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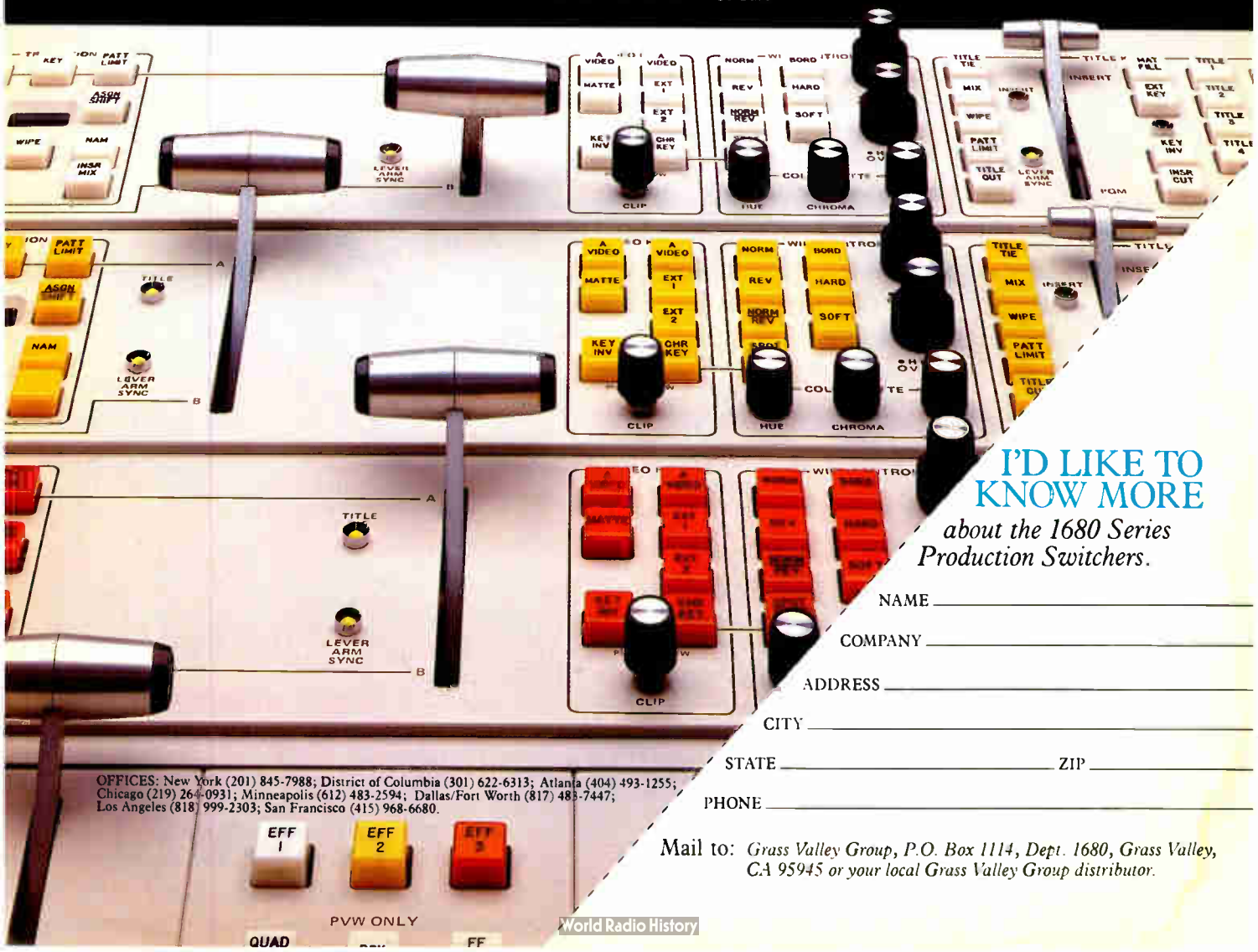

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Engineering for the Winter Olympics

FEBRUARY 1988 VOLUME 24/NUMBER 2

49 54

Features

Cover:

The Olympics is an exciting time for broadcasters as well as for the general public. Our dramatic cover of the ABC Olympics shield indicates the efforts, detailed within our pages, of the network to make it the best ever.

Departments

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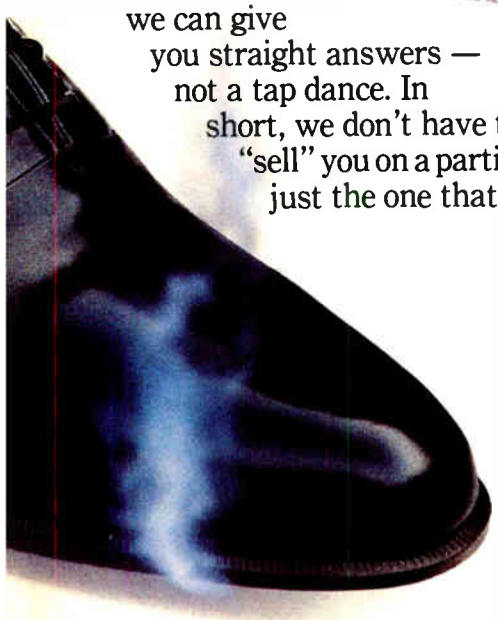

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FCC: Regulate NRSC

"...it [FCC regulation of the NRSC transmission standard] would provide a much needed impetus to get the AM side of the business out of its slump."

