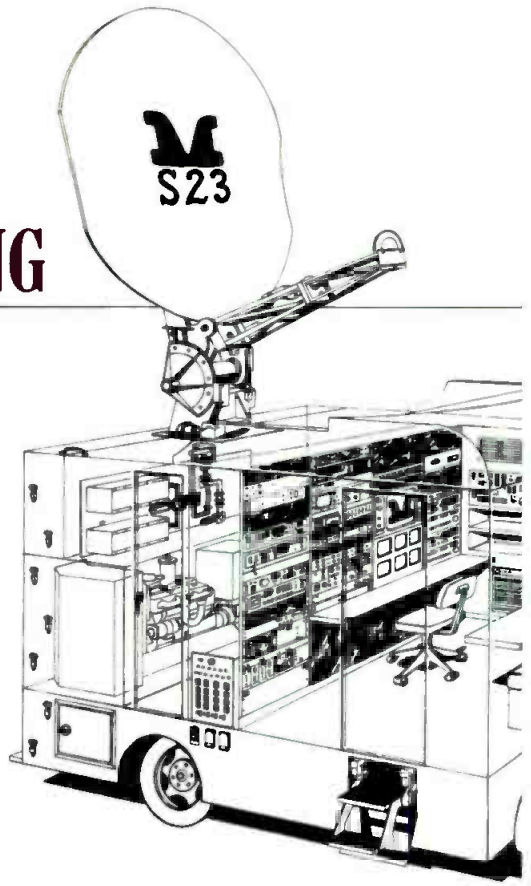




Typical interior layout and floor plan for a 22-foot Shook van.

www.americanradiohistory.com

REMOTE VEHICLE ENGINEERING



There are two ways to utilize two generators. One, full redundancy, is to size both for the entire expected load. This is the most reliable method and the most expensive in time, weight and space. The other method is to split power distribution between two smaller generators, each capable of about half the expected load. Then, if one load is noncritical and the other critical, and one generator fails, the critical bus can always be powered from the remaining generator.

In the event of a generator failure, even if you have a second generator, there is a time when power is off while the failed generator is switched off-line and the good generator assumes the load. For those of you to whom even this brief power failure is impossible to live with, a third source of power is available—an AC inverter with its own battery bank for backup power. The battery bank should be independent of the vehicle batteries and it is usually recharged either from shore or generator power. Power networks are available that can make this battery bank usable for starting the vehicle engine, if necessary. The weight of these batteries, however, makes large amounts of power impractical. For example, an inverter capable of 1000 W output at 110 V ac requires four 12 V, 100 A batteries similar to standard car batteries in order to operate for at least one hour at full rated output. So, as you can see, supplying enough batteries to provide 5-10 kW of total ENG power would be impractical.

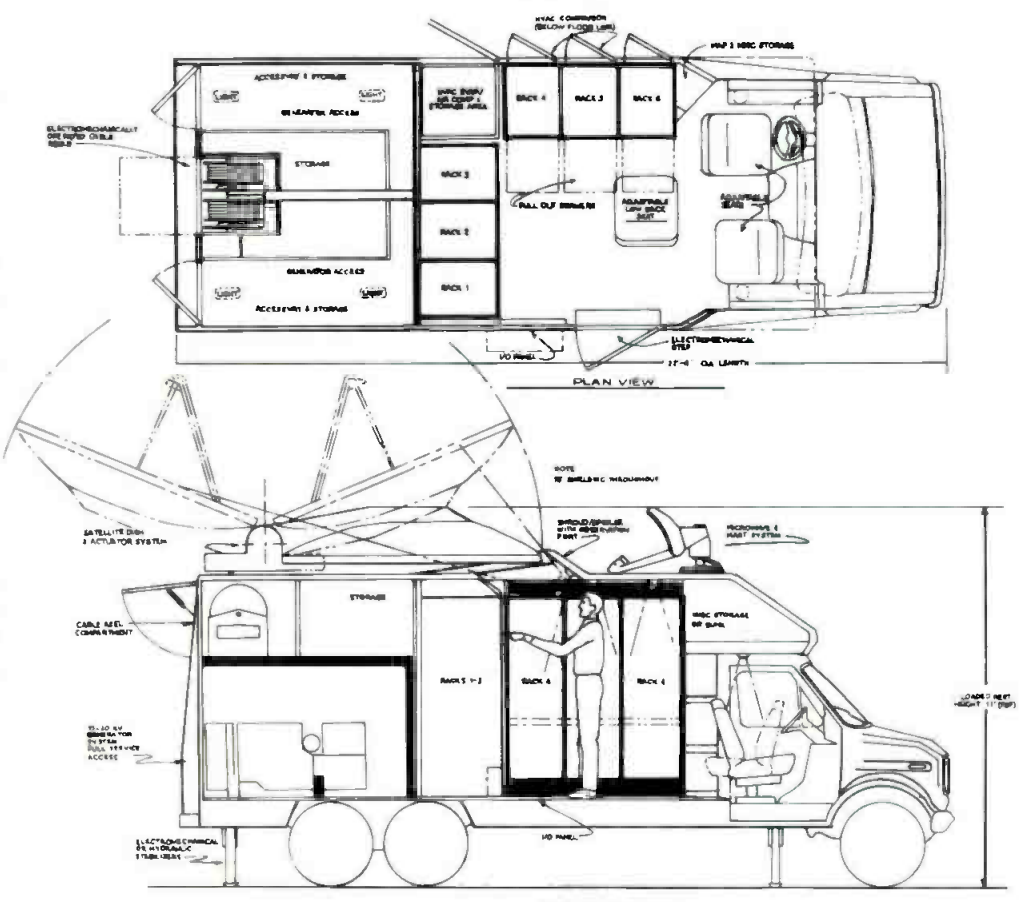
Usually, a generator is mounted toward the rear of the vehicle. If two are used, they are evenly spaced about the center of the vehicle for better weight balance. One single generator may be placed to the side if it is under about 7 kVA. Larger engine generators like the 20 kVA units common in satellite news vehicles (SNVs) are mounted in the rear center for proper balance.

The quality of output power from the generator is important. Some generators put out 'pure' (meaning undistorted) sine waves. Others have measureable distortion that may cause some equipment to malfunction. Nearly all manufacturers install some form of power isolation or regulation between the generator and the loads. This is usually in the form of an isolation transformer, which sometimes has a tap switch allowing the user to select higher or lower output voltage to compensate for sagging shore power. Such transformers do not automatically regulate voltage. More expensive ferroresonant transformers tap switching systems are necessary for automatic regulation. In any case, the output of the power isolation system will buffer your loads from the generator output.

It is also common to split the power distribution between at least two separate circuits. One circuit feeds the most important loads while the other feeds less critical loads, like lights and air conditioning. This allows you

Above: Cut-away plan for a Midwest remote package.

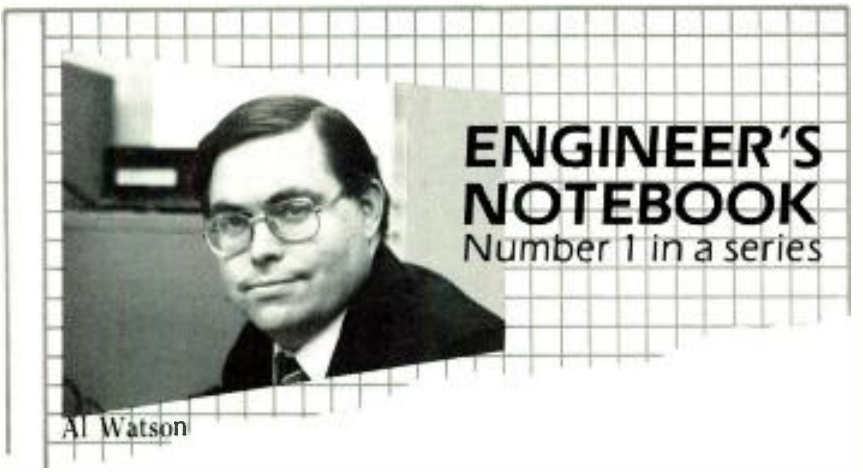
Below: Centro's floor plan for its 22-foot vehicle.



www.americanradiohistory.com

to shut down the less critical loads in case of failure of part of the main power supply. Remote production vehicle design firm Roscor goes a step further in its 45-foot trailers, according to its president, Paul Rosten. It splits power three ways so that two circuits feed Stabiline voltage stabilizers for equipment power and a third circuit is dedicated to air conditioning.

Satellite antennas pose an even tougher mechanical mounting problem than engine-generators. Ku-band dishes, which seem to be the most popular form today, are usually raised and lowered as a unit, with the dish in one piece. A 2.3-meter antenna presents nearly 60 square feet of area to wind forces. The antenna, its mechanical tilting assembly and its rigid base can weigh nearly 1000 pounds. It is designed to remain rigid enough in high winds to remain pointed to a satellite within .1 degree of rotation. To provide the best possible support for these antennas, manufacturers are using sophisticated computer-aided design and techniques like "finite element analysis." The goal is to transmit stability up from the ground through the vehicle directly to the antenna base, eliminating the vehicle as a source of motion. Curtis Chan, vice president of marketing and product development at Centro Corporation, points to Centro's rigid welded and bolted frame as an example of the use of modern computer design. When used with leveling feet, it provides rigid ground support to the antenna mounted 10 feet above. Bill Kimmel, president of Specialty Vehicles, uses a similar computer program to design "bridge truss" elements into the walls of his vehicle. When coupled with special equipment racks mounted below the antenna, his vehicle provides a stable platform while keeping the RF



N/DYM™ Technology Comes to Broadcast Microphones

By Alan Watson, Director of Engineering
Electro-Voice, Inc.

Those familiar with the benefits enjoyed by musicians through the new neodymium-magnet microphones have no doubt predicted that the new technology would soon be available in broadcast microphones. And now, with the advent of the Electro-Voice RE45N/D hand-held shotgun microphone, the prediction has come true.

The advantages N/DYM™ technology brings to broadcasting are significant. Above all, it gives us a microphone with the high output previously available only from condenser mics—but without the problems of dead batteries, noises caused by poor ground connections in phantom-powering, humidity damage, static electricity, and poor rf rejection.

The Alnico magnets used in most dynamic mics yield a sensitivity of 6 dB less than would be possible if the steel parts of the magnetic structure could be completely saturated with the field. Increasing the Alnico magnet size does not work since the added size interferes with the acoustic design of the mic. Neodymium magnets, however, are so powerful that the magnet can be far smaller and still provide the "lost" 6 dB of sensitivity.

N/DYM Technology extends far beyond a mere substitution of magnetic material. To maximize the new opportunities, Electro- Voice engineers found that the ideal neodymium magnet shape is one with a thin, wafer-like configuration.

This permitted using a voice coil and attached dome of far larger diameter while reducing the surround—yielding important added advantages for broadcast engineers: a smoother, more evenly contoured pickup pattern with extended high- and low-frequency response and better rejection of unwanted noise from the sides.

For more information, please write to us for the specification sheet and brochure on the RE45N/D—the broadcast industry's first N/DYM dynamic shotgun microphone.

600 Cecil Street • Buchanan, MI 49107 • 616/695-6831
In Canada:
Electro-Voice Div., Gulton Industries (Canada) Ltd.
P.O. Box 520 • Gananoque, Ont. K7G2V1 • 613/382-2141

Electro-Voice®
a MARK IV company

BROADCAST/PRODUCTION MICROPHONES
Quality-made in the U.S.A. since 1927

Advertisement
Circle 117 on Reader Service Card Page 59

www.americanradiohistory.com

REMOTE VEHICLE ENGINEERING

waveguide assembly as short as it can possibly be.

Larger antennas, like the 4.5-meter Ku-band antennas used by Dalsat Inc., require special design, says marketing executive Clyde Combs. Their antennas have two cuts parallel to the longitudinal axis of the vehicle. This allows folding the antenna to the eight-foot width of the vehicle. Because this larger antenna is designed for transmission in extreme weather, it must also be strong enough to withstand 80 mph winds and 125 mph gusts. Even though folded, the antenna is designed to remain two-degree compliant for the operational life of the vehicle.

Waveguide design is another critical area in the fabrication of mobile satellite equipment, and this is a specialized art requiring experienced RF engineers to do it right. Waveguide assemblies combine rigid and flexible pieces, as well as rotating joints. This high-frequency electronic tubing is then subjected to the most severe weather changes imaginable. To help keep RF losses to a minimum, many manufacturers install a pressurizer and a dehumidifier like the unit designed by Hubcom. Ron Adamson, director of sales and marketing, points out that waveguide attenuation is minimized when this system is used.

Support structure for the dish of a Dalsat truck. Some of the larger 4.5-meter ku-band models require special designs to promote portability.

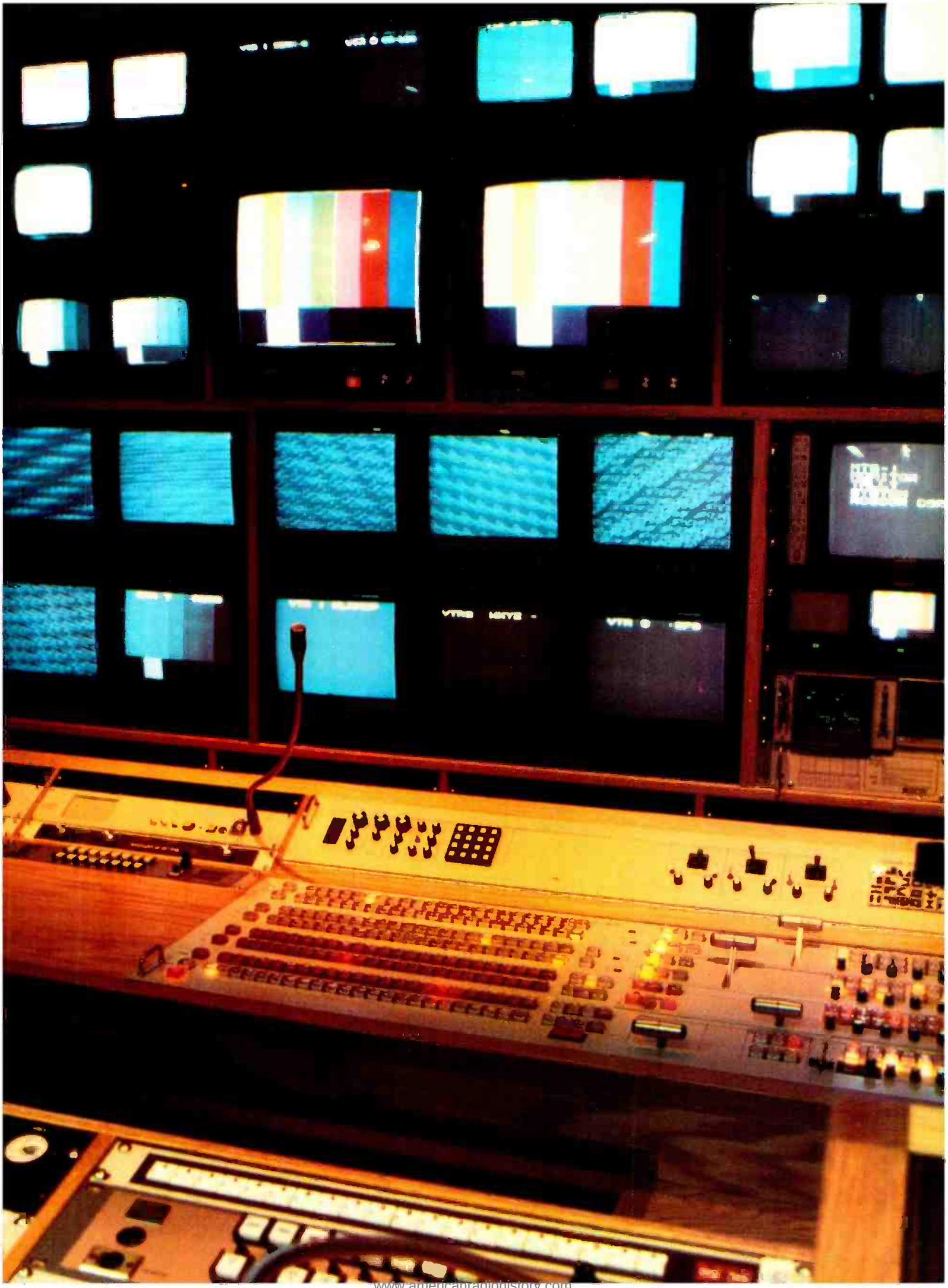
Communication antenna masts pose another significant design problem. The most common mast extends 42 feet above the vehicle. Although small, the microwave antenna on top can be subject to high wind forces. These forces can then act to tilt the vehicle. To minimize this effect, some companies, like TV Engineering, place the mast in the center of the vehicle. Jack Vines at TVE says that this location is the best when leveling feet are not used. Other firms place the mast off-center behind the driver, but recommend the use of leveling feet. Unfortunately, not all users bother to lower the feet every time, and a van could go over.

Stability is fine when you are parked, of course, but what ensures that all that expensive electronic gear inside will live through the hours it takes to drive to and from remote locations? Vibration and shock equipment apparently cannot be eliminated entirely. In most vehicle designs, rack panels are constructed much the same as those in a lab and mounted rigidly in the vehicle. Roscor attaches the top of its racks through shock mounts to the roof of the vehicle, but most other companies rigidly mount all surfaces. In fact, additional rear support is added for all rack-mount equipment to minimize movement. The main design goal is to minimize vibration and oscillation of mechanical assemblies and to rely on the vehicle's suspension to cushion heavy road shock. A vehicle can be so rigid that it can shake itself apart. Some manufacturers therefore design in flexibility so that high stress areas can bend instead of breaking. Cooling of equipment is a feature that was ignored by some earlier designs. Today more design effort is spent on equipment cooling than on work space cooling. Because most heat generated is behind the racks, it is imperative that cool air be ducted and circulated in that area. Convection may not be adequate to prevent hot spots which will degrade system performance and reduce life. Many manufacturers are now installing central air conditioners with custom ducts to ensure proper circulation through every rack. The ideal system would force cool air in the bottom of the rack and pull it out the top, matching the flow of the heated air in the rack. This is the method most commonly used in computer room installations. Alternatively, forcing cold air in the top and pulling return air from the floor can be just as effective.

Master control console for a large Roscor remote vehicle. Interior racks are shock-mounted to the roof of the truck to minimize equipment movement and shimmy.

But what happens when you are parked in a blizzard with winds at 40

www.americanradiohistory.com



www.americanradiohistory.com

REMOTE VEHICLE ENGINEERING

m.p.h. outside? You are going to need heat, so look for a heating element in the central air conditioner or heating devices in the work area. The ideal system, of course, would use the heat generated by the electronics to heat the room, but ducting and controls are probably too complicated to be economically feasible today.

One tip on air conditioners and power. If you fear power interruptions when the air conditioner compressor motor cycles on or off, look for "hot gas bypass" systems. These trick the compressor into thinking it must keep running, even if cold air is not needed.

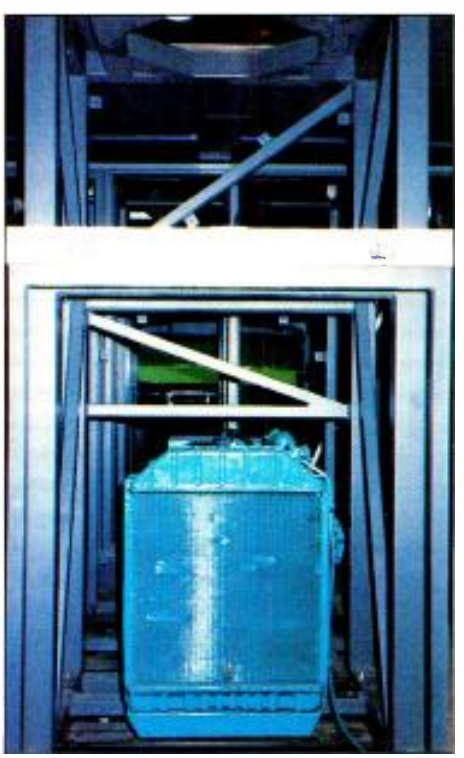
Other interior details you should look for include sound and heat insulation. Most designs use foam and/or honeycomb material in the walls, ceilings, floors, and doors, then cover it with plywood and then with good antistatic commercial-grade carpeting.

Speaking of noise, two forms of noise cannot be heard and are therefore often overlooked. One is radio frequency interference (RFI) and the other is electromagnetic interference (EMI). These can cause problems whether emitted by your equipment OR received from outside sources. For this reason, some mobile facilities are built with shielding material literally everywhere except on the windshield.

So what does the future hold? Many limits to equipment have been overcome, and that process continues. Electronic gear, for instance, is being reduced in size and made more rugged. Space is being utilized by innovative changes in basic items, like furniture. One van packs electronic gear right behind the driver and passenger seats, utilizing the rotating seats to accomplish two functions. Another design, by Electronics Media Consultants, combines mobile equipment with the largest visual effect on the road—a Giant Boom Box—which looks just like a huge radio, according to Steve Butler, president. Next, look for that giant TV.

Bob King, vice president of marketing of BAF Communications, says he just finished an extended tractor complete with satellite antenna and generator which is capable of towing BAF's long production trailer. The trailer can be parked in a convenient spot and the tractor moved to the best location for satellite linkup.

Hydraulic components for the antenna mast of a Dalsat vehicle.



If you want the ultimate in automatic satellite antenna positioning, Midwest might have just the system. According to Jay Adrick, their new positioning system uses a flux gate compensated compass, a LORAN sonar position location system, and a computer to determine the location and the attitude of the vehicle automatically; the antenna is moved to a preselected position without your touching a control.

If you want to get farther off road than anyone else, pick up one of Centro's four-wheel drive SNVs with a low profile (seven feet, four inches). You can also park it in your favorite underground garage or load it onto a cargo airplane. It's possibly the first mobile-'fly-away' package.

Speaking of fly-away—look for the new SNV from Specialty Vehicles. Bill Kimmel says they have integrated a complete fly-away kit including cases, end bells, and folding antenna into their SNV. You can drive it to the airport, pull out the cases, park the van, and off you go. The only duplication is the antenna—the van has its own 2.3-meter antenna on top.

As you can see, juggling all the design tradeoffs in a mobile production or communication vehicle is a monumental task. It is to the manufacturers' credit that they can meet as many of your demands as they do. If you are realistic about your needs now and in the future and if you listen to the voices of experience out there, you will get a good vehicle that should serve your needs well. ■

For More Information

on manufacturers and products mentioned in this story, please use the Reader Service Card.

A.F. Associates . 250	Dalsat Inc. . 253	Shook 258
BAF Communications 251	Electronics Media Consultants. 254	Specialty Vehicles . . . 259
Centro Corporation. 252	Hubcom . . . 255	TV Engineering. 260
	Midwest . . . 256	
	Roscor 257	

Shafer is a product design engineer and technical writer, currently working for The Energy Source, Manhattan Beach, CA. He holds a BSEE degree from USC and has done graduate work in engineering.

www.americanradiohistory.com

Sony Betacam SP.® Bigger than ever.

www.americanradiohistory.com

Now the Sony Betacam SP system is bigger than ever for the four essential areas of video operations: field acquisition, production, post production, and transmission. No other manufacturer sells a more complete line of products.

For the field a wide selection of advanced CCD and tube cameras handle the full scope of ENG and EFP applications. And the new single-piece BVW-200 sets a revolutionary standard for a compact, lightweight camcorder. Dockable VTRs, field portables and a host of peripherals, such as a color playback adaptor and wireless mic contribute to the unlimited flexibility of the Sony Betacam SP field acquisition system.

Whether in the field or in the edit suite, the Sony Betacam SP system provides unmatched versatility in video production: with features such as 4-channel

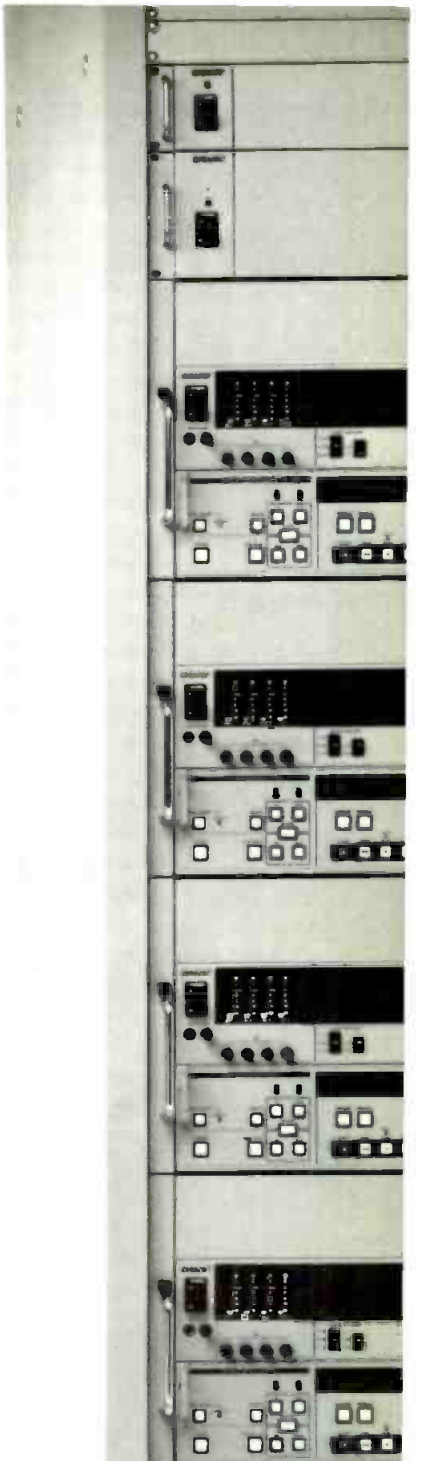
Sony Communications Products Company, Broadcast Products Division, 1600 Queen Anne Rd., Teaneck, NJ 07666.
© 1988 Sony Corporation of America. Sony, Betacart, and Betacam SP are registered trademarks of Sony Corporation.

www.americanradiohistory.com

audio, component/composite editing as well as the capability to interface with every other Sony Broadcast VTR.

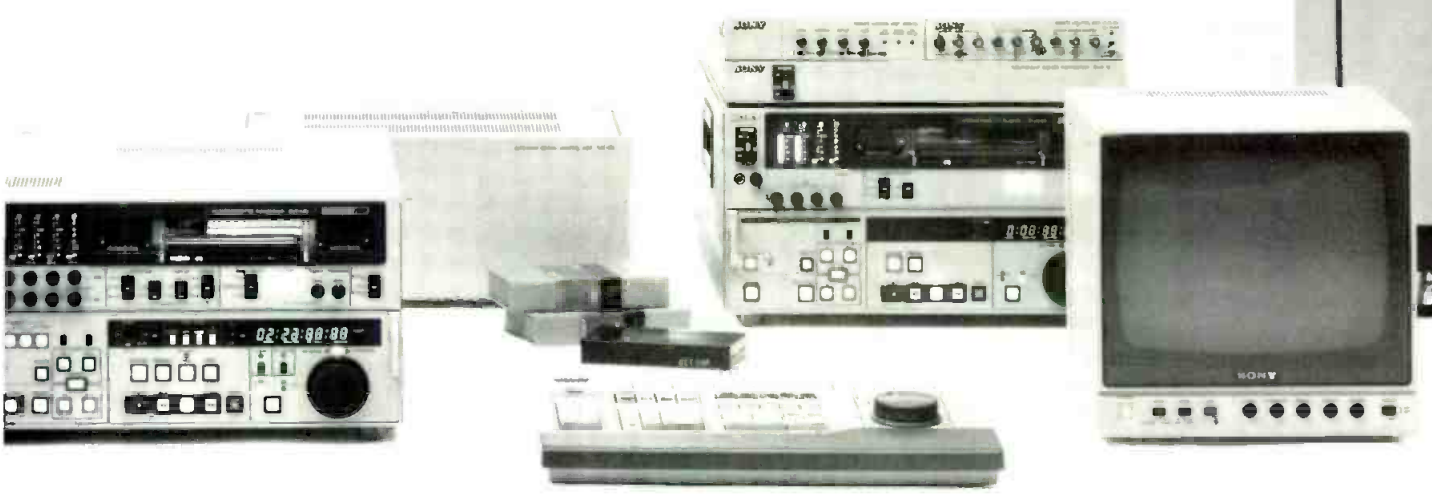
For transmission, Betacart,* Multicassette System, the standard of reliability, is now joined by the incredible 1000 cassette capacity Library Management System, which accommodates large and small cassettes for both program and commercial replay.

If you're looking for a system you can grow with, and a company that has demonstrated its commitment to that system, contact your Sony Broadcast representative.
Or call Sony at 800-635-SONY.



SONY

Broadcast Products



www.americanradiohistory.com

The new SPG-1300N

proves our commitment to setting standards ...Again!

In 1971 Jim Leitch, our founder, designed the original NTSC Sync Generator with consistent SCH! This SPG-100N was so new and exemplary that it became the forerunner to RS-170A.

We're doing it again with the all new SPG-1300N, proving our commitment to leadership with progressive concepts in television technology.

- Low cost, modular 1RU design.
- No warm-up, high stability TCXO (<1 Hz).
- RS-170A zero SCH Sync Subcarrier, Black and Test Signal outputs.
- Independent timing for pulses, black and test signals.
- Adjustable blanking widths and burst flag position.
- NTSC Digital Genlock.
- Accurate, 12-bit digital test signals (option).
- Color frame-locked stereo tone output.

LEITCH

Leitch Video International Inc., 10 Dyas Rd., Don Mills, Ont., Canada M3B 1V5 • Tel: (800) 387-0233 Fax: (416) 445-0595 Telex: 06 986 241
Leitch Video of America, Inc., 825K Greenbrier Circle, Chesapeake VA 23320 • Tel: (800) 231-9673 or (804) 424-7920 Fax: (804) 424-0639
Circle 118 on Reader Service Card Page 59

www.americanradiohistory.com

SUMMER OLYMPICS: HIGH-TECH DESIGN

How can a contractor based in London build a sophisticated broadcast facility in Seoul for a client in New York? With a big assist from computer-aided design and telecommunications, that's how. A mix of CAD and communications, set up by systems house Dynamic Technology, has streamlined NBC's efforts to surpass its predecessor in the technical and engineering quality of its Olympic coverage.

NBC's stake in a successful Olympics is especially high, given its recent history. Not since the 1972 Winter Games in Sapporo, Japan, has NBC provided exclusive Olympic television coverage for U.S. audiences. The network's successful bid for the 1980 Moscow Summer Games ended in a Lloyd's insurance bailout when then-President Jimmy Carter insisted that the U.S. Olympic team boycott that Olympiad because of the Soviet invasion of Afghanistan.

Since Sapporo, the seven consecutive Olympiads that have entertained and fascinated U.S. TV viewers have come courtesy of ABC, a network that appeared to have developed a monopoly on that event and that had, by everyone's tacit admission, sharpened its talents to cover the Olympics in an eye-catching and sometimes heart-wrenching fashion.

NBC's vice president of Olympic operations, Kenneth Aagaard, does not hesitate to give full credit to ABC for its excellent coverage of the Calgary Games, especially in the area of audio. Michael Weisman, executive VP for NBC Sports, says that his network is out to shatter the "mystique" that ABC has a lock on Olympic-style television.

According to Weisman, NBC has committed a healthy budget, a mountain of equipment, an army of support people and some of its top on-camera talent to make these Seoul Summer Games the best ever for the Stateside sports fan. It has even convinced the IOC to run some key events at unusual hours in Seoul so that the live transmissions will hit prime time in the continental U.S.

Preparations for NBC's remote operation at the Seoul Olympics have spanned three continents with CAD and communications.

NBC executives are confident that they have done everything to assure that the Seoul Olympics are well covered for their viewers. There is a $100 million production budget and an on-site staff of 1100 people to create the American-flavored programs that will be beamed home over three full-time satellite transponders (two Ku-band and one C-band) and a variety of part-time and backup satellite links.

Charlie Jablonski, NBC's peripatetic Olympic engineering executive, who commutes back and forth to Seoul and is now in residence at the Seoul Hilton, describes this NBC operation as the biggest "temporary" undertaking his network has ever em-

BY JOSEPH ROIZEN, with EVA J. BLINDER

www.americanradiohistory.com

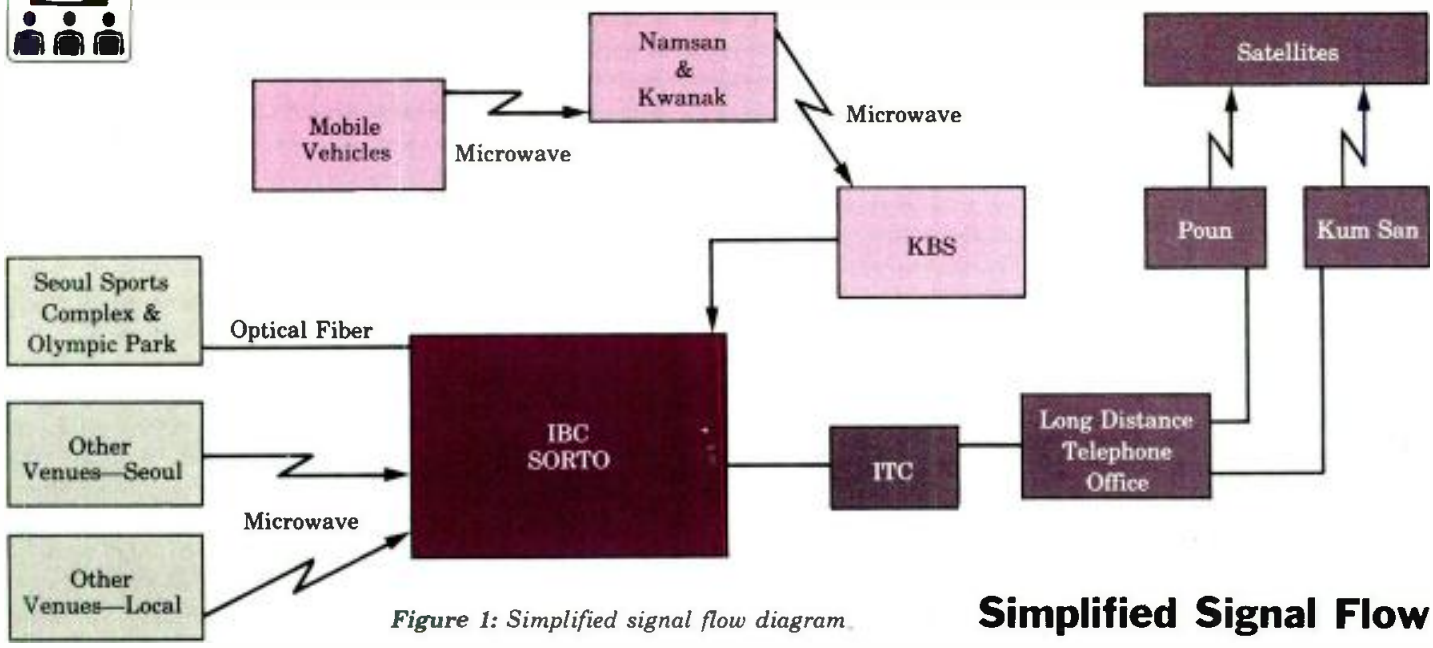


Figure 1: Simplified signal flow diagram

Simplified Signal Flow

barked upon. He, along with other NBC officials, is certain the net will do a superb job of covering the Games this fall.

The International Broadcast Center (IBC), which KBS and the Seoul Olympic Radio and Television Organization (SORTO) are constructing behind KBS headquarters in Yoido, will be the core of NBC's operation during the Seoul Olympics. NBC has by far the largest facility of all the international broadcasters on site, approximately 60,000 square feet, located on the first two floors of the IBC. In fact, NBC's Seoul facility will rank as the third-largest NBC production complex anywhere, just behind the Rockefeller Center and Burbank studios.

The task of building it was farmed out by NBC to London-based Dynamic Technology Ltd. (DTL), who mocked up a working system in its facility last September. DTL, a facilities builder with special expertise in distribution, lighting and control systems, had already completed a number of major systems installations in the UK and Africa. One factor that especially suited the company for the NBC Olympics job was its well-planned computer-aided design system.

DTL's London facility has five Tandon AT-compatible personal computers dedicated to CAD applications. The computers, all with 20 Mbyte hard disk drives, are networked through a central file server using a Q-Link local area network, manufactured by the British company Quorum Computers Ltd. (The network links 16 computers in DTL's building, although only five are part of the CAD system.) The machines used for CAD are also equipped with Intel 80287 math coprocessors. They run Autocad computer-aided design software with additional customized software. The customized software enhances Autocad's ability to build drawings in layers, allowing each input/output to have up to 35 layers, five "parent" layers each with seven "child" layers. The parent layers are assigned to video, audio 1, audio 2, time code and machine control. Child layers can include connector type, pin number, signal type and cable type, to name a few examples. All drawings are stored on the server.

The main 3M switcher has a phenomenal 214,144 crosspoints, dwarfing even the NBC master grid in New York.

DTL constructed this full-scale, working mockup of the NBC project, including a large edit room and control room.

Because the job was so complex and the client on the other side of an ocean, DTL set up a telecommunications link between its offices and NBC's New York headquarters. Through this simple dial-up modem connection, network engineers in New York had full access to their drawings in London.

Autocad's layering capability was an added advantage in the communications scheme. If requested changes were relatively minor, the DTL engineers could call up the layer involved, make the changes, and transmit just that layer to New York. According to DTL's Dave Craddock, a layer could

www.americanradiohistory.com

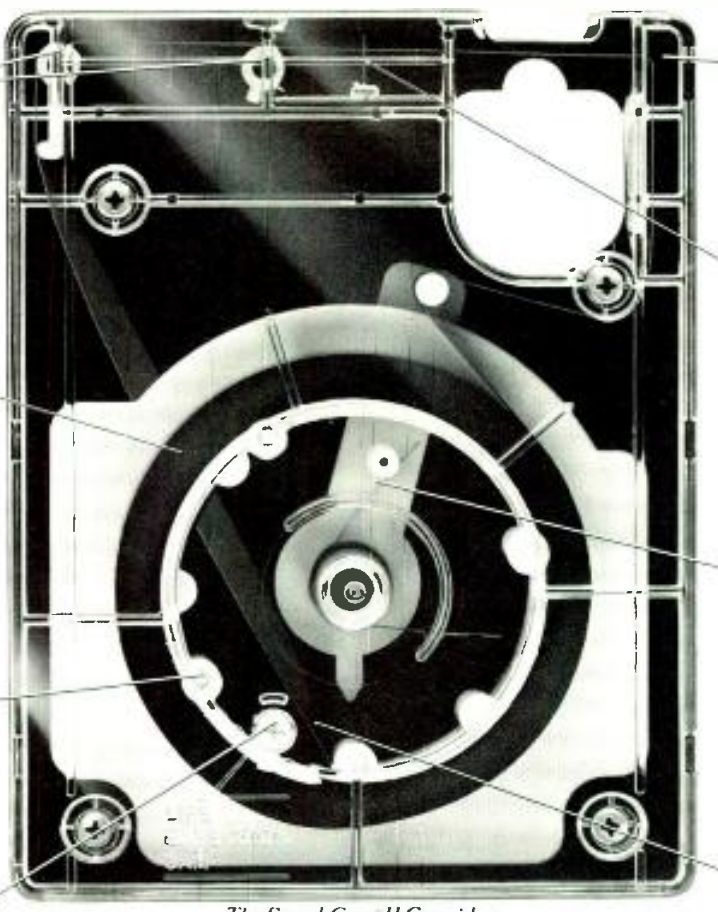
DISCOVER THE SECRETS TO A LONGER LIFE.

Naturally lubricated concave guides gently position tape to allow cartridge machine to perform critical guidance.

High-output, low-noise, 100% laser-inspected tape delivers impressive frequency response and higher recording levels for better signal-to-noise performance.

Non-rotating hub reduces wow and flutter, eliminates annoying rotating hub rattle and minimizes stop cue overshoot.

Adjustable cam to control tape loop for maximum life.



The ScotchCart II Cartridge

Cover constructed of polycarbonate materials for long-lasting, break-resistant use.

No pressure pads to cause troublesome tape steering and wear or induce modulation noise.

Patented dynamic tension control system ensures proper tape-to-head contact, provides constant tape tension and controls tape looping.

Tape exits from the hub's center instead of twisting and curling over the pack, reducing edge stress and debris to prolong life.

A broadcast cartridge that lasts longer isn't worth much unless it delivers consistently high performance throughout its useful life. That's why the revolutionary design of the ScotchCart® II cartridge is noticeably superior to other carts.

It also sounds better because of 3M's extensive audio tape experience—over 40 years of successful innovation.

So if you measure a cart's value by how much trouble-free operation it provides in the long run, talk to your professional audio dealer or local 3M sales office about the advantages of the ScotchCart® II cartridge.

Or, if you'd like a free sample, call International Tapetronics, 3M Broadcasting and Related Products Department at 800-447-0414. (In Alaska or Illinois, call collect 309-828-1381.)

It's no mystery why it performs better. Longer.

3M

Circle 119 on Reader Service Card Page 59

www.americanradiohistory.com

be transmitted in two minutes, contrasted with two hours for a complete drawing. Every few weeks DTL also spooled off the entire plan onto a high-speed spooler and sent it by courier to New York.

For the installation work, DTL installed an additional computer and modem on-site in Seoul. If DTL's staff discovered a discrepancy between the drawings and the actual IBC building, it could make changes on the spot and modem them back to London within minutes.

According to Craddock, most modem communication between London, New York and Seoul was at a data rate of 1200 bits per second. DTL opted against installing ultra-high-speed 9600 bps links because of the prohibitive cost of the necessary high-speed international telephone lines, he said.

Before actual construction began, DTL engineers built a nonworking model of the Seoul facility in New Jersey for NBC's approval. They then built a working model, dubbed the "Mockiad," in London. The Mockiad, composed of a large control room, large edit room and small edit room, was fully interconnected and functional. NBC's production staff tested it out by performing a mock rehearsal of an actual Olympic broadcast.

The entire system is being prefabricated in DTL's London facility for transport by container ship to Seoul, where it will be assembled. (By early June, 25 DTL personnel were already working at the Seoul site.) Last-minute components will be shipped by air.