Since our readers comprise the bulk of the technical and engineering management in the radio (and television and teleproduction) business, most are aware that the National Radio Systems Committee has petitioned the FCC to accept its proposals regarding AM Improvement and make them mandatory. The FCC should do it.

There are many reasons for such a move. The first, and most obvious, reason is that there can be no question that the implementation of such an improvement system will undoubtedly provide a technical benefit to AM broadcasters individually, as well as to the industry as a whole. Secondly, it would provide a much needed impetus to get the AM side of the business out of its slump.

The NRSC has, in its petition to the FCC, given the industry plenty of time to comply, suggesting January 1, 1990, as the date by which all stations must have converted to the new transmission standard. The necessary modification involves the station's main audio processor and there are NRSC modification kits available from several manufacturers, many of whom have a large installed base of audio processors. In other words, it should be easy to get the proper modification kit from the manufacturer of your processor, or one that will adapt to it.

At this point, there can really be no excuse for not complying, whether or not the FCC sees the light. Many kits are available and they are typically inexpensive: in a recent NAB Engineering Report, the association stated, "The cost [of the kits] is typically less than $400 but will depend on the model of audio processor and, especially, whether you broadcast in mono or AM stereo."

Even if one of the NRSC mod kits will not work with a station's main processor, there is an alternative to buying a new processor. There are devices called NRSC "post processors" that are available from several manufacturers to solve such a problem, and the cost will be "less than $700, but more if you broadcast in AM stereo," according to the report.

It is clear, with the manufacturing community and the major trade association co-operating toward improving a troubled industry, the FCC should take the hint and respond positively to the NRSC's petition and make the conversion to AM Improvement mandatory.

Tim Wetmore

Tim Wetmore
Editor

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SMPTE Elects Officers

The Society of Motion Picture and Television engineers has announced the results of its annual election of officers and governors for the 1988-89 term.

Stanley Baron, managing director in the technical division of NBC's New York headquarters, was elected SMPTE engineering vice president, succeeding outgoing VP Richard G. Streeter of CBS, who held the office since 1984. Baron will be responsible for supervision and coordination of the work of the Society's nine technical committees.

Baron, who has been heavily involved in the design and development of digital TV systems for more than 21 years, sees a time of change ahead for the Society. "Challenges and difficult choices will be faced over the next few years," he says. "Throughout this evolutionary period, the SMPTE must be prepared to respond incisively to the challenges to ensure that the explosion of technological activity produces meaningful services and not anarchy."

SMPTE also announced the reelection of conference vice president Blaine Baker, president of MPL Film and Video, Nashville, TN; sections vice president Irwin W. Young, chairman of Du Art Film Laboratories and Du Art Video, New York City; financial vice president Stephen D. Kerman, director of sales in the television division of Tektronix, Beaverton, OR.

In a related development, the society announced that the offices of secretary and treasurer have been combined. The new position will be held by Richard K. Schafer of Eastman Kodak, Rochester, NY.

The Society also elected a new board of governors consisting of: Grant Dearnaley, National Film Board of Canada; Charles B. Nairn, Communications Technology; John C. Gates, Gates Service Group; Karl Renwanz, WNEV-TV; Robert J. Ringer, RTS; Richard J. Stumpf, Universal City Studios; Bernard L. Dickens, CBS; Earl V. Higgins, Ampex; and Donna Foster-Roizen, Telegen.

WSB-TV in Atlanta was in a prime position to cover the Atlanta prison riots of recent months. Trouble was, though the station had ordered an SNV to help it cover the events and to act as a local news source, the truck had yet to arrive. A last-minute solution was found when Centro loaned a vehicle to the station until the one it ordered arrived.

The above photo shows a view inside the operations area of Centro's Satellite Networker SNV truck.

The truck provided live shots and tape feeds for News One (ABC's affiliate news service), as well as *World News Tonight*, *Nightline*, and *Good Morning America*. It also served as the feed point for all coverage coming from the pool feeds inside the prison.

"Never before have we been able to field test a piece of equipment prior to purchase as we did the Centro truck," says Dishong. "On day three we went up on the bird at 5:40 p.m. and operated continuously until 3:10 a.m. the following morning. It was like a live shot assembly line."