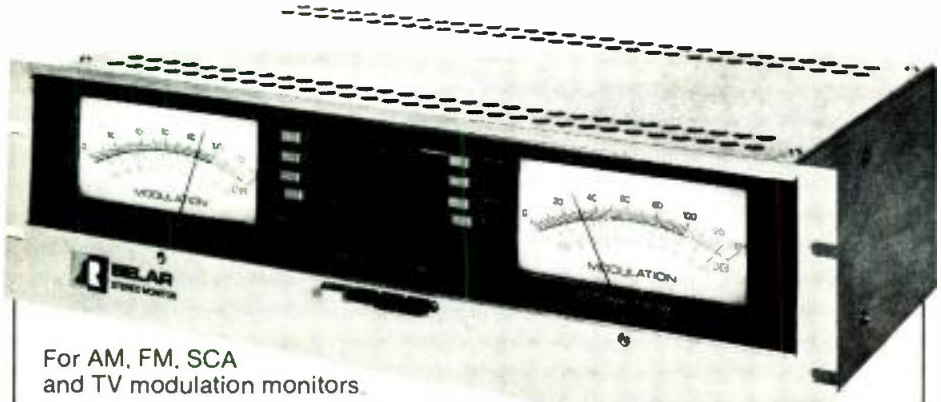
The heart of the facility is a huge routing switcher specially constructed by 3M and configured for easy shipping to London and Seoul. This switcher has a phenomenal 214,144 crosspoints; by comparison, the NBC master grid in New York has only 65,000.

The other terminal equipment includes Leitch timing and synchronizing gear, Tektronix frame synchronizers, McCurdy talkback systems, Grass Valley production switchers and editing switchers and over 1000 Ikegami color monitors, 100 of which will fill the main control room wall.

The facility is made up of two studios (one two-camera and one three-camera), each with its associated control room. The identical control rooms each have a Grass Valley Group 300 production switcher with access to eight assignable Kaleidoscope channels, a 36-channel Solid State Logic 6000 audio console and a Quantel Cypher character generator terminal.

In addition, there are four large edit suites, 11 small edit suites, graphics facilities and a large central technical area. The facility accepts 26 KBS inputs and 21 NBC inputs via remote-controlled amplifiers and frame syncs, all controlled by a Graham-Patten UTEC system. Stereo audio inputs are fed via Tektronix 118 synchronizers.

The edit suites exemplify NBC's extensive equipment commitment to covering the Seoul Olympiad. Of the 15 edit suites, four are seven-VTR



For AM, FM, SCA
and TV modulation monitors.

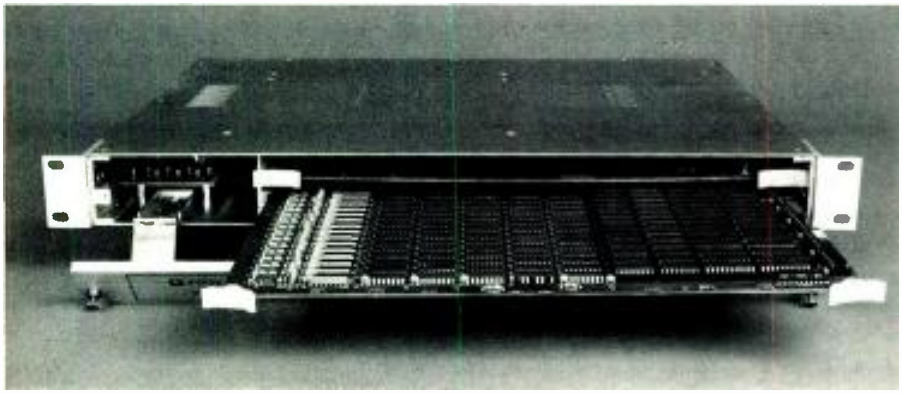
WHEN ACCURACY COUNTS...COUNT ON...

Call **(215) 687-5550** or write for more information on Belar AM, FM, Stereo, SCA and TV monitors.

BELAR
ELECTRONICS LABORATORY, INC.
LANCASTER AVE AT DORSET DEVON, PA 19333

Circle 120 on Reader Service Card Page 59

MODEL 9521 20 x 10 DUAL AUDIO ROUTING SWITCHER



A Single Rack Unit

Combining high density and flexibility, Image Video's 9521 packages two 20 x 10 Audio Switchers into just one rack unit to provide a surprisingly compact 20 x 10 Dual Audio or 20 x 20 Single Level Switcher. And, interfacing the 9521 with our 9520 Video Switcher creates a 20 x 10 Video and Dual Audio System neatly contained in only two rack units. Complete with RS232/422 serial interface and compatibility with all Image Video standard and custom control panels, the 9521 sets the highest standard to date in audio switching systems.

IMAGE VIDEO LIMITED

705 Progress Avenue, Scarborough, Ontario, Canada M1H 2X1 Tel. (416) 438-3940 Tlx. 065-25392 Fax. (416) 438-8465
1051 Clinton Street, Buffalo, N.Y. Tel. (716) 855-2693 Tlx. 065-25392

Circle 121 on Reader Service Card Page 59

www.americanradiohistory.com

rooms for heavy-duty production and 11 are three- or four-VTR rooms for rapid daily program assembly. The network claims that these editing suites will achieve three new Olympic records: the largest collection of computerized edit systems, the largest installation of component video editing systems, and the greatest use of the MII format for program production.

Each of the four large suites features a GVG 51 editing system controlling seven dedicated Panasonic MII VTRs. Each also boasts its own GVG 300 production switcher, which in turn has access to eight assignable Kaleidoscope channels. The large edit suites each also have a 24-channel Ward Beck audio console and a Cypher graphics terminal.

The small suites, also based on GVG 51s, each have four MII VTRs, a GVG 100 switcher, and a Graham-Patten 16-input audio board. All are fully component analog.

In the central technical area, 14 MII machines are available, along with Type C, U-matic and Betacam decks for interchange purposes. Feeding these systems is the installation's 3M main routing switcher, which has a maximum configuration of 256 by 256 with seven levels. The studios and edit suites are downstream of the routing switcher, but are reentered via a frame synchronizer. Three master outputs lead to three seatellite feeds; these outputs can come from the studio control rooms, the large edit suites or the routing switcher itself.

Extensive interarea communication is provided by a McCurdy intercom system which is larger than 300 by 300.

The total video and audio equipment complement at NBC's IBC Olympic headquarters, and at the various venues from which it intends to do unilateral coverage, is massive, to put it mildly. For example, NBC is installing 100 cameras,

The facility will be the third-largest NBC production complex anywhere, just behind NBC's Rockefeller Center and Burbank studios.

The International Broadcasting Center in Seoul, under construction adjacent to KBS headquarters.

SHOOK BUILDS THEM BETTER

"We give you what you want."

FOR QUICK DELIVERY AND QUALITY FIELD PRODUCTION

RACK-READY OR TURN-KEY

MOBILE TELEVISION PRODUCTION SYSTEMS

SHOOK
ELECTRONICS USA, INC.
6630 Topper Parkway San Antonio, Texas 78233

10th Anniversary Year

- EFP
- ENG
- SATELLITE

Call for details.

512-653-6761

www.americanradiohistory.com

ranging from 29 "hard" studio types to 11RF backpack, portable cameras that can roam the playing fields without a cable hookup.

Besides the RF cameras, which will operate from various Seoul and local venues, an optical fiber hookup will link the IBC with the Seoul Sports Complex and Olympic Park, where many of the events will take place.

The network plans to bring 154 VTRs, including 90 Panasonic MIIs and 59 Type C machines. In fact, this Olympiad will be one of the first major field tests of MII's production and post-production abilities. Four U-matics and one Betacam recorder will be brought along to insure compatibility with outside formats. To keep all the VTRs properly fed, NBC is stocking 7500 videotapes on-site in Seoul.

Quantel has supplied 23 of the 25 graphics devices that NBC will use in Seoul. For sophisticated character generation, NBC will use 12 Sports Cyphers (which it says Quantel developed specially for it). Six Quantel component still stores, four Paintboxes and one Harry will take care of creating and manipulating both computer graphics and live video. Additional graphics equipment for unique special effects include a Wavefront 3D computer graphics unit and an Abekas A64 digital disk recorder. According to the network, this combination is the largest component video facility ever assembled anywhere.

NBC has rented 19 multicamera remote mobile vans from a variety of production companies in the U.S. and is shipping them over to Seoul for arrival in August.

NBC is planning to air 197.5 hours of coverage of the Seoul Games, part of which will come from the massive 1500 hours of international (clean feed) pool coverage by the host broadcaster, the Korean Broadcasing Service (KBS). The rest will come from the unilateral coverage NBC will produce with its own cameras and personnel.

The 197.5 hours is in itself a massive undertaking, given the difficult environment NBC must face in a distant land with a huge language and cultural difference. ■

Roizen, president of Telegen, is an engineer who writes extensively about the television industry.

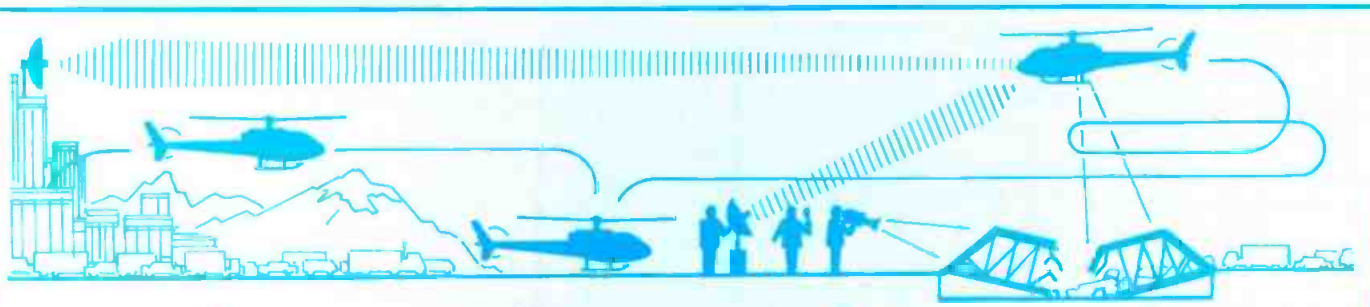
Circle 123 on Reader Service Card Page 59

For More Information

on products and companies mentioned in this story, please use the Reader Service Card:

Abekas (A64 digital disk recorder) 261
Graham-Patten (UTEC, audio mixers) 262
Grass Valley Group (51 editor, 300 & 263 switchers, Kaleisoscope) . . . 264
Ikegami (color monitors) . . 265
Leitch (timing equipment). 266
3M (routing switcher) . . . 267
McCurdy (intercoms) . . . 268
Panasonic (MII VTRs) 269
Quantel (Cypher, Paintbox, Harry) 270
Solid State Logic (6000 audio console) . . . 271
Tektronix (frame synchronizers) 272
Ward-Beck (audio consoles) . . 273
Wavefront (3D graphics) . . . 274

www.americanradiohistory.com



1
Get to the scene first by over-flying obstacles and ground traffic.

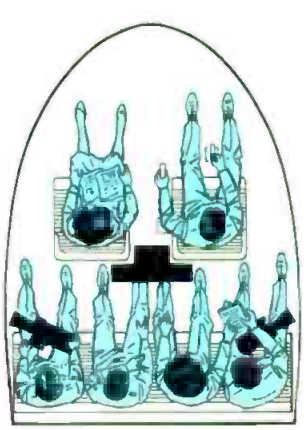
2
Land at news scene, drop off talent and technicians. Set up portable microwave system.

3
Shoot ground action and relay video live to helicopter.

4
Simultaneous shots from ground and air relayed from helicopter to station.

TOTAL 'LIVE' COVERAGE

Brighten up your rating picture with Aerospatiale...



Wide body cabin

With an Aerospatiale 350 or 355 you will be first on the scene and first to send back live pictures simultaneously from the ground and air. Send a strike team into an area using a helicopter with ample room for personnel and equipment. Aerospatiale features a wide body, flat floor, no intervening posts or partitions, and three separate, lockable storage areas.

The large cabin allows plenty of unobstructed room for close-ups of the reporter or aerial coverage. Left or right sliding doors provide the camera operator with maximum freedom of movement.

The Aerospatiale 350/355 series has earned a reputation as a "smooth, open platform for aerial photography." Low vibration and noise levels allow for "studio quality" sound reproduction. Top speeds of 145 mph and ranges up to 450 miles make Aerospatiale helicopters highly rated in a business where high ratings count.

For further information contact Ron LaFleur, Vice President, Marketing, Aerospatiale Helicopter Corporation, 2701 Forum Drive, Grand Prairie, Texas 75053-4005. (214) 641-0000 or toll free...

1-800-873-0001

aerospatiale
helicopter corporation

that's special. that's aerospatiale.

Circle 124 on Reader Service Card Page 59

www.americanradiohistory.com

The MII Field Editing you go. And it's

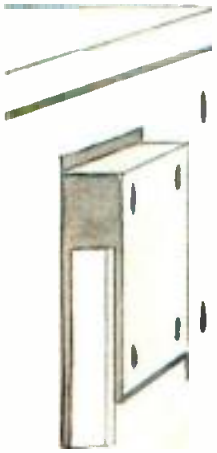
Panasonic
MII

Official Video Equipment Of
The 1988 Olympic Games

Title 36 United States Code Section 380

www.americanradiohistory.com

System goes anywhere available now.



Finally, a broadcast-quality 1/2" portable on-line editing system designed for rugged field use. Now you can shoot and edit precisely all in the same afternoon and broadcast that night with MII.

System components:

The AU-550 Field Edit VTR—
- Full studio capability in a portable VTR
- Auto tracking
- Up to 90 minutes record/playback
- Full confidence playback
- Built-in Time Code Generator/Reader
- TBC compatible
- Dolby C* and more...

The AU-A50 Field Edit Controller—
- One-event memory
- Serial interface capability (RS 422)
- Easy tape search
- Full edit functions and more...

The AU-MX50 Field Audio Mixer—
- Selectable 6 x 4 audio matrix
- Equalizer function
- Tone generator and more...

For more information or a complete list of features and functions, contact the MII representative nearest you.

*"Dolby" and the Double-D symbol are registered trademarks of Dolby Laboratories Inc.

MII Panasonic
Broadcast Systems Company

Call our field offices now:

Northeast: One Panasonic Way, Secaucus, NJ 07094; (201) 348-7671.

Washington, D.C.: (703) 759-6900.

Southeast: 1854 Shackleford Court, Suite 250, Norcross, GA 30093; (404) 925-6772.

Midwest: 425 E. Algonquin Road, Arlington Heights, IL 60005; (312) 981-7325/(317) 852-3715.

Southwest: 4500 Amon Carter Blvd., Fort Worth, TX 76155; (817) 685-1132.

Western: 6550 Katella Avenue, Cypress, CA 90630; (714) 895-7209.

Northwest: (408) 866-7974.

Circle 125 on Reader Service Card Page 59

www.americanradiohistory.com

THE ELECTION CONNECTION

When the final returns are in, your station will be a winner with automated election reporting.

BY EVA J. BLINDER

Scene: election night. With 53 percent of all precincts reporting, the only clear winner is confusion. The producer knows the lead has changed in a major race—but where's the updated data? Are those vote totals correct? Why do they add up to 200,000 when the community only has 100,000 registered voters?

As with any other situation where large amounts of rapidly changing data must be tracked and sorted, the solution to the election crisis lies with the computer. Makers of election reporting systems have taken advantage of the latest hardware and software advances to design systems that mediate between on-air displays and the flood of election results. The result: rapid, accurate results formatted to fit the user's needs and character generator, and all largely transparent to the operator.

Behind these straightforward interfaces lies a complex mix of technologies, borrowing from areas as diverse as spreadsheet software and telecommunications. The available systems for election reporting parallel each other closely, due to the similarity of the tasks they perform and the sources they access. Each, nevertheless, offers its own level of hardware power and its own set of software advantages.

The job of handling election data can be broken down into three basic steps: input, manipulation (involving such number-crunching functions as sorting, prioritizing and selecting specific data) and output. Input and output are handled similarly by virtually all election reporting systems.

On the input side, data is received from any (or all) of several possible sources and entered into the system via an RS-232 serial interface port. While election reporting systems vary in the number of inputs they support, all accept inputs in the same three general categories. The first is simple manual entry at a terminal or PC of results phoned in by reporters in the field. Many systems also allow input terminals to be located remotely and linked to the main system by modem.

Most election systems offer customized connection to the Secretary of State's election computer, in states where that service is offered. And all offer highly automated connection to the major election data services, such as the News Election Service and the Associated Press, that are available via dial-up modem connection. Subscribers access NES data with off-the-shelf modems operating at 1200 or 2400 bps; the AP provides its own dedicated modem. These national services adhere to the ANPA (American Newspaper Association) standard for transmission of election data, making standard interfaces possible.

On the output side, the sorted and totaled results must be displayed on a character generator for airing. In most cases, the actual display is designed first on the character generator, forming a template for the display of results. As results are tabulated and called up, they are entered into the appropriate slots of the display screen. A few systems offer variations from this "template" approach, such as control of fonts and colors from the election computer terminal. In most cases, however, control of the on-air look is left to the character generator.

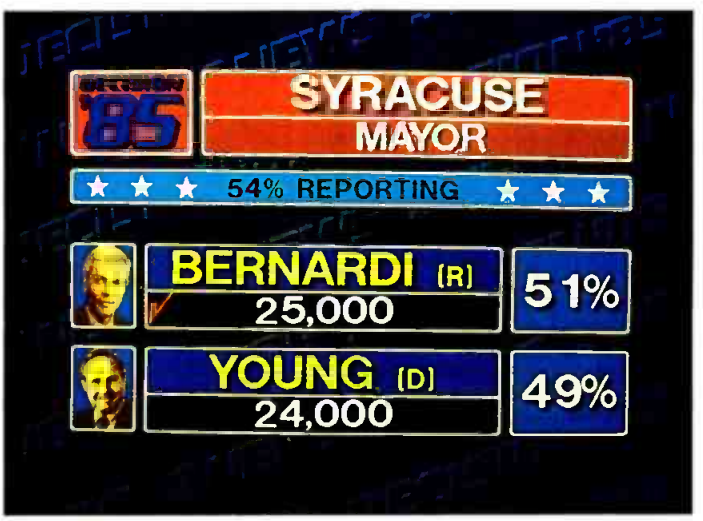
Virtually all third-party election computers interface to the popular Chyron CG line. Some of the more recently-introduced character generators, such as Quanta's Orion and Delta models and Abekas's A72, are not yet supported, but the manufacturers say they are working to help interface their machines. Abekas notes that the A72 has the ability to incorporate full-color pictures of the candidates, which can be resized at will. The device will also be able to incorporate animation into election displays.

A recent entrant into this field is

www.americanradiohistory.com

Dubner Computer Systems, which unveiled its 20KEL, a combination character generator and election reporting package, at the recent NAB convention. The reporting package's control over the CG is a little more extensive than most for the obvious reason that they share the same hardware. This configuration also allows the unit to be reprogrammed after the election for basic character generator use.

The 20KEL makes use of the computer in Dubner's 20K character generator, which is built around the Motorola 68020 32-bit microproc-



Above: Producer's screen of Leader system flags updated information in red for quick identification. Left: Leader's race setup screen allows user to define race format and tie information station needs to wire service slug lines.

www.americanradiohistory.com

essor. This computer does all the number crunching and data manipulation for the election reporting functions. Its substantial processing power and mass storage (via 10 Mbyte IOmega removable hard disks) allow it to handle up to 2000 races and 6000 candidates. For manual input, the system supports up to 16 entry terminals. Data input from the national services, however, is controlled by an IBM-compatible PC, which receives the incoming information and performs the initial selection and sequencing before sending it to the 20KEL.

The PC connects with the commercial source via a modem, using any standard terminal software. The operator then can alter, delete or reorder the downloaded information using a special built-in wordprocessor. The modified data is then sent to the serial port of the 20KEL.

The PC operator can also use the "K" macro language that comes with the 20K character generator to control CG functions. For instance, the operator can use a macro at the PC to change display colors or switch among rolls, crawls and pop-ons.

A Dubner spokesman notes that while the election package could run on the company's inexpensive 10K CG in theory, in practice such an application would be unlikely because of the 10K's limited storage capacity. No interface has been written to the company's high-end Graphics Factory product as yet, although Dubner will consider writing one if the demand materializes.

Another character generator manufacturer that offers a dedicated election package is BTS. The Vidivote election package is a hardware and software add-in for the Viditext II and Vidifont Graphics 5 that has its own 68000 processor and 512K of supporting memory. Because it runs on the same computer bus as the CG, it offers high data transfer speeds and quick updating of on-air displays. At the same time, its separate hardware allow the CG to be operated in parallel to the Vidivote.

Each race is assigned a unique message number by the system and updated instantly when new information is received or entered. Because the message number is the same for data entry and display, it is not necessary to use a separate step to update the race tables. The character generator display templates are resident in memory for increased speed and efficiency.

Vidivote supports up to 24 RS-232 input terminals with an external computer interface. It also offers a software package, Vidilink, that runs on an IBM-compatible personal computer to link Vidivote directly with the Associated Press election data service. The same hardware can be used for off-line entry of any kind of windowed or templated data, such as weather information. (BTS's Vidicast/Vidisports weather and sports reporting package runs on it as well.)

A few systems offer variations from the "template" approach, such as control of fonts and colors from the election computer terminal.

For information provided by state government computers, BTS offers a string manipulation software program called Vidiflex that allows stations to customize the Secretary of State data. Vidiflex will dial the Secretary of State's computer and download specific information in the order needed for use by Vidivote. It is flexible enough to compensate for the differences among the data formats of various states.

For NES and Associated Press election returns, Vidivote's Vidilink software buffers incoming data, then enters it into the Vidivote's database. User-entered tables correlate the information from the supplier with the user's needs, insuring that candidates' names, for example, are presented exactly as the station wants if that differs from the format on the newswire. As the vote comes in, Vidivote automatically sorts the data, figuring the percentage of precincts reporting and candidates' totals and percentages. Activity in the races being monitored is displayed on a separate status monitor. Up to 900 races can be followed at once.

Most election reporting systems talk to CGs from various manufacturers. Dynatech NewStar's new Leader election system, while marketed jointly with Chyron, is not limited to Chyron in its output interfaces. In addition to the Chyron 4 series and Scribe character generators, Leader presently interfaces with BTS's Vidifont Graphics 5 and has plans to support Quanta's recently introduced Delta and Orion.

Leader is basically a software package that runs on an IBM-compatible 80286- or 80386-based computer. It allows the user to track the progress of races via a series of producers' screens, each capable of displaying up to 20 races. Up to 99 different producers' screens are supported. Races may be grouped in any desired order on the producer's screens, which may be paged through one by one or jumped to directly. Each "race square" on the producer's screen shows the race title, subtitle, race number, time of the last update and last time aired.

The producer's screen flags race status via simple color-coding. An "inactive" race (i.e., one in which race totals have not changed since it last aired) appears in green. When updated information is received, the race automatically changes to red. If the lead changes in the race, the entire square will flash to alert the producer. The square changes back to the original green color as soon as the updated information has aired.

If additional detail is needed on a particular race, the operator can place the cursor over the race number and call up a screenful of detail with another keystroke.

While the Leader system talks to the Vidifont and Chyron 4 CGs using a standard template method, it takes a different approach with the Scribe, allowing the Leader keyboard to control the Scribe's output directly. This method speeds up the process considerably, according to the company; preview time is less than one second with the Scribe, compared to 3-5 second for the 4100 and 5-8 seconds for the Vidifont. With a computer terminal hooked up to the preview screen, the

www.americanradiohistory.com

user can preview a race with the touch of a button, then automatically swap channels, air the previewed race and preview the next race. In this configuration, Leader works interactively with the Scribe for streamlined, extra-fast operation. The user can build and change formats on the fly, with the system IDing important races for instant access.

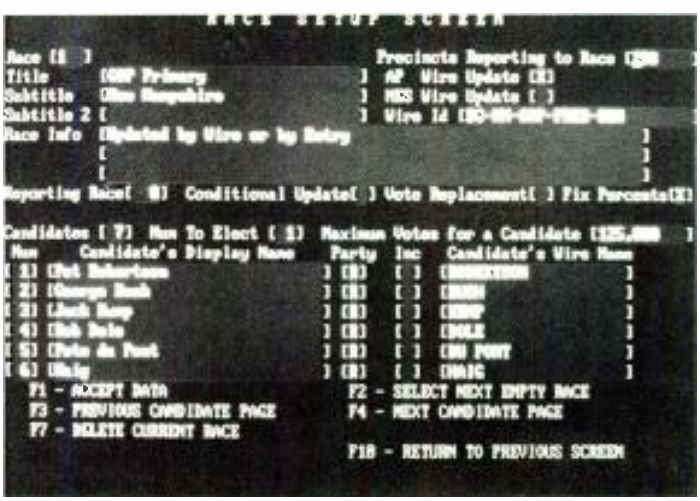
Media Computing of Scottsdale, AZ, also furnishes a dedicated election system known as ANGIS (for Automated News Graphics Interface System). ANGIS is available in different hardware configurations depending upon the user's needs, but all are built on off-the- shelf IBM-compatible MS-DOS personal computers linked with a local area network. According to the company, the typical installation is 12 to 20 terminals and a LAN. The maximum configuration varies according to the hardware selected. A company spokesman states that with a Novell network ANGIS can accommodate 100 terminals per server and can "easily" handle four servers. Media Computing will sell a software-only system if a station already has the hardware in place. Most users, however, will buy at least the server from Media Computing.

ANGIS supports the Aston 4 as well as Chyron's 4100 EXB, 4200 and Scribe CGs. Communication is through the CG's RS-232 serial port at 9600 bps. In Chyron-based configurations, it utilizes the off-line edit channel of the CG, leaving both CG keyboards free for other uses. This also allows information to be stored redundantly, on the Chyron as well as on ANGIS.

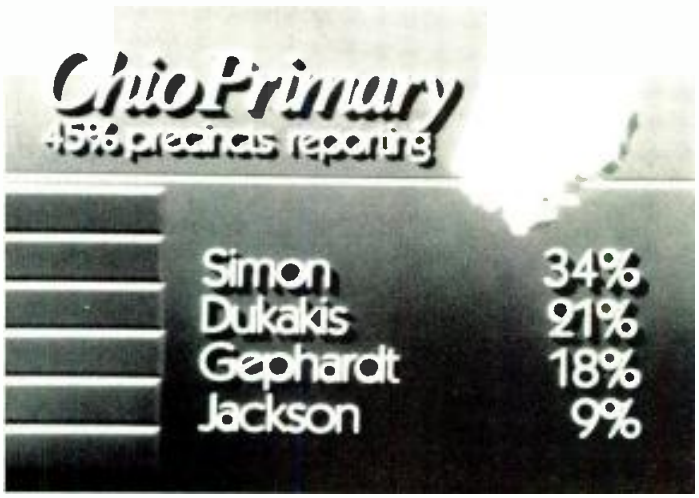
ANGIS allows the user to preprogram various data checks and validation routines. For example, the system will perform dynamic range checks to insure that if a race is set up in "replacement" format (where each update provides the latest total votes), the new number must be equal to or greater than the old one. It could also set a cap on the allowable range (for example, 90 percent of all registered voters). The spreadsheet-like data entry method allows the user to massage the numbers in a variety of ways and generate bar graphs.

The ANGIS producers' screens can be set up as desired by each producer, with as much or as little information on each race as the producer desires. At maximum, the screen can show the names of all races, percentage of precincts reporting, the candidates' names with number of votes and percentages, whether the candidates are incumbents or declared winners, if the leader has changed since the last review, time of the last update, and any associated character generator messages. If desired, the CG display can be time-stamped.

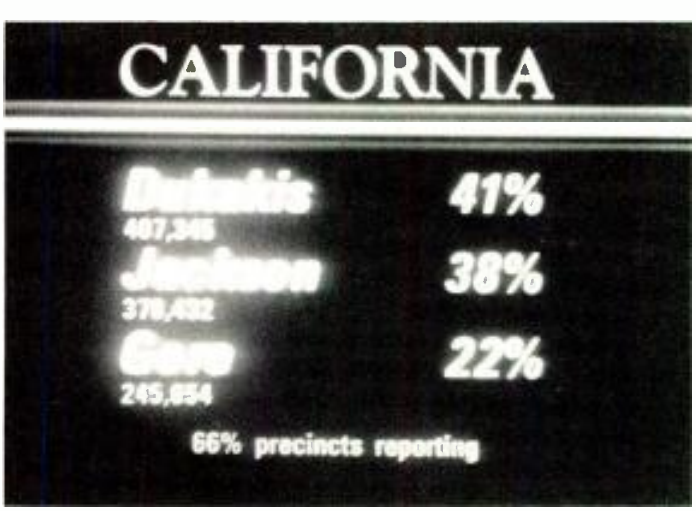
A slightly different approach to hardware is taken by Telesource Communications of Phoenix. Telesource supplies a complete hardware and software package built around an AT-type computer running at 10 MHz with 0 wait states. It is a multiuser system operating under XENIX or UNIX rather than MS-DOS. The system, which supports up to 16 users (eight users is standard), comes complete with the server, all cables, a printer and modem, and the system software. Terminals themselves are supplied by the user. The terminals are connected to the host



BTS's Vidivote is a complete hardware and software add-in for the Viditext II.



Chyron's Scribe antialiased CG interfaces with Leader, ANGIS, TUI and other election reporting systems.



Scribe Junior also offers election interfaces.

www.americanradiohistory.com

machine with a star connection. The system is delivered "preinstalled"; all the user needs to do is interconnect the cables and turn on the power.

An interesting wrinkle is that the Telesource system comes configured for standard MS-DOS applications as well. The system's 40 Mbyte hard drive is formatted half for XENIX/UNIX, half for MS-DOS, and will boot from either partition, according to the company.

Telesource presently supports all Chyron models including Scribe, the VP-1, 4100, 4100 EXB, 4200 and RGU; Dubner; Vidifont; and some of the older 3M CGs. The company also interfaces to Quantel, ADDA and Harris Iris still store systems, allowing the user to bring up background stills and lay down election results simultaneously. An interface for the Ampex ESS still store is in the works, according to a spokesman.

Any system function operates from any terminal, and the terminals can be located remotely or colocated with the host.

Any number of producers' screens can be defined, each with 40 races that can be paged through nine pages at a time. Changes are indicated in real time, with updates indicated by a flashing window with the time and number of precincts reporting in reverse video. If the lead changes, this is also indicated by flashing.

If raw hardware power is essential, a system built around a minicomputer may be the answer. One such system is offered by TUI Computer Services of Nashville. TUI's NewsTech system is based on a BTI timesharing minicomputer with a proprietary operating system that is resident and hardware-dependent. A basic system includes a refurbished minicomputer (waranteed for 90 days, 30 Mbyte hard disk driver, 10 Mbyte tape backup system, eight RS-232 communications ports, election software user license, runtime license for the BTI- format MARS database management system and three days of on-site training and installation. Options include extra ports, faster drives, and a new (rather than refurbished) BTI minicomputer.

The multiuser operating system supports up to 40 users at one time, with each CG, modem and terminal on its own port. Each port is recognized as a separate entity and serviced in a timesharing fashion by the host. The system can also handle multiple outputs to update more than one CG at a time. Originally developed for CNN, NewsTech was used there on Super Tuesday to update four Scribes simultaneously. It interfaces directly with the Chyron 4100 and Scribe CGs.

NewsTech can handle 100,000 races at once with more than 20 candidates per race and up to one billion votes per candidate. It can classify candidates as declared winners, incumbents or favorites, and by party affiliations. Its update capabilities are flexible and powerful and it can handle, for example, a variable number of items per page, multiple pages per race, or a variety of formats within a single race, all automatically.

The 20KEL's processing power and mass storage via 10 Mbyte IOmega removable hard disks allow it to handle up to 2000 races and 6000 candidates.

The NewsTech producers' screen is organized into three levels. The first offers a race-by-race rundown, the second screen a line-by-line summary of a series of races showing the top two contenders with their respective vote counts and percentages. It also reports if there is a declared winner or lead change since the last update, and the time of the update. The third producers' screen summarizes all races, up to 76. The system can track up to 999 races.

NewsTech incorporates the capability for reporter roll-bys, allowing reporters to pull up a particular race or series of races at any time.

Another minicomputer-based system is available from Data Center Management (DCM) in Charlotte, NC. Built on a DEC PDP-11 platform, this multiuser system handles from two to 30 terminals and interfaces to Chyron Scribe, 4 series and VP-1 CGs and Dubner character generators. (The company is at work on a Vidifont interface.) Because the system uses the keyboard interface of the Chyron, rather than the offline port, it can interface with older Chyrons that lack the offline input.

DCM's system offers a special "slave terminal" display for on-air talent that provides supplemental information automatically coordinated to the character generator display. The system provides automatic sequencing of on-air race displays with automatic step-through and a choice of full-page or lower third displays. It will automatically update race information from wire services, and offers special polling programs to access county and state computers for race result. Winners may be flagged automatically or manually, and the company will custom program the system. An interesting capability is the special inquiry display, which allows the user to set up a display of the latest election results in a public place, perhaps as a PR venture. The same facility may be used to sell the race results to a local radio station. ■

Blinder is senior editor of BME.

For More Information

on manufacturers, products, and services discussed in this story, use the Reader Service Card.

BTS (Vidivote) . . 275	**Dubner Computer Systems . . 278**	**Media Computing (ANGIS) . . . 280**
Chyron Corp. 276	**Dynatech Newstar (Leader) . . . 279**	**Telesource . 281**
Data Center Management . . . 277		**TUI (NewsTech). 282**

www.americanradiohistory.com

NEW IDEAS IN TBCs

Once thought to be a dying breed, standalone TBCs are coming to play a vital role in integrating diverse tape formats.

BY CRAIG J. BIRKMAIER

"Prediction: By 1985, the standalone TBC and its accessories will have disappeared as standalone products. Instead they will be offered as standard built-in or optional plug-in modules by video recorder manufacturers." This bold statement, made in 1981, was actually on its way to becoming truth. Yet, as it turned out, nothing could be further from the truth. It is true, of course, that all major manufacturers of VTRs now offer accompanying plug-in card TBC modules, and in a perfect world these would be all that is required. But who could have foreseen that there would be more than a dozen incompatible videotape formats on the market, and that integrating them all would become an engineering nightmare?

The problem is that video recorder manufacturers have optimized integral TBC's to such an extent that they have become machine specific. Advanced features such as slow motion and time compression/expansion only work with the TBC designed for that machine. And, in an era of tight budgets, many operations are using equipment that is not strictly "broadcast quality."

Thus, rather than becoming extinct, the standalone TBC has evolved. In fact, it is becoming the genetic link between the generations of video recording equipment we have grown up with, and their prodigious offspring.

The major factor that has kept the market for standalone TBCs viable is that they are essential for the production of a quality video product—espe-

Microtime's new Tx4 S-VHS TBC provides for Y/C input and output and U-Matic dub mode.

Birkmaier is a product designer and marketer. He heads up Professional Products and Promotions in Gainesville, FL.

www.americanradiohistory.com

TBCs

cially when graphics and special effects are required, and for hard-pressed news organizations which find themselves handling everything from analog component to quad to U-Matic to S-VHS.

Traditionally, the TBC took NTSC video in, and spit it back out with clean blanking intervals, reduced velocity errors and less noticeable dropouts. The new generation of TBCs still talk NTSC, but they have become multi-lingual. Newspeak for the TBC, now includes Y/C (at 688 or 629 kHz), and Y, R-Y, B-Y. Typically, the new generation of TBCs take in composite video and both types of Y/C signals. On the output side, the Y, R-Y, B-Y signals are added for compatibility with the component half-inch formats.

This means that virtually any format can be mixed with any other format, to create the hybrid system that is "right" for your application. Perhaps of most significance, both broadcast and professional video users can take advantage of S-VHS, and integrate it with their existing small-format and one-inch component.

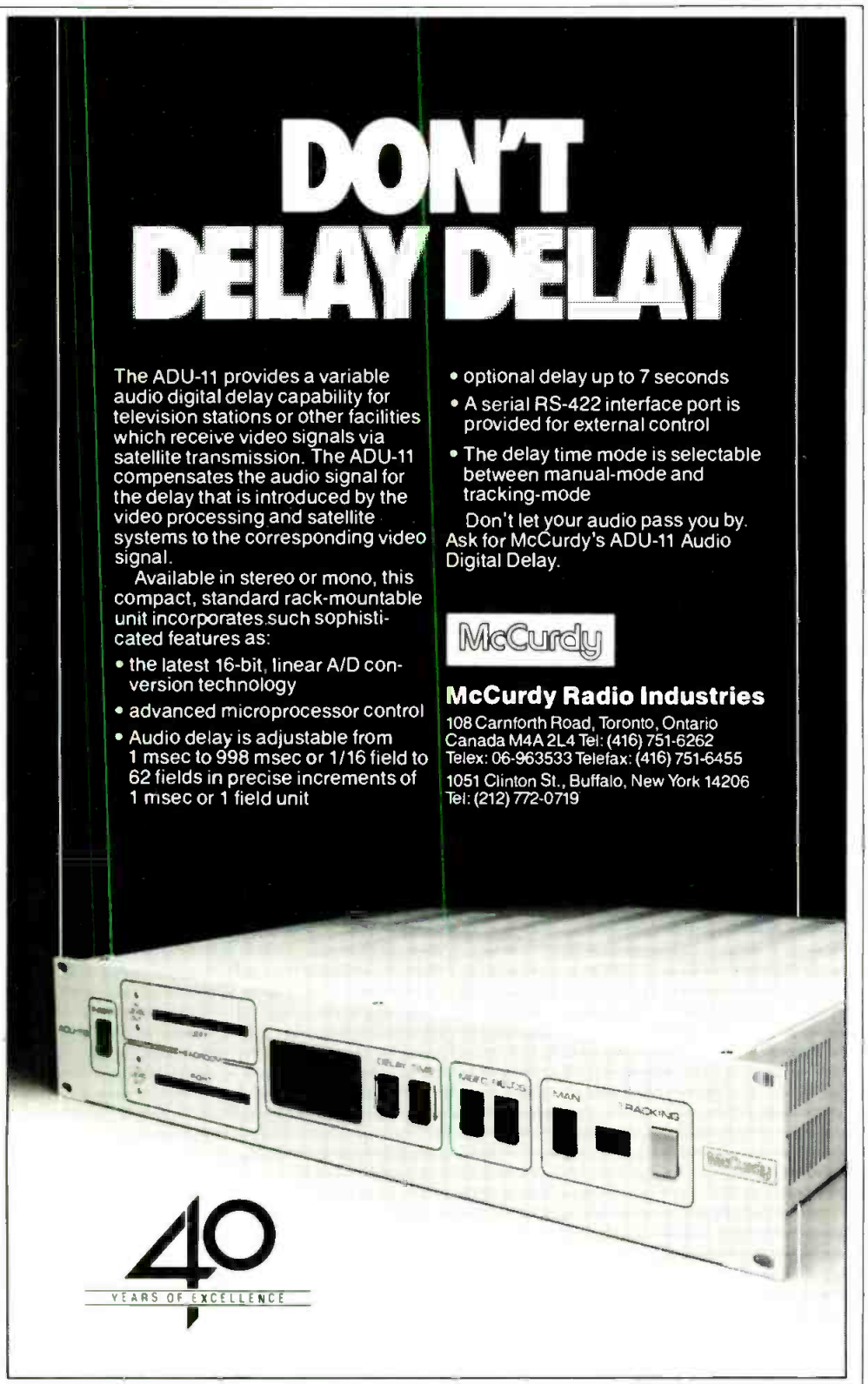
The evolution of TBCs into special effects devices is another story unto itself; the result of synergy with the digital technology that makes the TBC possible. This aspect of the TBC is beyond the scope of this article.

For the large production or broadcast facility, the proliferation of VTRs and their associated TBCs (built-in or standalone) provides unique problems. In particular, a machine may be assigned to one of several edit bays, production control rooms, or a master control facility.

Even in a self-contained edit suite, working with multiple cassettes, or tape reels, requires re-setting the TBC for each tape.

Now, there are several new systems available that take advantage of digital control technology to make your life easier. They involve two basic principles: remote control assignment of a TBC to various control locations; and memorization of the TBC settings for the various reels used in an edit session.

The HUB 1000 TBC control system from Zaxcom Video, for example, provides a comprehensive solution to the delegation of TBC control in a large facility. The system is based on an RS-422 local area network, with many similarities and ties to the proposed SMPTE ESbus control standard. The Hub controller interfaces with local TBC control panels at the machines, that interface to virtually any built-in



Circle 126 on Reader Service Card Page 59

www.americanradiohistory.com

TBCs

or standalone TBC. Machines can be assigned to remote control panels in the edit bays or control rooms. Currently the system can support as many as 64 TBCs and 8 remote control locations.

The real magic occurs at the remote panels, which provide control of all TBC functions and 15 memory registers for each machine that is controlled. These registers can be programmed for the set-up that relates to a particular "reel," and can also be used to modify the TBC settings in real time during a production (any individual, or all TBC settings can be changed simultaneously).

Broadcast Video Systems offers the DS-600 Digital Store that can be used to memorize control settings for any device that has a parallel remote control port. Primarily used with color correctors, this device can be used with TBCs to memorize "reel" setups. The DS-600 uses a looping parallel control connection scheme, with the ability to store 16 switch settings and 16 analog settings. The analog values must be within a range of +/- 10 V. The system has a temporary buffer, and 1000 pages of memory (each set-up is a page).

The big news in standalone TBCs introduced at the recent NAB is the ability to integrate S-VHS with other formats that may already exist in your facility. Every manufacturer of standalone TBCs introduced a new product or upgraded an existing product to take advantage of the S-VHS format.

In addition to the already wide field of companies offering TBC products, a few new names joined the fray this year.

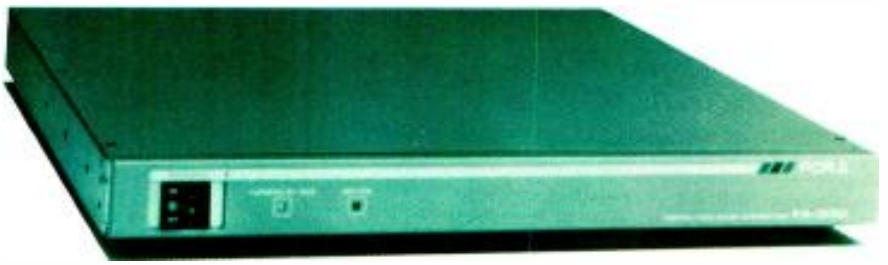
AMX Corporation, entered the market with the introduction of the ATS-550, a infinite correction window TBC with field or frame freeze capability. The unit offers conventional composite video inputs and outputs in addition to Y/C 3.58 input/outputs for S-VHS and ED-Beta.