WSB's truck will be equipped with a single 300-watt, four-port RF system; SkySwitch four-channel satellite communications package; full three-machine editing capability with Sony Beta and ¾-inch VCRs, Grass Valley Model 100 production switcher, and Sony MPX-29 eight-input audio console; and RTS intercom and IFB system.

Performance and Portability

The S-1 Flyaway — Another Midwest Innovation

It's the world's first hi-performance, truly portable Ku-band satellite uplink. Each of the 13 A.T.A. approved cases weighs less than 100 pounds, and the complete system conforms to international baggage regulations. Checked as excess baggage, the S-1 arrives when you arrive. Economically.

The system utilizes a Vertex 1.8M offset-fed antenna with a transmit gain of 46.6 dbi. This precision, aluminum surfaced reflector antenna meets the 29-25 $\log \Theta$ FCC 2° spacing curves.

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Video and audio control and monitoring equipment are included in the standard S-1 package. Options include a 2-way communications channel, and an international receive configuration is available. The S-1 is also easily adaptable for data transmission. Contact Midwest for complete information.

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Class A Broadcasters File with FCC

In a filing with the FCC that is sure to have national ramifications, the New Jersey Class A Broadcasters Association (NJCABA) has filed a petition for rulemaking, proposing that the Commision revise its rules and allow a power increase for Class A stations from 3000 to 6000 watts. This increase in power is rated at a height above average terrain of 100 meters or equivalent.

The power increase is expected to have either negligible or no impact on Class B stations and none at all on Class C facilities. The NJCABA filing includes three levels of protection for Class B stations as follows:

1. Class A stations now sufficiently spaced to adjacent channel Class Bs would protect the Bs to approximately the 58 dbu contour.

2. Class A stations shortspaced by less than 10 km would protect the Class B 60 dBu contour.

3. Class A stations shortspaced more than 10 km would protect either the Class B 64 dBu contour or the same contour to which the Class B protects the Class A.

Class A stations are themselves currently protected only to the 60 dBu contour, at best, and shortspacing further reduces that protection, according to the filing. The efforts outlined in the filing are intended, of course, to improve what representatives of NJCABA claim are "serious and worsening" coverage conditions.

The NAB has been informed of the filing and, by February, should have issued an official statement. Meanwhile, NJCABA awaits the FCC procedure of public comment, followed by review.

Teleport Links U.S., Europe, USSR

BrightStar Communications will upgrade its U.S.-Europe television transmission services under the terms of a recently signed two-year agreement with Washington International Teleport (WIT). The deal, worth an estimated $1.5 million, moves all of BrightStar's traffic functions to WIT's satellite broadcast facilities in McLean, VA.

BrightStar specialized in direct and two-way television transmissions to and from points inside the U.S. and Europe. WIT will be responsible for handling BrightStar's 24-hour technical services, domestic uplinking and downlinking, microwave services, and transatlantic telephone lines.

BrightStar moved from Westar IV to Intelsat 332.5 East on January 1. The move doubles the company's broadcast capacity and allows both Ku-band and C-band transmissions.

WIT played an active role in broadcasting the recent U.S.-Soviet summit talks, transmitting over 100 hours of live feeds daily, 24 hours a day. Its domestic and international customers for the summit services included the European Broadcasting Union and the U.S. Information Agency, along with BrightStar, ABC, CBS, the Canadian Broadcasting Corp., TV 7 Australia, and WTN.

WIT's ability to provide direct feeds from various U.S. government sites, including the State Department and Capitol, enabled direct transmissions to countries throughout eastern and western Europe. The teleport boosted its transmission capabilities with extra transportable international and domestic earth stations from Crescomm, and a mobile domestic earth station from Horizon Satellite.

Cohen to Get NAB Engineering Award

Jules Cohen, president of Jules Cohen & Associates in Washington, DC, has been selected by the NAB's engineering conference committee to receive the Association's Engineering Achievement award. The award will be presented to Cohen at the engineering luncheon on April 9 during this year's NAB convention in the Las Vegas Convention Center.

"Jules is considered an engineer's engineer and is held in high regard throughout the broadcast industry," notes committee chairman T. Arthur Bone. "This award honors him for a tremendous number of contributions over a 40-year career."

Upon his release from the Navy after World War II, Cohen entered the field of consulting engineering, a career he has maintained for 42 years. He was the author of Appendix C of the Cable Television Advisory Committee Panel II report to the FCC, which dealt with the problems of echoes in TV systems. Furthermore, as chairman of the engineering committee concerned with interference to TV broadcasting from noncommercial FM stations, he similarly had a pivotal role in the development of the rules adopted by the FCC for governing the assignment of FM stations in the 88.1 to 91.9 MHz frequency band.

Cohen also represented TV broadcast interests as co-chairman of the Technical Analysis Working Group of the Land Mobile Radio/UHF Television Technical Advisory Committee, as well as radio broadcast interests in combatting the 1979 proposals to reduce AM channel spacing 9 kHz. For the past ten years, he has worked exclusively in the field of the effects of nonionizing radiation.

Pacifica to Restore Radio Archive

An aging archive of noncommercial radio programs, some nearly 40 years old, will be restored with the help of a grant from the National Archives.

The National Historical Publications and Records Commission of the National Archives awarded $55,000 to the archive to aid in the restoration work. Karen Ishizuka, Pacifica's director of development, said the matching requirements of the grant dictate that the archive must raise an additional $12,800 from other sources. Approximately $105,000 has already been raised for the restoration project, including individual donations, and other funding grants from the Limantour Fund, the Wallace Alexander Gerbode Foundation, the Walter and Evelyn Haas Fund, and the L.J. and Mary C. Skaggs Foundation.

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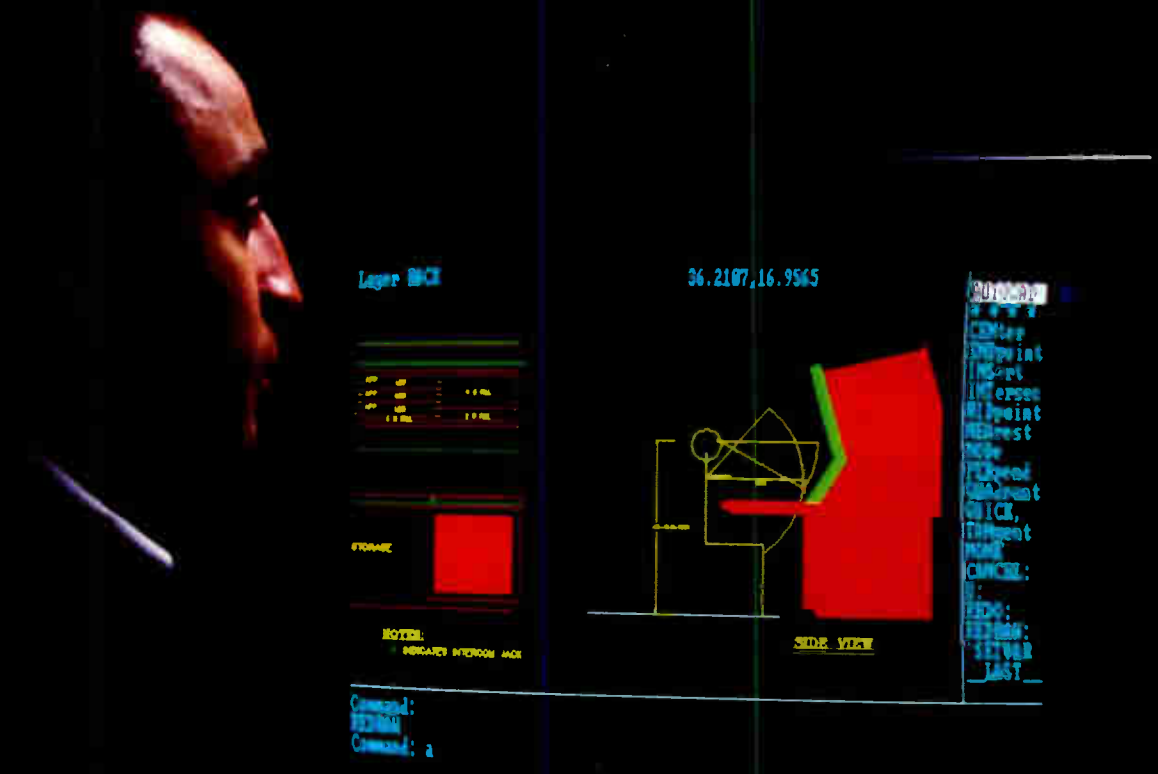

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The Pacifica Radio Archive, founded in 1949, is believed to be the oldest collection of noncommercial radio programming in the country. Its library of more than 22,000 programs dates back to the early 1950s. The oldest programs are deteriorating due to age and antiquated tape stock. Approximately 7000 programs are scheduled for restoration.

The archive's catalog includes many rare recordings, including 1960's recordings of T.S. Eliot and Bertolt Brecht reading their own works and 1950's debates on nuclear war between Edward Teller and Linus Pauling. The collection is fully catalogued according to Library of Congress standards and MARC formatting and is accessible to the general public.

CBC to Launch News Channel

The Canadian Broadcasting Corporation (CBC) will begin operating a new English-language news and information channel next fall, according to a recent announcement by CBC president Pierre Juneau.

The service, which will operate 24 hours per day, seven days a week, will be distributed via satellite to cable TV systems around the country and consist of three operational bases in Calgary, Toronto, and an as-yet undisclosed location in eastern Canada.

"This decision presents us with the most exciting challenge that English television has faced in many years," said Denis Harvey, vice president of English TV for the CBC.