Another new name to the TBC market is Digital Processing Systems of Ontario, Canada; however they are not a new face. Scientific Atlanta decided to divest the studio products division of Digital Video Systems, a long time player in the TBC market. The studio products people formed Digital Processing Systems and purchased the existing studio products of DVS. DPS brings a full line of digital products to the marketplace, including: two TBCs; a TBC/framestore; a frame synchronizer, and sync/test signal generator. Their new product at NAB was the DPS-270, which uses component processing of both direct color NTSC video and S-VHS inputs.

Thus, rather than becoming extinct, the standalone TBC has evolved; it is becoming the genetic link between generations of video recording equipment.

Broadcast System Design is offering the Model 501 TBC which includes some unique video processing features as well as the ability to handle virtually any heterodyne VTR input/output. Inputs and outputs include composite video, Y/C 3.58 (S-VHS four-pin), Y/C 629 (S-VHS dub), and Y/C 688 (U-Matic dub). The video processor introduces several controls that are new to TBCs, allowing "after the fact" white balance of your recorded video. In addition to chroma level and phase, adjustments are provided for the chroma I-axis and Q-axis. A luminance EQ control is provided to enhance the functioning of luminance setup and gain controls.

FOR-A added to its existing product line of TBCs and TBC/Effects generators with the introduction of the FA-300 S-VHS TBC. The unit offers composite or Y/C 3.58 inputs and outputs as well as Y, R-Y, B-Y outputs for use with component half-inch formats. A CCD digital delay line allows for correction of chroma to luminance delay.



The FA-300, the latest TBC from For-A.

The Fortel Super Pro 200.

Fortel introduced the SuperPro 200, a multiformat video processor compatible with most 3/4- and half-inch recording systems. The processor provides interformat transcoding, picture enhancement, dynamic tracking with high speed viewable shuttle, infinite window timebase correction and frame freeze functions.

Hotronic enhanced the AE61 TBC line with the AE61S which provides a Y/C 3.58 input and output for S-VHS,

www.americanradiohistory.com

TBCs

The big news in standalone TBCs is the ability to integrate S-VHS with other formats that may already exist in your facility.

in addition to handling composite heterodyne inputs. The unit offers component processing and Y/C delay compensation.

Lenco, know primarily for sync generators, encoders, and modular video distribution equipment, introduced a new modular rack frame system with a unique new module—the Starflex 4500 digital frame synchronizer/TBC. The two-rack-unit modular frame accepts a variety of timing and distribution modules, and can accommodate up to four frame sync/TBCs in a frame. The unit accepts one composite video input from any heterodyne VTR and offers frame freeze capability.

New from Microtime is the Tx4 component TBC. The unit can handle composite video Y/C 3.58 (S-VHS) and Y/688 (U-Matic dub) inputs, and provides all of these outputs as well as Y, R-Y, B-Y outputs for integration with 1/2-in. component formats. The Tx4 offers chroma noise reduction and Y/C delay compensation. A full frame

STANDALONE TBC COMPARISON CHART

Manufacturer	Model	Correction Window	Inputs				Outputs				
				Y/C 358	Y/C 629	Y/C 688		Y/C 358	Y/C 629	Y/C 688	Y,R-Y,
			NTSC	S-VHS	S-VHS	U-Matic	NTSC	S-VHS	S-VHS	U-Matic	½" C
Alta Group	Cygnus	Infinite	✓	—	—	—	✓	—	—	—	—
AMX Video Products Div.	ATS-550	Infinite	✓	✓	—	—	✓	✓	—	—	—
Broadcast System Design	Model 501	16 lines	✓	✓	✓	✓	✓	✓	✓	✓	—
Digital Processing Systems	DPS-170	16 lines	✓	—	—	—	✓	—	—	—	—
	DPS-175	Infinite	✓	—	—	—	✓	—	—	—	—
	DPS-270	16 lines	✓	✓	—	—	✓	✓	—	—	—
FOR-A	FA-300	Infinite	✓	✓	—	—	✓	✓	—	—	✓
	FA-410	16 lines	✓	—	—	—	✓	—	—	—	—
	FA-400/420	Infinite	✓	—	—	—	✓	—	—	—	—
	FA-440	Infinite	✓	—	—	—	✓	—	—	—	—
	FA-450	Infinite	✓	✓	✓	✓	✓	✓	✓	✓	✓
Fortel	SP-100	16 lines	✓	✓	—	—	✓	✓	—	—	—
	DHP 525S	Infinite	✓	✓	—	—	✓	✓	—	—	Op
	Turbo 2	Infinite	✓	—	—	✓	✓	—	—	✓	✓
	SuperPro 200	Infinite	✓	✓	✓	✓	✓	✓	✓	—	✓
Hotronic	AE-61	16 lines	✓	—	—	—	✓	—	—	—	—
	AE-61S	16 lines	✓	✓	—	—	✓	✓	—	—	—
	AF-71	Infinite	✓	—	—	—	✓	—	—	—	—
Lenco	TBC-450	16 lines	✓	—	—	—	✓	—	—	—	—
	Starflex 4500	Infinite	✓	—	—	—	✓	—	—	—	—
Microtime	Tx4	Infinite	✓	✓	—	✓	✓	✓	—	—	✓
	T-300	35 lines	✓	—	—	—	✓	—	—	—	—
	T-320	35 lines	✓	—	—	—	✓	—	—	—	—
	T-320D	Infinite	✓	—	—	—	✓	—	—	—	—
Nova	700	32 lines	✓	—	—	—	✓	—	—	—	—
	700S	32 lines	✓	✓	—	—	✓	—	—	—	—
	511	32 lines	✓	—	—	—	✓	—	—	—	—
	620	Infinite	✓	—	—	—	✓	—	—	—	—
	620S	Infinite	✓	✓	—	—	✓	—	—	—	—

www.americanradiohistory.com

TBCs

of memory is provided for field or frame freeze, and an optional remote control panel offers a wide range of digital effects when used with a production switcher (a key output is provided for effects integration).

Nova Systems, one of the first companies to offer S-VHS TBCs (the full featured 620S was introduced last September) added the 700S to their product line at NAB. The 700S adds S-VHS inputs to the popular Nova 700 TBC which handles composite heterodyne inputs. Existing Nova 700 users can have their units upgraded to 700S capabilities at the factory.■

The Nova 700S is the second S-VHS offering from the company, making multiformat integration a reality.

DOC	Internal Sync Gen	Image Enhancement	Remote Capability	Special Effects	Special Features	Rdr. Svc. Number
✓	✓	✓	✓	✓	4 inut stereo audio and video routing switcher	220
—	✓	—	✓	—	Black burst output, freeze	221
✓	✓	✓	?	—	"After-the-fact" white balance	222
✓	✓	—	—	—		223
✓	✓	—	—	—	Freeze	224
—	✓	—	✓	—	H and VY/C delay compensation	225
✓	✓	✓	✓	—	Freeze	226
✓	✓	—	—	—		227
✓	✓	—	✓	—		228
✓	✓	—	✓	✓	¼ screen compress, posterization, mosaic	229
✓	✓	—	✓	—	MII inputs, transcoding to/from RGB	230
—	✓	—	—	—		231
✓	—	✓	✓	—	Freeze	232
✓	—	✓	✓	—	Dynamic tracking, freeze	233
✓	—	✓	✓	—	Dynamic tracking, freeze	234
Opt.	✓	—	—	—		235
Opt.	✓	—	—	—		236
Opt.	✓	—	—	—	Freeze	237
✓	✓	—	—	—		238
—	—	—	—	—	Freeze	239
✓	✓	—	✓	✓	Freeze, special effects remote option with key out	240
—	✓	—	✓	—		241
✓	✓	—	✓	—		242
✓	✓	—	✓	—	Dynamic tracking, freeze	243
—	✓	—	—	—		244
—	✓	—	—	—		245
✓	✓	—	✓	—		246
✓	✓	—	✓	—	Freeze	247
✓	✓	—	✓	—	Freeze	248

www.americanradiohistory.com

Once again, S
the art of cuttin

Leave it to Sony to keep the simplicity of a childhood art form in the sophisticated art of video editing.

For the fact is, we've made technological advances that have added both precision and speed to editing, without adding complexity. And that holds true for all our editing control units.

The Sony RM-450, BVE-600 and BVE-900 clearly demonstrate this approach. They all share Sony's operating feel and philosophy. For one thing, they all share key common features. Such as Auto Detect, which automatically identifies the type of Sony VTR being used, and automatically sets the appropriate control parameters through its RS-422 serial control port.

In addition, they also share the ability to read Control Track and Time Code. As well as the ability to perform video/audio split edits. Yet they also offer a range of other features to accommodate every budget.

For two machine editing, you don't have to think twice. It's the Sony RM-450.

Two-machine editing has never been as smooth, effortless and flexible. The RM-450 comes equipped with both 33-pin and 9-pin RS-422 remote control interface connectors, for comparably equipped VTRs.

What's more, mixed operation is possible using any combination of 33-pin and 9-pin VTRs.

The RM-450 can work with Time Code based editing (with 9-pin VTR connections) as well as CTL editing. It will also do split audio/video edits.

In fact, every aspect of the RM-450 has been designed for stress-free operation. This includes a keyboard layout which allows for a minimum of key strokes, a JOG/SHUTTLE dial on both the player *and* recorder side for convenient search, and dynamic tracking operation, and more.

Indeed, it is difficult to think of a dual-VTR editing task for which the RM-450 wouldn't be perfectly suited.

RM-450

The BVE-600.
A/B Editing from A to Z.

The BVE-600 goes beyond the capabilities of the RM-450 to offer three VTR control (two players and one recorder). This makes A/B roll editing possible, when used with the optional plug-in video switcher boards and an external MXP-29 Audio Mixer. With either composite or component/composite boards in place, you have dissolve, wipe, superimposition at your fingertips...with no

www.americanradiohistory.com

ony elevates g and pasting.

BVE-600

need for an external video switcher.

In short, there is simply no more adaptable, efficient tool for use with U-matic® and Betacam® VTRs than the BVE-600.

The BVE-900. Created to be at home in any post-production house.

The BVE-900 was created with a clear strategy in mind: design the most expandable, easy-to-use, economically sound editing system possible. And make it meet Sony's rigorously high standards, and your high demands.

This editing control unit controls up to four VTRs in any A/B roll edit, enabling you to perform sophisticated editing chores like sync roll, sync play, and more.

The BVE-900 gives you sweeping control of video switchers; and of audio mixers, including fader selection and VCA control, for automated split audio/video edits.

And all this control is easily controllable, through a simple-to-master keyboard and easy-to-read menu driven display. It's technology that fosters creativity, rather than thwarting it.

Beyond any individual feature, all Sony editing control units are built with a full recognition of your post production demands. That's why all our units, when connected to Sony VTRs, switcher, audio mixer and video monitors, form a *system* which is capable of satisfying the most difficult editing needs. Yet if you need help or service, you only have to remember one name, Sony. What could be more convenient and efficient than that?

For more information about Sony's entire line of editors, write to Sony Information Center, P.O. Box 6185, Union, NJ 07083. There's a lot more to learn about the editing control units that bring new technological innovation and performance to cutting and pasting.

SONY

Professional Video

©1988 Sony Communications Products Co., a division of Sony Corp. of America, 1600 Queen Anne Rd., Teaneck, NJ 07666. Sony, U-matic, and Betacam are trademarks of Sony.

BVE-900

www.americanradiohistory.com

COMING SOON TO A STATION NEAR YOU—

DIGITAL AUDIO

WORKSTATIONS

www.americanradiohistory.com

Almost everyone agrees that digital recording in radio stations, particularly for production, is not a question of "if" but "when." And according to some industry visionaries, when it does come, digital audio will explode out of the production studio into on-air and full-station automation applications.

It is also a question of "how." For it looks as though digital audio will bring about a two-tiered market. On the one hand, smaller stations will replace different aspects of the analog process such as signal processors with digital equipment. On the other, larger-market stations, and stations with money to spend on capital investment, are looking not only at digital recording capability on tape or other media but toward hard-disk-based "full digital" stations based on systems such as New England Digital, WaveFrame, and the IMS Dyaxis.

What is bringing about this rapid change in thinking about digital audio in radio stations? Until now, cost has been a major factor precluding its adoption by the radio industry. But now initial development costs for hardware, software and storage technology have been absorbed, in large part, by the computer industry—which has acted as a proving ground for innovations in the technology. Thanks to open-architecture, a proliferation of competitive activity in the digital audio workstation area and economies of scale in application R&D and manufacture, digital audio recording-plus may soon fall within reach of radio broadcasters.

There will be economic limitations, however, because the digital audio industry agrees that the cost of microcomputer development and manufacture has gotten about as low as it can go. The cost of hard disk, floppy disk and magneto-optical technology is not expected to decline much further at this point, and the industry itself is already looking toward the big-ticket erasable optical disk as a storage medium.

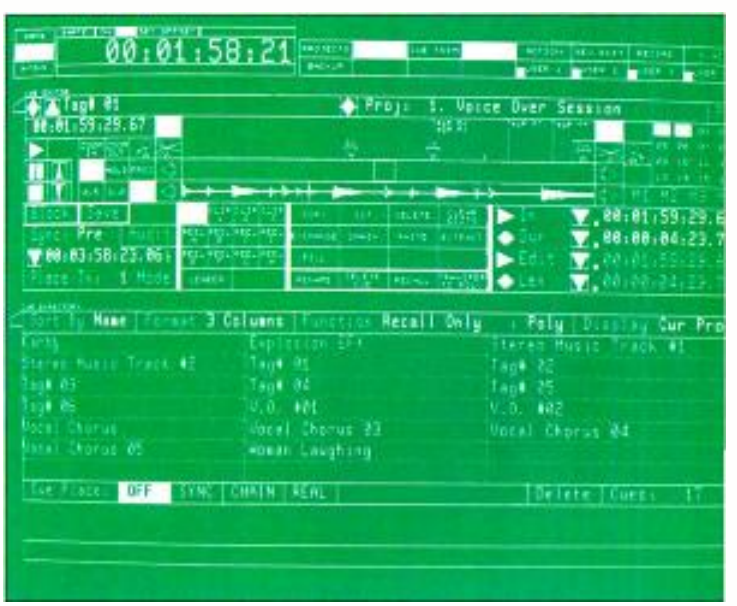
The fact that digital audio equipment costs may not get much lower will have a marginal impact on market development, according to normally conservative systems integrators who must interface the new technologies with existing systems. Duke McLane, senior VP of marketing for Media Touch, which is currently installing a 12-system touchscreen all-digital integration network for Muzak headquarters in Seattle, thinks that during the next 12 months, people will explore digital mass storage but postpone a full commitment.

"We feel digital technologies will be very prevalent within a year and will take the place of present playback technologies within five years," the Media Touch executive said.

McLane, whose company can interface hard disk and R-DAT capability through a buffer for on-air accessiblity in real time, feels that R-DAT and hard disk will be the leading transitional technologies.

Unless the "wait and see factor" slows the industry down, McLane also feels that optical laser technology will be a major part of the mix within five years.

In the beginning, digital audio workstations were developed to record and manipulate music, dialog and special effects. Primarily hard-disk based, most systems originally featured a music-industry-oriented synthesizer-style keyboard interface. With the addition of computer-based keyboard panels often based on or incorporating such "user-friendly" items as the IBM PC, the Apple Macintosh click-and-touch display screen and mouse, and in one case NAB cart-style technology, the workstation ap-



Menu screen for New England Digital's PostPro digital audio workstation.

Radio broadcasters are asking for mass-storage technologies and magnetic, optical and hard-disk media that can do it all—but at the right price.

BY BETH JACQUES

www.americanradiohistory.com

proach has become more accessible to the radio industry.

The goal now is to broaden workstations from a state-of-the-art radio production tool to an engine which drives the all-digital station. According to Mark Terry, director of marketing for workstation manufacturer New England Digital, the future of digital technology in the radio station is a system that is totally integrated from the front-end to the back-end of the studio.

"The 'whole station' concept is why the digital audio workstation will be the end format," he says. "Consider the ability of the workstation to produce finished material such as advertisements, voiceovers or in-house programming material quickly, store the original and all variations, maintain original-generation quality, put it on the air, and then send information to the back-end so that accounting knows the commercial has run and an invoice can be generated or a royalty should be sent to ASCAP.

"We are commited to fidelity, but fidelity in and of itself doesn't justify the cost of digital audio. The other half of the equation is random access and integration capability," he said.

According to Terry, better fidelity is the primary benefit of digital ATRs, some CD players, and DAT (which also offer some random access capability), and of improved traditional analog via high-quality cart machines that incorporate Dolby noise reduction. "But random access adds new functionalities and profitabilities," Terry emphasizes. NED's eight-track Direct-to-Disk system starts at $90,000.

Craig Damon, a radio production consultant for digital audio equipment manufacturer WaveFrame, feels that audio quality should be broadcasting's most important issue. "How much coverage a radio station gets depends on how much noise it generates," Damon says. "There is no noise with a digital system. Top-market stations are already going digital. It's going to be a thing of the near future."

Damon further feels that price comparisons between digital audio workstations and high-quality analog are red herrings. "Some stations spend $18,000 and it sounds like it," he says, pointing out that a good two-track ATR will cost around $12,000, a mixer for radio will also cost $12,000, and the addition of synthesizers, harmonizers, pitch transposers, reverbs, hook-up and room design will rapidly boost the final price tag to $150,000—well within the range of a "whole station" digital audio workstation. "In the long run, putting together pieces costs just as much," he says. "The price/performance ratio is really a marketing concern—in radio, quality of performance has to be the most important issue."

Digital audio workstations share advantages in addition to low-noise digital sound and "whole station"

Top: Andy Laird, VP engineering for Heritage Media Group, labeling a CompuSonics digital audio cart disk.

Middle: The Otari DTR-900 32-track digital ATR. Too expensive for radio?

Bottom: Sony's PCM-2500 professional DAT recorder can be used for satellite uplinking and downlinking.

APPLICATION-SPECIFIC DIGITALIA

Some new digital application-specific, and hence generally more immediately affordable, products are another way for radio to make the transition to the digital studio.

IMS' Dyaxis "personal" audio workstation uses third-generation Macintosh computers and transfers stereo or mono direct-to-disk in real time. Its mass storage system can store two and a half hours of 16-bit stereo audio.

Australian firm Southern Broadcasting's Digital Audio Mass Storage (DAMS) system is available through Media Touch. It can function as a high-capacity digital cart machine. Based on Winchester drives, it offers full memory redundancy and about 100 minutes of full-fidelity stereo audio.

Other products include Orion's digital console—which now uses digital processing to control analog sound but has been designed to be upgraded to handle full digital sound when digital processing becomes less expensive—and Broadcast Electronics' DV-2 digital voice recorder/reproducer, which offers six minutes of recording time. BE says the system is used most for weather information, call-in information services, capture and time-shift of network audio feeds and production sound effects.

www.americanradiohistory.com

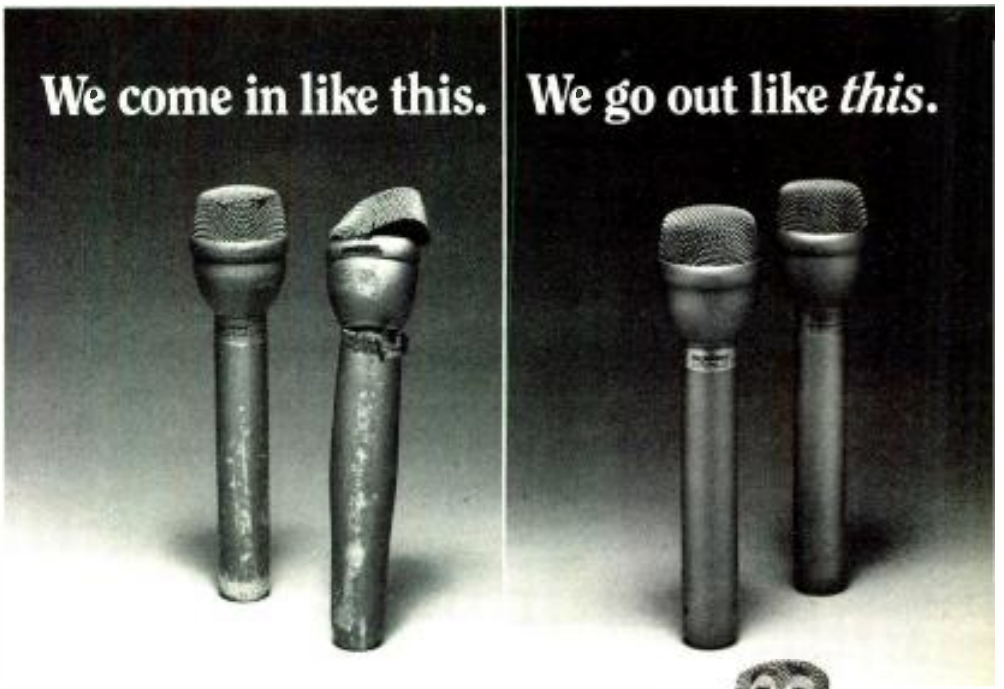
applications including playback, automation, central interface and control and logging. In the production process, DAW boosters cite nondestructive edits, fast random access, mass storage capabilities and no multigenerational loss. This translates into flexibility, time saved and the preservation of full digital audio quality whether one is customizing local advertisements or crunching for the morning zoo.

While there are many advantages to the DAW concept, however, there remain some questions. These include a general lack of "user friendliness" (it can take months to learn how to operate one of these systems), the lack of a skilled labor pool, the cost of storage time and software—in addition to the initial big-ticket hardware setup—and reliability, maintenance and manufacturer support. Another key issue is the transportability of digital programming—from satellite, a programming service, an in-house music library, or just physically from the production studio, a remote site or to another station in the chain.

Nevertheless, some of the industry's pioneers are treading boldly. Gannett Radio Division director of engineering Paul Donahue is overseeing New England Digital installations in the production studios at KIIS-FM, Los Angeles, and WGCI AM/FM, Chicago. KIIS-FM will run the country's first "whole station" on-air test in September. Limited first to one break, the interplay will draw from CD music stored on Winchester drives or on the station's own 11-inch optical disk, a Columbine log, and a selector to generate 100 percent digital music.

"We're strong believers in the digital audio workstation," Donahue says. "In its current form, one-time sampling sounds better than analog. The quality is better, the S/N is better, there's less distortion—that's important even with the 15 kHz cap. After three-times sampling the DAW just shines."

Donahue also praises the DAW's nondestructive edit capability, which he says offers an immediate pay-off in increased productivity. He also says a DAW is a simpler system to visualize and use than multitrack production, citing the increased flexibility of audio event editors which can handle



That's what the Electro-Voice unconditional warranty means to us broadcast microphones.

It's tough being a broadcast microphone. You get dropped, smacked into walls, rainsoaked, sunbaked, bumped by gesturing hands, and flung unceremoniously into equipment cases. Bruises, scrapes, and contusions are all in the day's work.

The EV Warranty: New life for broken microphones:

Those of us who are Electro-Voice broadcast mics can at least look forward to some T.L.C. applied by the skilled hands of EV service experts – **at no cost whatever, if we're less than two years old.**

And, whatever our age, EV mics are protected against acoustic system malfunctions due to workmanship or material defects – with a few qualifications, of course.

But what if you're **not** an Electro-Voice microphone? Well, tough, pal. And better luck in your next recycling.

The incomparable EV loan-for-trial policy

Another great thing about being an EV broadcast microphone: we get frequent auditions for new, challenging roles. Any qualified user or buyer of professional microphones can take us out – from an EV professional dealer – to see how we perform. Without charge or obligation.

Is it any wonder we Electro-Voice broadcast mics are so popular? We give you peace of mind, backed by the industry's strongest warranty. Plus risk-free trial. Can you blame us for feeling a bit, ah, superior?

Electro-Voice®
a MARK IV company

BROADCAST/PRODUCTION MICROPHONES
Quality-made in the U.S.A. since 1927
Circle 128 on Reader Service Page 59

www.americanradiohistory.com

Orion Newsmaker audio mixer. It can be used for both radio and TV applications.

more tracks than a conventional eight-track ATR.

As for user-friendliness, Donahue likes NED's ability to let users scrub across a screen and click in at edit points with a mouse. "There are several systems out there which are as good," he says. "I won't kid you—the learning curve has been difficult for us, but the results always seem to be better. It's now hard to justify editing tape."

CompuSonics's self-styled "Chevy" price tag and combination of production/broadcast digital capability has already attracted a number of supporters. Combining digital recorders, playback units and hard-disk storage peripherals via magneto-optical technology, Bernoulli drives and its own computers, CompuSonics features removable cartridge disks specifically designed for on-air broadcast.

"We originally thought there were two different types of systems broadcasters needed, on-air and production," says CompuSonic's chairman David Schwartz.

"We designed and sold a $35,000 fixed-disk system, but broadcasters told us the systems must be unified and they must go on-air," he says. "We got so much criticism about dual types of media that we developed the removable system so we could go on-air."

He points out that two Tokyo radio stations with CompuSonics hard-disk on-air capability have yet to publish reliability figures. The company is currently issuing licenses broadly because it is trying to establish its format as a worldwide industry standard. "We know our equipment is reliable because stations have been on the air with it for a year," he adds.

Instructed by the industry to be price competitive with "a good Ampex two-track ATR," CompuSonics' basic production installation costs $12,000, which includes a front-end controller, software and a Macintosh, delivering 45 minutes of stereo audio at 15 kHz bandwidth. Seven minutes of stereo audio are available on removable cartridge disk; the on-air playback decks take the disks but use the company's own on-board computer system. Systems are currently in place at KDAY-AM, Santa Monica, and KLUC-FM, Las Vegas, where Jay Pierce, chief engineer for Nationwide Communications, uses the system like a cart machine.

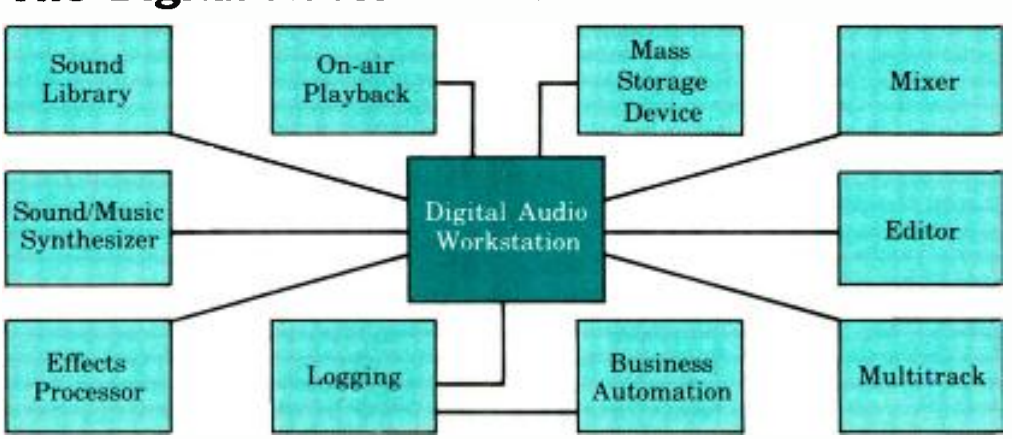
"Most of our DJs and production people have taken to it," he says, adding that his Otari reel-to-reel ATRs in production still get heavy use because of the reel-to-reel format. "Some of our on-air people who get into multitrack work are using the CompuSonics to edit, but the ones who didn't like production to begin with aren't touching this either."

"This is a practically-priced system for a radio station," says KDAY's Andy Laird, VP of engineering for Heritage Media Corporation's radio group.

Rather than replace its aging analog cart machines, KDAY is looking instead for cost-effective mass storage technology. Personally hesitant about putting a Bernoulli disk system on-air in a fast-format radio station, Laird nevertheless praises CompuSonics' ability to establish high-quality, nondegradable audio on what he feels will be a low-maintenance and ultimately trouble-free basis. "I really think we will see digital mass storage systems of some kind replacing tape and especially cart in the control room as well as in production," he says.

While cost and lack of perceived need will probably prevent digital ATRs from entering the radio market, reliability is the big sticking point for DAT, industry experts say. DAT is seen as just another tape-based medium, and it's panned for short life, rapid deterioration into the audio equivalent of snow (noise), and fragile hardware.

The Digital Audio Workstation



www.americanradiohistory.com

"Great fidelity in and of itself doesn't justify the cost of digital audio. Random access and integration capability are the other half of the equation."
—Mark Terry, New England Digital

"DAT is just a tape and not very good tape at that," says CompuSonics' Schwartz. "It's a K-Mart kind of product. It's been tested extensively and sure, it has a place, but not in pro."

On the other hand, Sony's Andy Nelles, manager for professional audio product management, stresses that tape-based systems will co-exist with hard disk technology in radio. "Tape is an accessible, low-cost medium and programming almost has to be based on it," he says. "Disk technology offers instant access, but DAT has fast location time and it's good for archival storage and transportability."

"You've got to start somewhere and DAT and DASH will be with us for at least ten years for program material—especially syndicated material," he says. "The biggest problem with hard-disk systems is the transportability of material. It's viable for in-house production, but how do you get satellite material up-linked and down-linked and into the station? Eventually you have to lay program material back onto tape."

"The buyers will determine whether nontape-based systems become dominant," concludes Otari's marketing manager John Carey, adding that right now it's too expensive to archive and store large quantities of memory on anything other than tape. "It takes a lot of data to represent one second of digital audio. Hard-disk is at the end of its development cycle in the computer industry, but the digital audio industry can't afford to finance the memory."

Also summarizing broad industry concerns, he queries the reliability of digital technologies, the swing to replacement of expensive components rather than traditional strip-down service and the wisdom of putting all one's eggs in one basket, even backed up by costly redundant systems. "Does anyone know how to troubleshoot a mother board," he asks? "That knowledge just doesn't exist."

Although Otari has experimented with disk-based systems for radio and thinks R-DAT may well be viable, Carey says that digital entry into radio isn't necessarily a sure thing. "Any new technology has to offer radio people the same kind of functional performance they are used to, and it must be cost effective," he concludes, adding that radio broadcasters can accept some tradeoffs in limits to fidelity. "That magic combination is not on the horizon as far as I can see. Right now there's expensive hardware which does *nearly* what they want."■

Jacques is senior editor of BME.

The Broadcast Electronics DV-2 Digitalk RAM-based digital recorder/player with six-minute capacity.

For More Information

on manufacturers and products mentioned in this story, please use the Reader Service Card.

Broadcast Electronics (DV-2). 283
CompuSonics Fairlight . . . 284
IMS Dyaxis. 285
Media Touch 286
New England Digital. 287
Orion 288
Otari. 289
Sony. 290
Southern Broadcasting (DAMS). . . . 291
Waveframe . 292

BRYSTON

BROADCAST PHONO PREAMPLIFIER

REQUIREMENTS

- Musicality
- Serviceability
- Low Distortion
- Balanced XLR Outputs
- 27dBm RMS 600 ohms balanced
- Cartridge load adjustment
- High Overload Threshold
- Linear Frequency Response
- Reliability
- Low Noise
- 1 Space Rack Mountable
- Accurate RIAA (± .05dB)
- 21dBm RMS 600 ohms unbalanced
- Non-reactive Phono Stage
- Fully Discrete Gain Blocks
- Drive Loads as low as 300 ohms

SOLUTION

BRYSTON BP-1

(BP-5 also available with 3 switchable high level inputs)

In the United States:
BRYSTON VERMONT
RFD #4, Berlin, Montpelier, Vermont 05602
(802) 223-6159

In Canada:
BRYSTON MARKETING LTD.
57 Westmore Dr., Rexdale, Ontario, Canada M9V 3Y6
(416) 746-0300

Circle 129 on Reader Service Card Page 59

www.americanradiohistory.com

COMPUTE

Audio Pads and Attenuators

By Ronald F. Balonis

Computers can make easy work of all kinds of design problems. And, by so doing, they can give you a practical level of expertise in almost anything. However, it's sometimes the precision of the values they calculate that can cause problems. To a computer, the component values in its electronic world are precise and continuous values. But to us components come in standard discrete values with an ordinary precision of 5, 10, or 20 percent.

Using two "humanizing" concepts from the Artificial Intelligence/Expert Systems field—recursion and binary search—this month's Compute program calculates the resistor values for T, PI, L, H, O, and U pads/attenuators. Given the input and output impedances and the desired attenuation, AFPADS.BAS calculates two sets of values: The precise computer calculations and the standard, real-world numerals and figures.

For critical applications, you use the first set of values to build a pad/attenuator with an exact impedance and with exactly the desired loss. For most everyday applications, you can use the over-the-counter EIA standard-value resistors to build a pad/attenuator with a close impedance match and desired loss.

The desired goal of a well-designed audio chain is to maximize the signal-to-noise ratio and head room and to minimize distortion. Audio pads/attenuators, placed at appropriate locations in the audio path, help to accomplish this by balancing the input and the output levels of the equipment in the audio chain. Also, in audio chains with equipment of various technological vintages, pads/attenuators can function as impedance-matching devices to interface the technologies.

(An audio pad/attenuator is a resistor network that introduces a transmission loss for a signal between circuits or equipment for the purposes of impedance and/or signal level matching.)

There are several pad configurations for a variety of needs. The T and H pads match unequal impedances. PI and O are used for telephone line type circuits. The U pad bridges from a very high

```
                    --- AUDIO FREQUENCY PADS/ATTENUATORS ---

   ----------- UNBALANCED ------------ -----------  BALANCED  ------------

   ----T ----- ----PI----  ----L ----- ----H ----- ----O ----  ----U -----
   *-R1-*-R2-* *-*-R3-*-*  *---R1-*--* *-R1-*-R2-* *-*-R3-*-*  *---R1-*--*
        |        |    |          |         |        |    |          |
        R3       R1   R2         R2        R3       R1   R2         R2
        |        |    |          |         |        |    |          |
   *----*----* *-*----*-*  *------*--* *-R1-*-R2-* *-*-R3-*-*  *---R3-*--*

INPUT IMPEDANCE (OHMS) ? 600
LOAD  IMPEDANCE (OHMS) ? 300
LOSS/ATTENUATION  (DB) ? 10

[EXACT]
R1 =    435.2      2626.8       465.8       217.6      2626.8       212.1
R2 =     68.5       413.6       242.7        34.3       413.6       424.3
R3 =    298.1       603.7         0.0       298.1       301.9       212.1
[STD]
R1 =    430        2700         470         220        2700         220
R2 =     66         430         240          33         430         430
R3 =    300         620           0         300         300         220      :7


                    --- AUDIO FREQUENCY PADS/ATTENUATORS ---

   ----------- UNBALANCED ------------ -----------  BALANCED  ------------

   ----T ----- ----PI----  ----L ----- ----H ----- ----O ----  ----U -----
   *-R1-*-R2-* *-*-R3-*-*  *---R1-*--* *-R1-*-R2-* *-*-R3-*-*  *---R1-*--*
        |        |    |          |         |        |    |          |
        R3       R1   R2         R2        R3       R1   R2         R2
        |        |    |          |         |        |    |          |
   *----*----* *-*----*-*  *------*--* *-R1-*-R2-* *-*-R3-*-*  *---R3-*--*

INPUT IMPEDANCE (OHMS) ? 20000
LOAD  IMPEDANCE (OHMS) ? 600
LOSS/ATTENUATION  (DB) ? 22

[EXACT]
R1 =  19700.2    223054.8     19724.6      9850.1    223054.8      9848.9
R2 =     53.8       609.1       508.2        26.9       609.1       609.2
R3 =    553.8     21667.6         0.0       553.8     10833.8      9848.9
[STD]
R1 =  20000      220000       20000       10000      220000       10000
R2 =     56         620         510          27         620         620
R3 =    560       22000           0         560       11000       10000      :7
```

Figure 1: demo screen for AFPADS.BAS.

www.americanradiohistory.com

```
0  'AFPADS.BAS --AUDIO ATTENUATOR PADS--
5 'BY RONALD F. BALONIS  APRIL 20, 1988
10 '
15 RESTORE:DIM OHMS(24)
20 FOR I=1 TO 24:'--LOAD STD RESISTOR TABLE
25  READ OHMS(I):OHMS(I)=OHMS(I)/10
30 NEXT I
35 DATA 10,11,12,13,15,16,18,20,22,24,27,30
40 DATA 33,36,39,43,47,51,56,62,68,75,82,91
45 '
50 DATA "--- AUDIO FREQUENCY PADS/ATTENUATORS"
60 DATA "----------- UNBALANCED ------------ "
61 DATA "-----------  BALANCED  ------------"
65 DATA "",""
70 DATA "----T ----- ----PI----  ----L ----- "
71 DATA "----H ----- ----O ----  ----U -----"
72 DATA "*-R1-*-R2-* *-*-R3-*-*  *---R1-*--* "
73 DATA "*-R1-*-R2-* *-*-R3-*-*  *---R1-*--*"
74 DATA "     |         |    |           |    "
75 DATA "     |         |    |           |    "
76 DATA "     R3        R1   R2          R2    "
77 DATA "     R3        R1   R2          R2   "
78 DATA "     |         |    |           |    "
79 DATA "     |         |    |           |    "
80 DATA "*----*----* *-*----*-*  *------*--* "
81 DATA "*-R1-*-R2-* *-*-R3-*-*  *---R3-*--*"
82 DATA "",""
95 '
100 CLS:READ A$:PRINT TAB(19);A$;" ---":PRINT
105 FOR I=1 TO 9:'---DISPLAY PADS/ATTENUATORS
110  READ A$,B$:PRINT TAB(4);A$;B$
115 NEXT I
120 '
130 INPUT "INPUT IMPEDANCE (OHMS) ";Z1
135  IF Z1<1 OR Z1>100000! THEN STOP:'OR SYSTEM
140 INPUT "LOAD  IMPEDANCE (OHMS) ";Z2
145  IF Z2<1 OR Z2>100000! OR Z1<Z2 THEN RUN
150 INPUT "LOSS/ATTENUATION  (DB) ";LOSS
155  IF LOSS<.5 OR LOSS>60 THEN RUN
160 '
165 '---TEST FOR REALITY
170 KMIN=2*Z1/Z2-1+2*SQR((Z1/Z2)*(Z1/Z2-1))
175 LMIN=10*LOG(KMIN)/LOG(10):PRINT
180 IF LOSS >= LMIN THEN 200:'--------IT'S OK
185  PRINT USING"LOSS<MINIMUM ###.###dB";LMIN;
190  INPUT X:RUN 0:'--NO! SAY SO THEN RESTART
195 '
200 '----------------CALCULATE NETWORK VALUES
205 K=EXP(LOSS*LOG(10)/10):'-----FIRST FIND K
210 '
215 '---T & H NETWORKS
220 KK=2*SQR(K*Z1*Z2):K0=K-1:K1=K+1
225 T3=KK/K0:         H3=T3
230 T1=(Z1*K1-KK)/K0:H1=T1/2
235 T2=(Z2*K1-KK)/K0:H2=T2/2
240 '
250 '---PI & O NETWORKS
255 P1=(K0*Z1*SQR(Z2))/(K1*SQR(Z2)-2*SQR(K*Z1))
260 P2=(K0*Z2*SQR(Z1))/(K1*SQR(Z1)-2*SQR(K*Z2))
265 P3=SQR(Z1*Z2/K)*K0/2
270 O1=P1:O2=P2:O3=P3/2
275 '
300 '---L NETWORKS
305 ZZ=SQR(Z1/Z2):K=SQR(K)
310 L1=(Z1/ZZ)*(K*ZZ-1)/K
315 L2=(Z1/ZZ)*1/(K-ZZ)
320 L3=0
325 '
350 '---U NETWORKS
355 U1=0:U2=0:U3=0:RU=Z2/Z1
360 IF RU=>1 THEN 400:'--DON'T EVEN TRY
365 U1=Z1*(SQR(1-RU)/2)
370 U2=Z1*(RU/SQR(1-RU))
375 U3=U1
380 '
400 '------------DISPLAY NETWORK VALUES
405 PRINT "[EXACT]"
410 PRINT "R1 =";
415 PRINT USING"#######.#    ";T1,P1,L1,H1,O1,U1
420 PRINT "R2 =";
425 PRINT USING"#######.#    ";T2,P2,L2,H2,O2,U2
430 PRINT "R3 =";
435 PRINT USING"#######.#    ";T3,P3,L3,H3,O3,U3
440 '
445 PRINT "[STD]":PRINT "R1 =";
450 R=T1:GOSUB 500:R=P1:GOSUB 500:R=L1:GOSUB 500
455 R=H1:GOSUB 500:R=O1:GOSUB 500:R=U1:GOSUB 500
460 PRINT:PRINT "R2 =";
465 R=T2:GOSUB 500:R=P2:GOSUB 500:R=L2:GOSUB 500
470 R=H2:GOSUB 500:R=O2:GOSUB 500:R=U2:GOSUB 500
475 PRINT:PRINT "R3 =";
480 R=T3:GOSUB 500:R=P3:GOSUB 500:R=L3:GOSUB 500
485 R=H3:GOSUB 500:R=O3:GOSUB 500:R=U3:GOSUB 500
490 INPUT ":";X: RUN 0:'----AND RESTART FOR MORE
495 '
500 '----FIND CLOSEST STANDARD RESISTOR
505 LO=1:HI=24:I=0:'--NORMALIZE THE RESISTOR
510 IF R>OHMS(24) THEN R=R/10:I=I+1:GOTO 510
520 IF HI<LO THEN 550:'-----DO A BINARY
525  II=INT((LO+HI)/2):'---TABLE SEARCH
530  IF R<OHMS(II) THEN HI=II-1:GOTO 520
535  IF R>OHMS(II) THEN LO=II+1:GOTO 520
540   GOTO 560:'---------IT EQUALS A STD VALUE
545 '
550 II=HI:'------OR GUESS HIGH
555 IF ((OHMS(LO)-R)<(R-OHMS(HI))) THEN II=LO
560  RX=OHMS(II)*10^I:'--THE NEAREST STD VALUE
565  PRINT USING"#######      ";RX;:RETURN
600 '-----END OF SUBROUTINE AND PROGRAM-------
```

***Figure 2:** program listing for AFPADS.BAS, an AF pad/attenuator program.*

to a very low impedance. The simple L pad is used when an absolute impedance match is not necessary. AFPADS.BAS calculates the values for all of the pad configurations.