"The new channel will offer a contemporary service designed to further fulfill the CBC's mandate to reflect each part of the country to all the others. It gives the CBC the opportunity to make extensive use of the information programming skills of our staff from coast to coast."

According to the CBC, first-year operating expenses are estimated to be $19.2 million, with all capital to come from advertising and subscriber revenues; no funding will be provided from existing CBC budgets. The company will also hire approximately 190 new employees to staff the service during its first year of operation.

Burns' Media Predictions for '88

Integrating hardware and keeping up with new technology are only two components of an engineering manager's responsibility. He must also be able to carefully assess and react to market trends and changes in programming.

In that light, we present some predictions for the new year from Los Angeles-based media consultant George Burns, president of Burns Media Consultants. Please note that the views expressed here are not necessarily supported by *BM/E*, but are presented for the convenience of our readers.

"I'm not working with a Ouija

board in making these predictions, I'm reflecting on a concensus developed as people spoke their minds to me or my staff on a variety of subjects related to their lifestyle preferences," says Burns, who adds that more than 20,000 subjects were involved in one-on-one interviews conducted by the company over the past year.

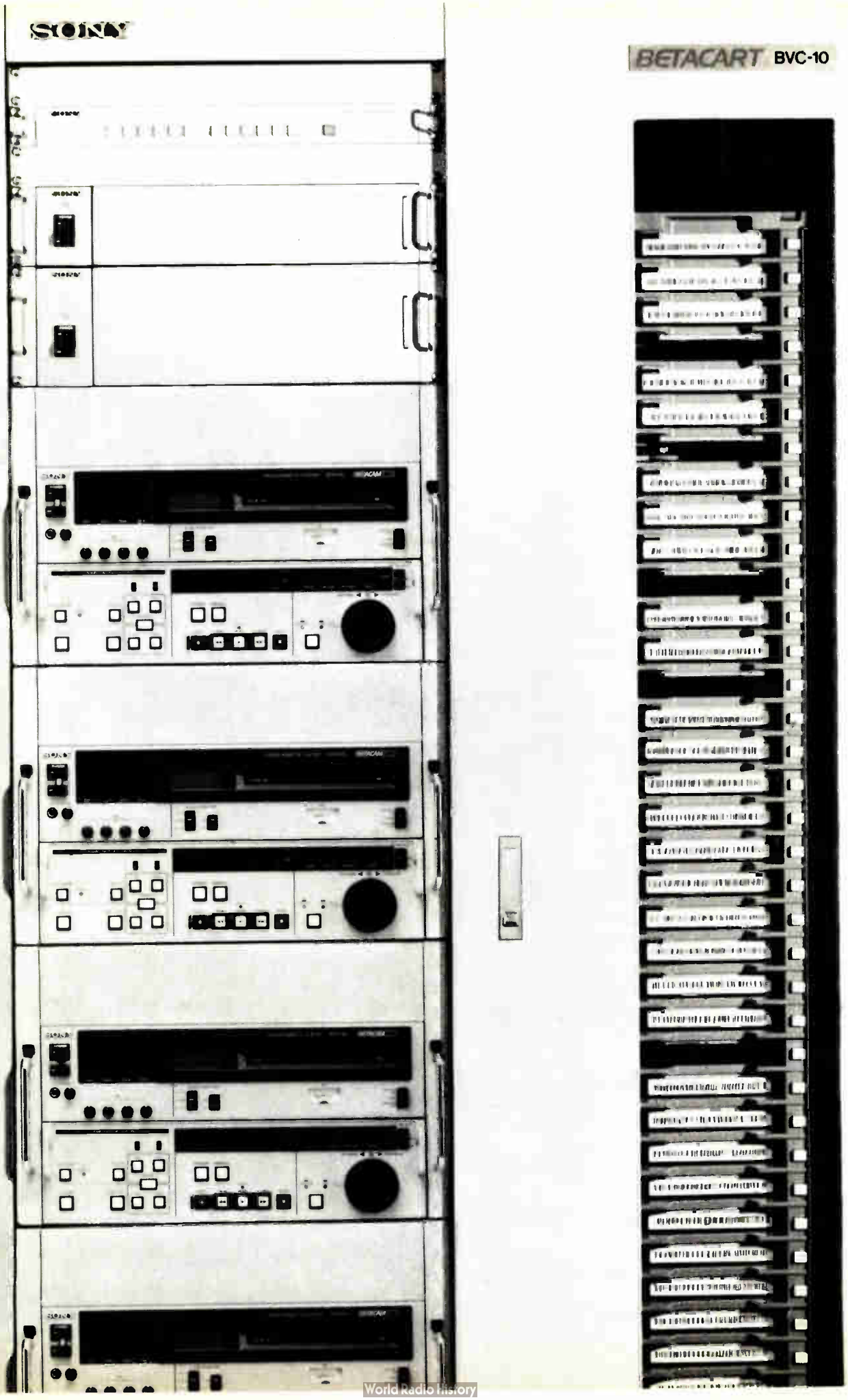
Among Burns's predictions:

- Female-oriented radio music formats (e.g., easy-listening, soft rock) will shrink drastically and lose most of their impact during '88 and be replaced by male-oriented music formats (i.e., album-oriented rock), completing a trend that became apparent during 1987.
- All-news radio will be reduced to a "briefing service," concentrating solely on the "three T's": time, temperature, and traffic—indicating that even the news has gone over to TV, pushing radio from informational programming to an informational "mood."
- The portable CD player for automobiles will become a major threat to radio's future, because the unit's programability allows drivers to be their own DJs.
- Country radio music formats will continue moving back to the "traditional" forms, with an emphasis on artists such as Ricky Scaggs, Reba McEntire, Randy Travis, and Dwight Yoakum.
- Cross-over music in black radio will be nonexistent, with play lists concentrating instead on "black radio for black listeners." Cross-over artists (e.g., Michael Jackson, Prince, Whitney Houston) will instead compete with each other for airtime on the Adult Contemporary stations.
- The "New Age" music format—introduced to great acclaim in 1987—will go absolutely nowhere in 1988.
- There will no longer be a radio audience for music in five years if radio does not begin to program music to the specific needs of the young teen audience. The radio station that wants to be successful in 1989 must start developing a format that appeals to young men (i.e., ages 18-24) in 1988.
- The country will redefine companies as "management centers" and cut away excess overhead and personnel. In 1988, the drift will continue to a "1099 (i.e., freelance) way of working." Jobs will be farmed out to an increasing number of independent contractors who offer well-defined specializations at a reasonable rate.

Correction/Clarification

In the December, 1987, issue of *BM/E*, Bern Levy's byline was accidentally omitted from "Lenses: Maintaining Your Image" on page 27. *BM/E* regrets the error.

Also, in the format comparison chart on p. 41 in "New Formats for News," Y bandwidth for VHS and S-VHS should have been 3MHz and 5MHz, respectively.



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Broadcast Products

NEW COLUMN

Treading the Tightrope

By Robert Rivlin

Friends of mine who edit or write for computer magazines tell me it's almost impossible for them to go to a party or family gathering without at least one person asking for their personal recommendation of a computer brand.

My own parallel experiences during the past several months have convinced me that the broadcast/teleproduction and computer industries are even closer than any of us realized: I've had an almost constant barrage of phone calls asking for my personal suggestions as to graphics systems, station automation, high-power transmitters, HDTV systems, routing switchers, etc.

"Look," I tell people. "I don't know any more than you do." Because no matter what our backgrounds, editors of trade magazines are essentially journalists. All we can do is take the information given to us by manufacturers, combine it with what we hear from those using the equipment, add a measure of personal insight and intuition, and then report what we have learned fairly, with balance, in what we write.

Still they persist. "Take off your editor's hat for a moment," they say. "Tell us what's really going on, which way the industry's headed."

"You know I can't do that," I patiently explain. "It's a violation of confidence. Anyway, why don't you just go and ask the manufacturers?"

And always the answer is the same. That the manufacturer never really tells them anything. That if there really is a new product or technology in the wings, the manufacturer must clear out the current inventory before introducing anything new. That delivery dates are misquoted. That performance criteria aren't met.

The editor walks a tightrope between the manufacturer and his potential clients, between his desire to tell everything he knows or intuits and the necessity of holding back confidential information, between being a journalist and being an integral part of the industry.

"Hire yourself a consultant," I tell people who call. "Meanwhile I'm writing a new column for the magazine that you may find helpful."

☆ ☆ ☆

Just when you thought it would be safe to begin venturing into the CCIR-601 waters, just when you thought that there really was a digital studio standard allowing equipment to be interface, comes the upsetting proposition that the digital studio standard may not be fully adequate.

The question being asked concerns the standard for piping digital signals around the plant. The current standard, RP-125, proposed by a SMPTE committee under the chairmanship of Merrill Weiss after months and months of work, says that the serial transmission standard should work with eight-bit quantization. Now that more and more digital equipment is coming on line, however, and the burden being placed on the digital signal for even more complex muiltilayering and multiple passes, it's become evident that eight bits may not be enough.

The problem is simply that when eight-bit signals are summed together, as they frequently are when doing special effects and editing, extra bits are generated. When should these bits be removed? In the prevailing method, they can be averaged at the time the signals are summed, allowing the whole image to be carried in an eight-bit signal. What is becoming apparent, however, is that this approach to digital signal processing yields poor results when multiple signal passes are required; after only 10 generations of iterative signal processing and averaging, there is a perceivable signal degradation.

What to do? Peter Symes, John Abt, and others at the Grass Valley Group have been the leading proponents of extending the standard to allow for 10-bit as well as eight-bit transmission. (Indeed, the parallel interface standard already provides two additional wires to carry bits nine and 10 of the signal if they are available.) This has the effect of postponing the signal averaging of extra bits created during digital summing until the last stage of processing.