Lines 130 to 155 prompt for the three input data items, input and output impedance and pad loss. Note—the following data limits will cause a program error restart: Impedances less than 1 or greater than 100,000, an input impedance less than the output impedances, or a pad loss less than .5 or greater than 40 dB. And, a null enter at the input impedance prompt terminates the program.

Lines 200 to 380 calculate the values for the 6 pads, lines 400-440 display the EXACT values, and lines 450 to 380 display the STANDARD values.

Lines 500 to 600 form the recursion/binary search subroutine that finds the closest standard resistor to use for each element of the pads.

One thing to watch for when keying the program in are the capital O's in several of the variables: O1, O2, O3, OHMS, LOSS, and LO. A numeric 0 is used with K0. Be sure to get them right. ■

Balonis is chief engineer at WILK-AM, Wilkes-Barre, PA.

www.americanradiohistory.com

The Whole Truth for FCC License Renewal

By Harry Cole

Our lesson for this month is not particularly new or novel. It is simply that, when you deal with the FCC, honesty is always the best policy. This applies not only to the licensee or the licensee's chief executive officer, but also to the station's engineering staff. As is apparent from a recent decision of the FCC's Review Board, the penalty for not telling the truth can be substantial: in May 1988 the Review Board denied a license renewal application as a result of "misrepresentations" made to the FCC by the licensee. The circumstances surrounding those "misrepresentations" should be of interest to any station's engineering staff.

The case involved a noncommercial televison station which was suffering financial and technical difficulties. On November 2, 1979, the station notified the Commission that it was going to go off the air from November 5 through December 7, 1979, to permit it to replace its switcher. According to that letter, the station could not maintain its programming schedule during the replacement effort. On December 27, 1979, the licensee wrote a second letter to the Commission, advising it that equipment shipping delays had precluded installation, and that the station would be off the air until March 1, 1980. On February 25, 1980, a third letter went in to the FCC; the licensee again cited further shipping delays as the reason for a further postponement of the resumption of operations until the end of May. Finally, on April 22, the licensee submitted a fourth letter referring to "technical problems" and "necessary repairs", but estimating that operation would be resumed on or about May 31. It did in fact resume broadcasting on May 29, 1980.

Now in the normal course of a station's dealings with the FCC, this string of letters would not be at all unusual. Stations are occasionally forced off the air for a variety of technical reasons, and the appropriate response is to notify the Commission and request authority to remain off the air pending correction of the problem. As it turns out, however, there was more to this particular station's situation than met the Commission's eye.

Primarily as a result of complaints filed by an organization of public interest groups, it came out that the management of the station in question had been considering taking the station off the air *not* for technical reasons, but for budgetary reasons. In response to these allegations (and after some prodding by the U.S. Court of Appeals in Washington), the Commission set the matter for hearing.

Cole is partner in Bechtel & Cole, a Washington, DC-based law firm.

The presiding administrative law judge heard testimony from the station's management and staff and reviewed a variety of documents dating back to the time the station was shut down. He concluded that there was substantial evidence indicating that the station's silence was the result of both technical and budgetary considerations. The evidence supporting this conclusion included memos, station staff studies and testimony indicating that as early as October 1979 station management had contemplated taking the station off the air through most of 1980 in order to save money. This conclusion was further supported by the fact that the program guide issued by the licensee did not appear to include programming for the station after January 1, 1980.

To make matters even worse for the licensee, it came out at the hearing that the equipment installation repeatedly referred to by the licensee in its letters to the Commission did *not* necessarily require that the station go off the air at all. Instead, alternative approaches existed which would have permitted the station to stay on the air pending final installation

www.americanradiohistory.com

Ready to Score Another Scoop!

Toshiba's Mt-3 Satellite Scoop System makes live coverage of fast-breaking news events routine.

This complete Ku-band system fits in 10 compact, lightweight flight cases that meet IATA carry-on baggage regulations.

Once on site, an array of proven Toshiba design advances facilitate set-up. A 1.8M parabolic antenna with a simplified 360° azimuth rotary mechanism in addition to an easy polarization, 6-segment FRP antenna reflector make set-up short and sweet.

The synthesized exciter minimizes MCPC/SCPC carrier phase noise and provides all-purpose control flexibility. And advanced microprocessor controls assure complete access with all existing international communication satellites.

Toshiba's Mt-3 Satellite Scoop System effectively takes the work and worry out of live news coverage.

The Mt-3 was developed jointly by Toshiba and CBS Engineering and Development.

Satellite Scoop System

Mt-3

TOSHIBA

TOSHIBA CORPORATION TOKYO JAPAN

ELECTRONIC SYSTEMS DEPARTMENT
1-1, SHIBAURA 1-CHOME, MINATO-KU, TOKYO, 105, JAPAN
TELEX J22587 TOSHIBA CABLE TOSHIBA TOKYO PHONE 457-3246-B

TOSHIBA AMERICA, Inc.

ARMONK OFFICE: 111 BUSINESS PARK DR., ARMONK, NY 10504 PHONE: (914)273-1750 FAX: (914)273-9516 TELEX: 131-556

Circle 130 on Reader Service Card Page 59

www.americanradiohistory.com

of the new equipment, albeit with a less than desirable signal.

On the basis of all these factors, the administrative law judge found that there were "coexisting reasons" for the station's silence and that *both* should have been reported to the Commission. However, the judge also concluded that the licensee's letters to the FCC were "literally true."

The Review Board disagreed with the judge on that point. As far as the Board was concerned, the licensee "actively and intentionally attempted to deceive the Commission by representing that its primary reasons for deactivating (the station) were other than those involving its budgetary problems."

This particular proceeding should be read with care by station engineering personnel, who may from time to time be asked by their station's licensee to provide technical justification in nontechnical situations. Before signing off on any such documentation, the engineer should be careful to assure himself or herself that that which is said is, in fact, accurate from a technical point of view.

One irony of the proceeding described above is that if the licensee had simply advised the Commission that it was going to shut its station down for a couple of months because of financial problems, it is extremely unlikely that the Commission would have taken any action against the licensee. Interruption of a station's programming may not be helpful if the station's renewal application is challenged by a competing applicant. But, historically, the FCC has not demonstrated any inclination to deny otherwise unchallenged licenses simply because of a temporary period of silence, especially if the licensee has explained the need for the temporary discontinuation.

Proposals on the Table— On other fronts, the Commission has advanced a number of proposals intended to streamline its rules. In the TV area, the FCC has proposed the elimination of the following rules:

—all time restrictions for operation of separate TV aural and visual program material;

—the periodic six-month power meter calibration requirement;

—the requirement that the color burst signal be omitted during the transmission of black-and-white programming;

—the maximum-to-minimum radiation limitations for TV directional antennas;

—the specifications pertaining to equipment installation and safety requirements; and the

NEW!!
SATELLITE EQUIPMENT

The PSA-35A Portable Spectrum Analyzer accurately measures wideband signals commonly used in the American and International satellite communication industries. The PSA-35A covers frequencies from less than 10 to over 1750 MHz, and from 3.7 to 4.2 GHz; switch-selectable sensitivity of 2 dB/div or 10 dB/div; and on-screen dynamic range of greater than 65 dB. The portable, battery or line-operated PSA-35A is the perfect test instrument for service and troubleshooting, dish and antenna alignment, and optimizing signal reception. $1965

AVCOM introduces a fully agile Single Channel Per Carrier Demodulator, the SCPC-3000E, for versatile and economical reception of SCPC signals.
The SCPC-3000E Demodulator features a high-performance synthesized 50-90 MHz tuning module for maximum system versatility. Frequencies are tunable in 800 steps of 50 KHz each. Standard expansions are 3:1 and 2:1, other expander formats are available. Deemphasis is switchable between 0, 25, 50, and 75 micro-seconds. Selectable low-pass 15, 7.5, and 5KHz audio filters are standard. The SCPC-3000E is rack-mountable and available for immediate delivery. AVCOM can customize the SCPC-3000E Agile SCPC Demodulator to suit specific receiver needs, contact AVCOM with your requirements. $1378

The highly stable SCPC-500-70 Single Channel Per Carrier Downconverter converts SCPC signals from a transponder in the 3.7 to 4.2 GHz range to a center frequency of 70 MHz. A sophisticated phase-locked cavity oscillator referenced to an ovenized crystal oscillator enhances frequency stability. No other equipment at a comparable price can match the SCPC-500-70 Downconverter. $1322

AVCOM
500 SOUTHLAKE BOULEVARD
RICHMOND, VIRGINIA 23236
TELEPHONE (804) 794-2500
FAX: 804-794-8284 TELEX: 701-545

Circle 131 on Reader Service Card Page 59

INCREASE YOUR STATIONS MOBILITY

With Champion commercial vehicles you can increase your station's mobility and save costly time and overhead.

There are countless ways your radio or television station can use a vehicle to improve the quality of your programming effectively and economically.

• Cover more live news • Broadcast more "on location" programs • Good P.R. tool • Save valuable travel and set-up time

For more details call: Al Garrow
1-800-445-1560

Champion MOTOR COACH INC.

5573 North St.
Dryden, Michigan 48428
(313) 796-2211

Circle 132 on Reader Service Card Page 59

www.americanradiohistory.com

reference table of minutes and seconds converted to decimal parts of a degree.

In the FM area, the Commission has proposed to streamline the downgrading of station classifications to a one-step process. As you are probably aware, in order to upgrade an existing FM station's classification, you must first go through a rule-making proceeding in which the FCC's FM Table of Allotments is formally amended to specify the higher class of channel. Then, the licensee must submit a minor-change application in order to get its license modified to conform to the amended channel classification. This procedure does not appear necessary when a station is trying to downgrade itself, according to the current thinking of the Commission. In any event, under a proposal now under consideration, a licensee interested in downgrading itself would simply have to file an appropriate application for modification of its facilities. Once the application is granted, the Table of Allotments would be revised accordingly.

Action on these various proposals can probably be expected by the end of the year. The television proposals do not appear controversial in the least, and the Commission has generally acted very quickly on such deregulatory matters. The FM proposal is somewhat more complicated and may require more detailed consideration. However, it is the type of deregulatory action which this particular FCC seems to favor, and it is unlikely that the proposal will be derailed.

"Booklet 'em, Dan-O—Interference One"—The FCC and the Electronic Industries Association (EIA) have joined forces in the publication of a booklet entitled *Consumers Should Know...Something about Interference*. We think that engineers might find the booklet useful—not because it will necessarily tell them anything they don't already know about interference but because it will give them some idea of what the average consumer knows about the subject. Said to contain "a step-by-step approach to understanding and resolving interference which may occur in the home," the booklet is intended as an aid "to assist consumers in identifying and resolving common problems of interference to home electronic products."

If it turns out that the booklet offers an accurate and understandable discussion of interference, you might want to pick up some extra copies.

If the booklet is, in your view, less successful, it is probably useful to have in any event in that it will give you an idea of the type of information which complainants may have in front of them when they complain. That may in turn help you deal with the complaints in a more efficient manner. ■

To celebrate our 15th year, we'll give you a $1,500.00 gift with the purchase of a System 12 or System 16 Stereo Audio Console. Choose any two: Equalized Stereo Mixer; BA-235 Monitor Amplifier with tone controls or SERIES IV Custom Upgrade. Offer ends September 15, so call Broadcast Audio, or your authorized BAC representative today! *Sorry* — offer is limited to 15 consoles per customer.

HAPPY BIRTHDAY!

BROADCAST AUDIO CORPORATION

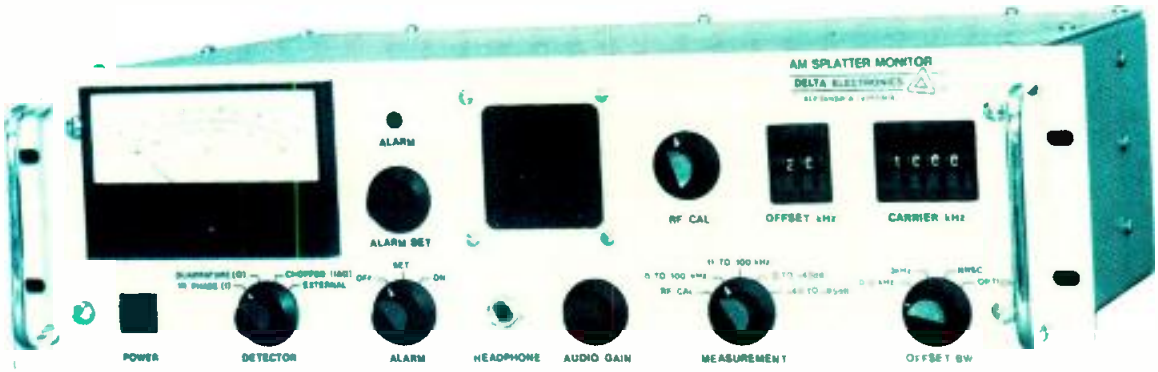
11306 SUNCO DR., RANCHO CORDOVA, CA 95742 (916) 635-1048

Circle 133 on Reader Service Card Page 59

www.americanradiohistory.com

EQUIPMENT

Delta's Splatter Monitor...Wheatstone Master Control Console...Leader's New Signal Generator...Klystrode from TTC...and more new products from the NAB



Delta Splatter Monitor

The Delta Splatter Monitor has been honored by the NAB as an inexpensive means of measuring interference. Spectrum analyzers, usually used for this function, can cost ten times the amount. The unit is easy to operate, is frequency agile (so it can be used at any station), and measures both in-phase and incidental-phase modulation.

For smaller stations without a chief engineer, the unit includes a built-in alarm that will notify other technicians and air talent of a problem. Portable active antenna and DC power makes it applicable for field testing—even operating from automobile cigarette lighters. The monitor costs $2150.

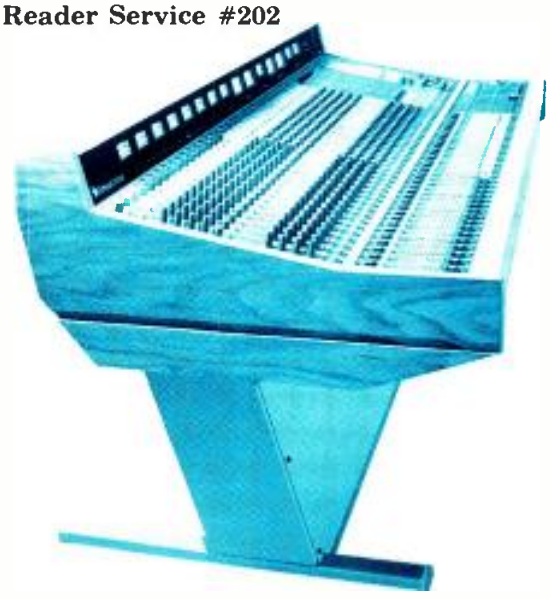
Reader Service #201

Wheatstone Master Control Console

With the start of stereo programming for broadcast, various new products are making their way into the market. Among them, the Wheatstone TV-500 console has four stereo buses, two separate stereo master buses, a mono bus for SAP, as well as mono sum outputs. Also included are four stereo auxiliary buses for fold back, mix minus, and special effects.

Mono input modules include source selection between two mic inputs and a third line input. The stereo line inputs can select any one of four stereo sources, as well as full mode and balance control. Full studio communications and VCA options are available. The main frames come with 16 through 56 input configurations.

Reader Service #202



New AM/FM RF Signal Generator

Leader Instruments announced a new AM/FM synthesized RF signal generator. The new model, 3215, features a user-friendly keypad

www.americanradiohistory.com

control of frequency, modulation, and output level. It has an RF frequency range of 100 kHz to 140 MHz so that it is applicable on both bands. Resolution is 100 Hz for frequencies below 30 MHz and 1 KHz for those up to 140 MHz. A phase-locked loop synthesizer

ensures stable carrier frequency outputs to within 50 ppm.

Semiautomatic operation eliminates generator setup time by preprogramming up to 100 different user-defined test conditions. A GPIB interface allows computer control of all settings. The list price for the 3215 is set at $2850.

Reader Service #203

TTC Has New Klystrode UHF Transmitter

Television Technology Corporation (TTC) introduced a new 10 KW UHF air-cooled klystrode TV transmitter at NAB. It incorporates a number of features that are not often found on comparably-priced transmitters.

The unit is being marketed for multiplex television service. Complications caused by aural operations at 10 percent of visual power are eliminated by TTC's new vector IF correction circuit. This circuit compensates for intermod products. The air-cooling makes it more compact, with no heat or water exchangers.

Stereo and MTS specifications are high due to the klystrode's wide bandwidth and lack of diplexer, which is not needed in multiplex operations. Average efficiency has been measured at 66 percent for the system.

Reader Service #204

Storeel Announced CD160 Storage System

These CD160 units from Storeel for broadcast store up to 160 compact disks and are compatible with the company's Storemax and Railrider high-density systems engineered to run on floor tracks.

Reader Service #205

New ACS Software for Amiga

Associated Computer Services unveiled Station Manager, a module-based videographics software series. Priced for medium-market broadcasters, it has a plethora of features not normally found in

Y/C Switcher, Still Store, ...and More!

450 Line Resolution

Over 50 Video Effects

Dual Channel Freeze

A/B Roll Video System

Dual Channel Y/C TBCs

Produce A/B Roll with the power of Still Store. Keep 200 to 2,000* images on line for instant recall with ALTA's **Centaurus** and take full advantage of **Super VHS** resolution. Use wideband Y/C video processing from input to output. Even mix and match composite and Y/C signals.

Create over 50 video effects. Wipes, pushes, pulls, splits, dissolves, split screens, fades, posterizations, strobes and freeze frames. Even stereo audio mixing and keying. All with full bandwidth, 8-bit encoding and a comprehensive two year warranty.

Produce high resolution A/B roll video with the power of **Centaurus** for $13,900. Or $16,900 with Still Store. Find out more today!

* With optional drive.

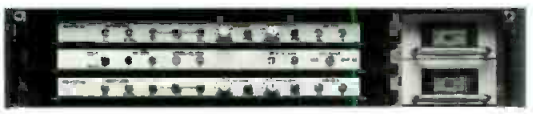
ALTA GROUP, INC
535 Race St.
San Jose, CA 95126
Telex 757994
Fax 408-297-1206
Tel 408-297-ALTA

Circle 134 on Reader Service Card Page 59

www.americanradiohistory.com

INTERLACING

DUAL SYNC GENERATOR
model RS-1701AN



RUBIDIUM DUAL SYNC GENERATOR
model RS-1701RB

GENLOCK COLOR ENCODER NEW
model ENC-3000

GENLOCK SYNC GENERATOR NEW
model SG-3000B

YEM
YAMASHITA ENGINEERING MANUFACTURE INC.
559-1 Funako, Atsugi-city Kanagawa 243 Japan
Phone: 0462(28)8692 Fax: 0462(29)1944 Telex: 3872340 YEMNC J

Circle 135 on Reader Service Card Page 59

lower-priced graphics packages. DeluxeProductions is the core engine, providing genlockable, broadcast-quality animation that is double buffered. Weather is made easy by map generation and downloading capabilities from services. A graphics library, character generation, teleprompter, tape library system, tape editor, and on-air program scheduling are all included.
Reader Service #206

Andrew Offers TVRO

A cherry picker antenna that can "pick off" and program from any satellite in the domestic orbital arc, the TVRO from Andrew Corp. will serve the needs of broadcasters who need to receive network and other signals. The 4.5 meter antenna is a dual-band (C/Ku) dual polarized system that can be tailored to station's needs. All packages offer the possibility of receiing any satellite message, though. Optional accessories include video distribution components up to full turnkey systems with remote control and monitoring.
Reader Service #207

Advanced Designs Has Doprad II

The recent availability of doppler radar technology and turbulence detection to the broadcast industry has spurned on interest in more sophisticated weather graphics. The Doprad II from ADC is a high-resolution system that is able to interface with a Collins receiver-transmitter and antenna system. The display unit offers real-time pan and zoom from keyboard, custom map generation, and fast frame looping with variable speed. In addition, the 10 Mbyte hard disk will store up to 200 images, sequencing of preprogrammed commands for automatic operation, flashing levels, automatic time lapse recording, and interactive graphics with custom fort generation. It can also merge and rotate images.
Reader Service #208

Armadillo Eliminator

Armadillo Audio has a new stereo audio signal processor, the Eliminator. Features include digitally controlled differential input AGC, two-knob equalizer automatically bypassed with rear panel I/O, and intelligent stereo expander. It has an integrated peak limiter/clipper, switchable replay bypassing, and essential operating parameters are metered. There are no internal trim pots or encapsulated modules used. It is $925.
Reader Service #209

Minolta Meters Market

The company's newest reflected light chroma meters, the CR-200 and 231 were displayed this year. The new units offer greater versatility and improved accuracy over past units. Absolute color or color differences can be measured with the colorimeters based on any of four color systems.
Reader Service #210

www.americanradiohistory.com

One Unit T & M from Rhode & Schwarz

The dual channel URV5 millivoltmeter from Rhode & Schwarz is a versatile three-in-one precision measuring unit. It can measure DC voltage to 400 V, high-impedance RF voltages from 20 kHz to 1 GHz, thru-line coaxial RF voltages from 9 kHz to 2 GHz, and power levels, 50 or 75 ohms, from 1 MHz to 18 GHz. Each channel can be displayed separately. List price is $3960.
Reader Service #136

Lenco Offers Modular Frame System

The new Starflex modular frame system from Lenco allows the user to choose from a variety of signal distribution, timing and processing modules, arranged in any manner desired. Starflex models include the 3120 master CRS generator, which can also operate as a CRS slave timing module; the 3125 black burst to CRS translator, which looks to a black burst signal and maintains color field one throughout the translation; the 3140 external CRS slave; and the 3150 external CRS black burst slave. Each of these modules is only one bay wide.