"At some point every digital signal has to be reduced to eight bits," notes Symes, "because that's the standard for digital recording. But if you have the capability of retaining the extra bits until that point, why round off the signal each time you process it?"

Grass Valley has taken just such a step, and has provided for a 10-bit parallel interface within its Kaleidoscope, routing switcher, and DA systems.

Not everyone is agreed, however, that the industry should adopt a new transmission standard "Why not have a 12- or even 16-bit transmission standard," ask Quantel's Richard Taylor and Howard Shephard? "Then we'd cut out errors altogether. But we don't have these high data rates because they're much too expensive to implement in a TV plant."

Shephard also makes the point that the amount of quantizing error depends on the particular type

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of digital signal processing used to sum the two signals together. "Because of the way we handle the signals with our Dynamic Rounding technique, we don't get discernible errors when they are summed," he insists.

A SMPTE committee chaired by Merrill Weiss of NBC is currently looking into the problem. "It's possible that eight bits are enough for a 4:2:2 signal," he comments. "But as people begin to look at 4:4:4 signals required for extra-high-quality work it may prove that 10-bit or even higher transmission will become a necessity."

☆ ☆ ☆

Dave Smith, VP of WBFF, Sinclair Broadcasting's Channel 45 in Baltimore, will take you on a strange tour of his city these days. Driving around with a portable TV set without any antenna at all, he will show you that the station's UHF picture compares favorably in quality with any of the three VHF stations in town viewed on a set with rabbit ears in almost every viewing location within a 10-mile radius of the tower.

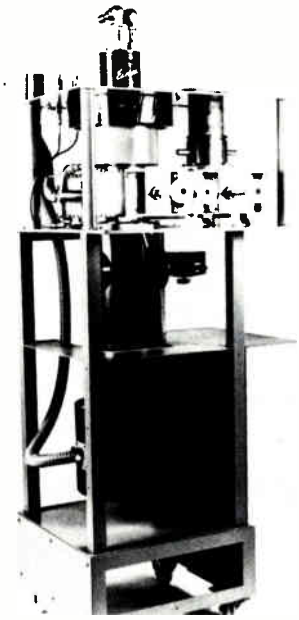
Smith will also tell you that the Channel 45 picture quality is more than just an engineer's subjective evaluation. Compared with what it was putting out just a year ago, the station's effective field strength for its close-in area has been raised at least 3 dB and as much as 15 dB (a 10 times increase). Distant viewing areas have not been affected.

According to Smith, a number of factors have contributed to WBFF's greatly improved signal strength. The most significant, however, has been the conversion from a high-gain to a low-gain waveguide antenna.

WBFF, like many other UHF channels, had originally sought to increase its ERP without placing a significant drain on its power consumption, by coupling its 80 kW transmitter to a high-gain antenna, producing a three megawatt ERP.

The station soon discovered, however, that although viewers in its 30- to 50-mile fringe area were quite well served by the antenna's relatively narrow beam width, those living close to the tower—70 percent of the audience—received a rather muddy picture.

WBFF's solution, undertaken when the station relocated its tower last summer, was to shift to a low-gain waveguide antenna. "The results shocked the hell out of me," Smith confesses. As predicted, the ERP was dramatically decreased—to just one megawatt. But the increased beam width raised the effective field strength to the levels described above; near-in picture quality improved greatly while fringe area reception did not significantly degrade.



Varian's klystrode tube will revolutionize UHF transmission.

Smith is generally a believer in super-powered UHF, and this summer will increase the station's capacity with a Comark 360 kW model. But he's also eyeing, with keen interest, Comark's development of transmitters based around Varian's klystrode tube—transmitters that promise to be able to deliver twice the efficiency of klystron-based units.

The increased transmitter power/low-gain antenna solution won't be right for every station," Smith warns. "If your tower is located some distance away from your primary viewing area, then the high-gain antenna approach will still probably work best. But for many stations located in large urban areas, this could be a real boon."

☆ ☆ ☆

Would Jim McKinney ever have received certification from the Society of Broadcast Engineers if the Society hadn't had a grandfather clause? This burning question—raised by McKinney himself—seemed to concern no one at January 13's Washington, DC, lunch in honor of McKinney. The former chief of the FCC's Mass Media Bureau, who recently jumped ship for a new job at the White House, was honored for his recent election to Fellow of the SBE.

Dick Rudman, the SBE's immediate past president, emceed the informal gathering at the Washington Marriot. "One of your contributions," he quipped as he presented McKinney with the framed Fellowship certificate, "was to take away a lot of the things people relied on, or that they thought they relied on." McKinney responded with a few words about licensing, certification, and his relationship to both.