Other available modules are the 3210 color bar/black burst generator, the 3410 CRS slave, the 3420 CRS-black burst slave, the 3500 precision video DA and the 3520 universal distribution amplifier. The 6500 audio DA, another in the series, has one input and six outputs with 150 ohm output capability and direct-coupled signal path throughout. The 4500 digital frame synchronizer/TBC fills two bays and features two inputs and two outputs.
Reader Service #137

Radio Systems Offers RS Series Consoles

RS programmable consoles are based on three main circuit boards; an Input Control Card (one per channel), Six Mixer Board (one per six console channels) and an Output Board (one per console). Connectorized cables interconnect the boards and external controls. Input control and monitor selector cards connect via ribbon cables and operate via DC control to eliminate program audio from the front panel. Parts like faders and switches more likely to fail are wired and mounted independently. RS consoles are available in 6-, 12-, and 18-channel configurations. Basic, cart and turntable interface boards are available.
Reader Service #138

ITC/3M Bows Audio Switcher

International Tapetronics/3M's audio switcher is designed to replace patchbays and distribution amplifiers in the radio broadcast environment. Power consumption for master control is 43W maximum. Up to 31 remote controls can be used with master control, which features "wild audio" capability to route mono automatically to left and right outputs after the system has been configured for stereo. The switcher interconnects outside program sources including satellite feeds, traffic helicopter reports, network or syndicated news feeds, outside broadcasts, promotions and sports events and weather information.
Reader Service #139

E-V Intros Broadcast Mic

Electro-Voice brings the benefits of neodymium microphone technology to the broadcast market with the RE45N/D, a small dynamic shotgun unit designed for ENG/EFP applications. The N/DYM mic element provides the output of a condenser mic (–50 dB), even in high-humidity environments, without battery or phantom power. The RE45N/D's design delivers unidirectional characteristics with smooth, off-axis response.
Reader Service #140

Panasonic Unveils MII Studio VTR

Panasonic Broadcast has introduced the AU-660PE MII studio VTR with enhanced editing capability. The unit incorporates a 9-bit time base corrector, a standard adaptive comb filter and amorphous video heads enabling HF characteristics compatible with metal tape. Edit functions include audio split editing, spot erase, in/out preview and programmable in/out keypad plus variable memory editing ac-

commodating slow motion editing from 1X to 2X times normal speed. The production edit panel is detachable and can be operated remote.
Reader Service #141

Comrex Bows New Line

Comrex Corp. introduced its new generation of multiline frequency extenders. The new units transmit up to 10 kHz of audio on standard dial telephone lines. In addition, line management functions are fully automatic. Model PLXmicro, designed for use with a cellular phone, features direct four-wire interconnection. Used in connection with the company's TH-X extender/hybrid, the setup delivers high-quality audio.
Reader Service #142

www.americanradiohistory.com

BUSINESS BRIEFS

NAB/FCC Face-offs: The association has asked the **FCC**, in a motion for stay, that the commission accept only over-the-air pickup employing applications for noncommercial, educational FM (NCE-FM) translators... The NAB also urged the FCC to reconsider its rule allowing noncommercial FM translators assigned to reserved channels and owned and operated by their primary stations to use alternative signal delivery methods... NAB CEO and president **Edward O. Fritts** and NAB TV Board Chairman Benjamin McKeel praised a recent FCC ruling which adopted new syndicated program exclusivity rules...A recent Request for Proposals (RFP) from the NAB is calling for research studies to be conducted on **AM psychoacoustical effects**.

Following the recent success of its role in the Reagan/Gorbachev summit transmissions, **IDB Communications** reports record 1987 earnings, new dish acquisitions, and a significant staff promotion. Net income for fiscal 1987 was at about $1.8 million/$.42 per share... Teleport Communications sold its three earth stations at The Teleport on Staten Island to IDB...And David Anderson, former IDB director of technical facilities, is now serving as the company's VP of operations.

Movers and Shakers: Congratulations to Gene Hammerle, new director of engineering at **AF Associates**... Shane Dickey is the new VP of engineering for **Digital F/X**...Randall Smith, **For-A**'s new sales manager for the West...Max Mitchell, **Ampex** president and CEO, reported the resignation of Mark L. Sanders from that company's VP/GM-Recording Systems Division slot.

Three important **Betacart** installations have been reported by Sony: WWOR-TV, Secaucus, NJ; Houston's KHTV; and the CBS News Hard News Center in New York. ■

Sunset Sound Recorders, Hollywood, CA, has installed a 64-channel Amek APC1000 assignable production console in its newly refurbished Studio Two facility. As the focal point of the studio's major remodelling and re-equipping project, the console will serve heavy duty on the studio's many commercial, production and broadcast projects. The APC1000 features microprocessor-controlled recall and dynamic reset, in addition to automated GML moving faders.

Space demands and custom wiring were of particular concern. The facility, in fact, considered building their own home-grown console, according to studio manager Craig Hubler. But the Amek board matched spec.

Sunset owner Paul Camarata said, "Our criteria were very demanding. We were looking for extremely clean and transparent audio quality, flexible EQ and dynamics, plus comprehensive automation and memory functions."

www.americanradiohistory.com

Where do you reach over 20,000 broadcast and teleproduction engineers and engineering managers?

PROBABLY NOT WHERE YOU THINK.

Where do you reach the highest concentration of technical and engineering management?

THE ANSWER MAY SURPRISE YOU.

Which magazine has been refocused and redesigned based on telephone interviews with 400 chief engineers?

STILL NOT SURE?

TAKE ANOTHER LOOK. THE NEW BME.

The new *BME* is the magazine engineering managers have been asking for. In addition to offering great reach, it also has the lowest CPM for broadcast and teleproduction engineers and engineering managers.

For complete information on the new *BME*, write Act III Publishing, 295 Madison Avenue, New York, NY 10017. Or call your *BME* representative. East Coast: Michael Dahle and Gene Kinsella, (212) 685-5320. West Coast: Jay B. Lewin or David M. Adrian at (818) 888-5288.

www.americanradiohistory.com

Digital Audio in Radio Broadcasting

By Larry Titus

It seems as though every radio station in the country is racing headlong toward the purchase of anything digital. What radio station doesn't own or isn't contemplating the purchase of a CD player for its air studio? How many stations are linked by a digital satellite audio feed? What engineer isn't desperately trying to keep up with the current standards for digital audio tape (DAT) and trying to figure out where a new DAT machine will hook up to the On Air console?

It seems like digital audio for everyone is just around the corner but is it really?

Digital audio, in fact, has been around for quite some time. The unique sound of an old telegraph system relay spoke volumes of information to those who knew how to listen. And in the 1950s binary computers were "taught" to read music. Some computers could listen and respond to their environment. But it wasn't until the late 1960s that computers could actually "digitize" audio (that is, convert sound accurately to digital information) and reproduce it. Then the promise of "high quality" digital audio seemed right around the corner.

Consider the development of the compact disc. Several years ago consumer electronics manufacturers worldwide set a standard for encoding digital information into the form we now know as Compact Disc (CD). Radio stations around the country went to great lengths and great expense to be the first with CD digital audio in their studio, touting benefits like greater signal-to-noise ratio, better dynamic range, more faithful reproduction of the original source and media that will last forever.

So radio stations put this new digital medium on the air, only to discover that audio processing destroyed the dynamic range, listeners couldn't appreciate the better signal-to-noise ratios in stereo because of the FM stereo noise penalty and the indestructible disks were, in fact, not indestructible. Worse yet, machines designed for broadcast use were not available so engineers had to try to match levels and remote control a new (consumer) CD player.

Today broadcast-quality CD machines have come of age—but unfortunately few manufacturers are willing to make the investment in R and D to create a cost-effective but broadcast-environmentally-hardened CD player. Many stations rely on cheap consumer models, which they consider disposable, and view compact discs and CD players as an inexpensive way for the average radio station to get into the "digital game."

People could be forgiven for thinking that the all-digital radio station—where all the audio is digital—cannot be far away. Unfortunately, it's further off than most radio station managers and engineers realize.

The recent introduction of consumer DAT recorders and players resounds with the familiar ring of the CD player—with one exception. The thrill of first auditioning a CD is gone. Almost everyone in broadcasting has heard a CD at some point, and digital audio tape doesn't sound different from a CD.

Furthermore, the only DAT players currently available are consumer models, and they will not tolerate the harsh broadcast environment. Digital audio tape recorders are expensive machines. The media is expensive, too, and very fragile.

ITC, which introduced its versions of a DAT machine (HCDA) in 1987, is to be commended for its effort to generate a broadcast-quality digital tape recorder. But the company found little interest in the machine and a cost which was too high compared to CD. Surveying the marketplace and

Titus is the president of Titus Technological Laboratories, which designs and manufacturers automatic audio switching equipment for the broadcast industry. Until recently he was the Director of Engineering for Chase Broadcasting, Inc. (three AM, three FM, two TV).

www.americanradiohistory.com

ADVERTISERS INDEX

Manufacturer	Page No.	Circle No.
Aerospatiale	51	124
Alden Electronics	20	110
Alta Group, Inc.	83	134
Avcom of Virginia	80	131
Belar Electronics	48	120
Broadcast Audio Corp	81	133
Bryston Vermont Ltd.	75	129
Camera Mart	50	123
Champion Motor Coach	80	132
Dynatech Newstar	14	107
Electro-Voice	37	117
Electro-Voice	73	128
Fidelipac	3	101
Image Video Ltd	48	121
JVC Industries, Inc	16	108
Leitch Video Ltd	44	118
McCurdy Radio	64	126
Microtime	34	116
Midwest Corporation	6	103
Motorola	19	109
NEC America, Inc.	12	106
Panasonic Broadcast Systems	52-53	125
Panasonic Industrial Co.	30-31	115
Sachtler Corp. of America	24	112
Shook Electronics	49	122
Sony Broadcast Products, Inc	41, 42, 43	
Sony E.D. Beta	4-5	102
Sony Pro Audio	22	111
Sony Pro Video	68-69	127
Studer Revox America	Cov. II	100
3M Broadcast	10-11	
3M/ITC	47	119
Telex Communications	28	114
Toshiba Corporation, Broadcast Equip.	79	130
Utah Scientific	26	113
Videotek	8	104
Ward Beck Systems	Cov. IV	
Wheatstone Corp.	Cov. III	136
Yamashita Engineering Manufacture, Inc	84	135

SALES OFFICES

295 Madison Avenue, New York, NY 10017 Telex: 64-4001

Eastern States
295 Madison Avenue
New York, New York 10017
212-685-5320
Telex 64-4001
Michael Dahle
Gene Kinsella

Western States
21777 Ventura Blvd. Suite 237
Woodland Hills, CA 91364
(818) 888-5288
Jay B. Lewin
David M. Adrian

Europe/United Kingdom
33A Station Road
North Harrow
Middlesex HA2 7SU England
(01) 427 9000
Telex: 21289
Ric Bessford

Japan/Far East
2-14-20, Minami-Aoyama,
Minato-Ku, Tokyo 107 Japan
(03) 405 5118
Telex: 2427388
Fax: (03) 401-5864
K. Yamamoto
Y. Yozaki

CLASSIFIED

HELP WANTED

The Washington DC Bureau of Conus Communications is seeking a full time Engineering Maintenance Supervisor. This person must be capable of supervising a small engineering maintenance department and must have experience in servicing Sony Betacam field equipment, and studio edit facilities. Candidates for this position should have experience in operating a wide variety of broadcast video and audio equipment, as well as, the use of a spectrum analyzer. Experience with satellite equipment or transmitters is desirable, but not required. Individuals seeking this position must be able to work in close quarters with an active news organization, and make decisions quickly, frequently while under pressure. Salary is open, depending on qualifications. Resumes should be sent to Scott Goodfellow 1825 K Street, NW, Suite 601, Washington, DC 20006.

REGIONAL SALES MANAGER—Growing manufacturer of broadcast video products seeks two regional sales managers. Positions based in California and Chicago area. Require aggressive self-starter capable of working with minimum supervision. We offer competitive salary, excellent benefits including profit sharing. Interested individuals should send resume with salary history and requirements to BME, 295 Madison Ave., NY, NY 10017.

Transmitter Supervisor—Washington, D.C. station needs supervisor to perform maintenance and supervise the technical operation of XMTR facility. Requires Bachelor's Degree in Electrical Engineering, Electronic Technology or a related field. Must possess General Radio/Telephone License. RF endorsement is desireable. Three years of progressively responsible TV maintenance experience with supervisory responsibilities. Experience in maintaining VHF/UHF transmitters utilizing vapor-cooled klystron tubes. For prompt and confidential consideration, forward your resume with salary history to: Clarence Brodus, Director of Operations & Engineering, WHMM-TV, 2222 Fourth Street, N.W. Washington, D.C. 20059. We Are An Equal Opportunity Employer M/F/H.

Top fifty VHF affiliate in the Southeast seeks chief engineer. Job entails supervision of all engineering and maintenance personnel. Individual will be responsible for all technical functions and must have SBE Certification. College degree preferred. Must be forward-thinking and aware of new technologies as well as knowledgable of state-of-the-art equipment. Requirements include at least five years broadcast experience and knowledge of budgeting procedures. Position open on or before August 1, 1988. An affirmative action/Equal Opportunity Employer. Address inquiries to: BME Magazine 295 Madison Ave., New York, NY 10017.

Assistant Chief Engineer. Top Philadelphia CHR Station seeking self-motivated Ass't Chief Engineer. Studio and RF experience required. FCC General. Strong company; good benefits. Resumes to: Chief Eng, WEGX-FM, Three Bala Plaza, Suite 580E, Bala Cynwyd, PA 19004.

FOR SALE

FOR SALE
ENTIRE FILM-TO-TAPE SUITE
BOSCH FDL-60 w/Digital Grain Reducer, Corp. Comm. System 60 SL B2 Color Correction Computer, MAGNATECH MD-636-B4 Magnetic Reproducer w/multiple head assemblies, Two (2) Lipsner Smith CF-200 Film Cleaners, Film Editing Bench w/rewinds; splicers, etc. All equipment has been meticulously maintained, is fully operational and can be viewed as a system by prospective buyers. (212) 869-2500

Equipment For Sale 2-ACR's, plus 3,000 carts, plus Storeel storage, 1-ADDA 750 Still Store (3 Panels, plus 2 drives), 2-HL-79, 2-HL-83, CDL 480 MC Switcher, EPIC editor, CDL 480 Prod. Switcher (2 M/E). Call Don Hain, WPLG-TV. 305-325-2342.

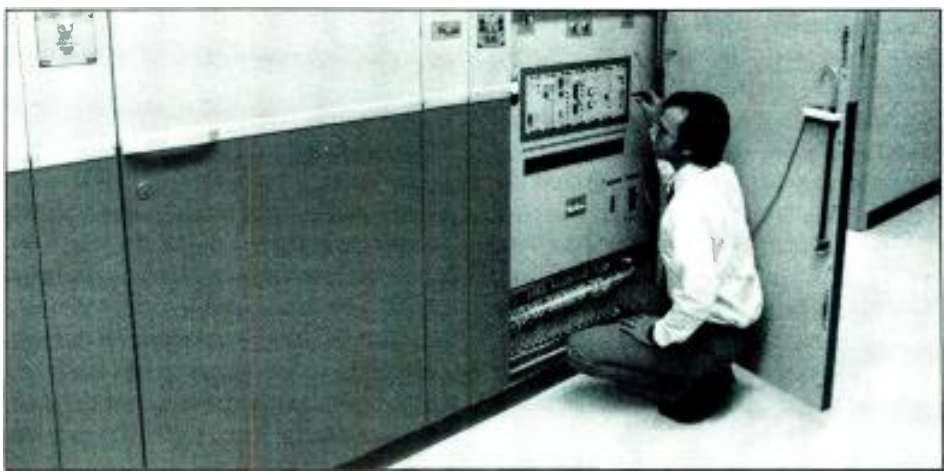
www.americanradiohistory.com

finding it "too cloudy" as to the future of a digital audio "streaming" tape medium, ITC will probably apply its technology to other media. Even Sony admits its DAT machines are not designed for broadcast use, and recent calls to distributors of broadcast equipment indicated that sales of DAT machines were very low and interest expressed by radio stations slight. Integration of a DAT machine into a radio station Air Studio as a replacement for the standard audio tape cartridge machine will be a long way off, if indeed it is achieved at all.

Far-sighted engineers look beyond the mirage of DAT and ask for a medium with the ruggedness of an audio cart and the quality associated with digital audio. Even with their imperfections, CDs are a known quantity, so it would seem that the erasable optical disk is the obvious next step.

The Maxtor Corporation has announced a removable-media erasable optical disk drive capable of storing up to one gigabyte of information (using magneto-optical recording technology). Beating both Sony and Verbatim to the punch, Maxtor also introduced a machine designed specifically for data storage, as opposed to digital audio. Although the ITC HCDA technology might be applied to this area, the era of the erasable compact disk (ECD) for the broadcaster still looks a long way off. To my knowledge no manufacturer is currently working on a broadcast ECD machine, a sophisticated piece of audio equipment which would require considerable investment of time and money against a finite marketplace.

Broadcast engineers—and radio broadcast engineers especially—are scarce. Several radio stations have cut engineering staff, while many broadcast engineers are leaving the industry.



But what about digital audio systems based on the old reliable Winchester technology or a mass audio storage system based on computer RAM (Random Access Memory: memory chips in a computer)? the answer to those questions is another question: how much are you willing to pay to be the first, second or one hundredth all-digital radio station?

In terms of cost, right now digital audio storage on a magnetic medium (hard disk or streaming audio tape) can cost more than double that of a comparative analog system. Also, there are few standards for encoding audio onto a hard disk, so media transportability is limited. And the price for large mass storage hard disks has stopped declining, due to changes in demand in the computer marketplace.

To make matters worse, the cost of dynamic RAM chips has doubled or tripled in the past year due to production cut-backs in Japan. Lead times for memory chips can be several months, and some manufacturers of computer equipment are delaying introduction of products based on high demand memory chips. These devices are the same ones that would be used for the mass audio storage that would go into your digital audio radio station. Also bear in mind it will take an awful lot of chips to store your commercial library.

And there's one final problem: who is going to install and maintain the "new technology" that you want to integrate into your station?

Broadcast engineers—and radio broadcast engineers especially—are scarce. Several radio stations have cut engineering staff, while many broadcast engineers are leaving the industry entirely for more money in other areas. Few stations are seeking young engineers to train and promote from within, while engineers qualified to implement and repair the very sophisticated machinery associated with digital audio are almost non-existent. This problem is only going to get worse.

In conclusion, the implementation of new digital technology into a radio station is going to to cost much more than most radio stations will be willing to pay. This is partly because we appear to look to Japanese manufacturers for our new broadcast technology, but these manufacturers concentrate on the consumer market where the profit margins are astronomical compared to broadcasting. Few manufacturers seem to be willing to invest the time to develop digital broadcast equipment, and so radio stations will continue to take the back seat when new technology is introduced. It wasn't so long ago that we led the way. ■

www.americanradiohistory.com

ONE THING WE DEPEND ON:

QUALITY IS EASY TO IDENTIFY.

The SP6 8-bus radio and television production console

This is the production console that our clients have long had on their wish list. It gives the radio and television production staff the flexibility and power required in today's fast paced facilities. The power of machine control logic and external module control. The power of variable frequency equalizer networks. The flexibility of mono and stereo effects buses. The simplicity of multi-track composition, and the sophistication of its control room and multiple studio communications and monitoring capabilities. A full series of accessory control panels, clocks, timers, turret components and furniture configurations complete the package. The SP6 is compact, comprehensive and dependable.

One thing *you* can depend on is Wheatstone.

Wheatstone® Corporation

6720 V.I.P. Parkway, Syracuse, N.Y. 13211 (315-455-7740)

Circle 136 on Reader Service Card page 59

www.americanradiohistory.com

The ST Series by Ward-Beck. Television's first true Stereo Console!

Ward-Beck proudly introduces the first purebred Stereo Television Console.

This is no ordinary mixing board modified and adapted for stereo TV. The ST Series has been designed, without compromise, from the ground up to give television broadcasters full stereo facilities.

The ST evolved from extensive consultation with end-users, resulting in a microprocessor controlled system incorporating totally new circuitry, new module designs, and a unique console profile for enhanced operational simplicity.

The ST3642 has ample capacity for major production facilities, while the ST2442 is ideal for on-air and smaller production applications.

The ST Series... Legendary Ward-Beck quality, competitively priced, for every television market!

WBS

First by Design.

Ward-Beck Systems Ltd.,
841 Progress Avenue, Scarborough, Ontario, Canada M1H 2X4.
Tel: (416) 438-6550 Tlx: 065-25399.

www.americanradiohistory.com