"I am particularly honored to receive this now after I've left the FCC, and when I'm no longer in a position to do you any good," McKinney smiled. He called his 24 years and one month at the Commission "the most wonderful quarter century anyone could plan to have if they really tried for the ideal job." He noted that he had supported the SBE from its initial founding and was one of the first members of SBE's certification program.

"I quickly add that I was one of the first because you had a grandfather provision and I didn't actually have to take the exam," he continued. He recalled, however, that he had less luck persuading the FCC to grant him a license.

"I tried to convince them that since I wrote the test, they should just give me a license," he related. His efforts failed, so he simply took each section after he finished writing it. "I scored 100 on all the sections," he added, "and I was probably the only one to do so, because some of the questions were wrong."

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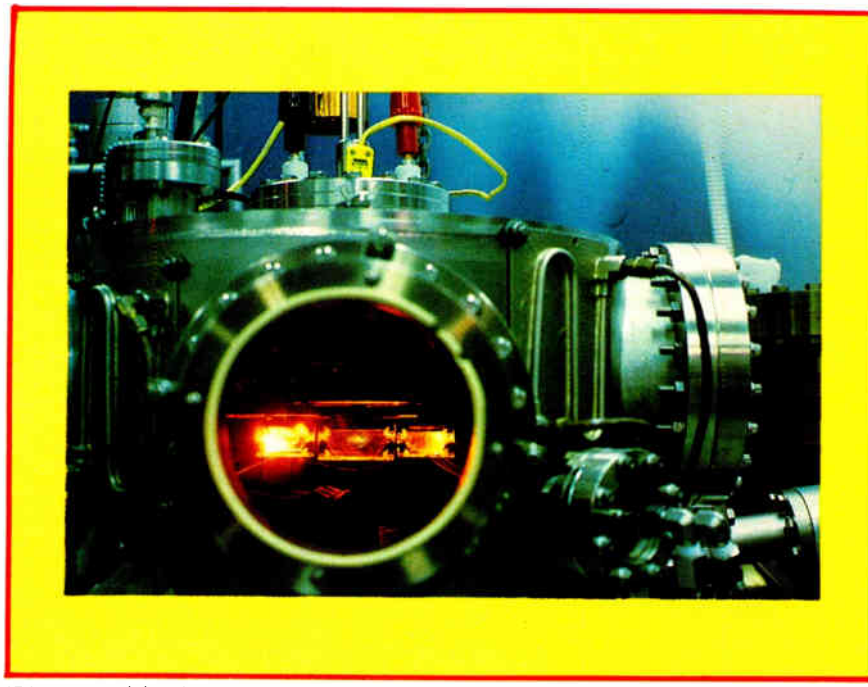
NEW COLUMN

Broadening Applications for Superconductivity

By Tim Wetmore



IBM uses this electron-beam vapor deposition system for preparing thin films of superconducting material. The three sources of yttrium, barrium, and copper are shown glowing as a result of heating by electron beams.

The central communicating modules of an all-digital video plant are floating in plexiglass cases holding baths of liquid nitrogen. Remote control panels are connected by fiber optic cable to the walls of the plexiglass which, in turn, feed control data to the floating yttrium-barium-copper-oxide ($YBa_2Cu_3O_7$) compound that serves as the connector holding the communicating module. This makes for a very clean, very fast, and very quiet facility, but nonetheless a facility shifting digital video data around a huge plant at speeds one would dream of for the future.

Precisely. This video production facility (that can process 3D rendering and other videographic data at speeds far exceeding a Cray computer) does not yet exist. Nor will it soon. Nevertheless, the impact of superconductors will be felt in the forseeable future, and it is in a scenario similar to the one just described that it is likely to affect the engineering manager who designs and maintains the computerized video plant of the relatively near future. Of course, there are those who doubt the viability of such technology.

It is important to remember at this point that absolutely no one predicted that the largest application in the world, by far, for lasers would be in the compact disc player, or that lasers would have any real-world applications beyond microsurgery. Also keep in mind the opinion of experts on fiber optics not too long ago.

With that in mind, a future for superconductors can be, very loosely, projected. As it is now perceived by those laboring in the R&D of superconductivity (currently at AT&T Bell Labs and at IBM Research), there are likely to be two classes of practical applications for superconductors, though when there is a scientific breakthrough it is impossible to predict how something might ultimately be used.

Probably the first and most wide-spread application will occur in large-scale situations, as in generators of all kinds. Specifically this refers to generating a magnetic field, like with a motor or something like magnetic energy storage. Possible uses here would be in power lines and heavy industry. The second class would likely be in the electronics-related fields, these being the most wide-ranging in terms of variety of applications. Of course, for video, the application seems most relevant because as digital video in all its forms continues its ubiquitous growth, it takes on the physical properties, in effect, of being a computer, and there are many applications predicted for superconductors in this area. Enter IBM.

Though AT&T Bell Labs has made some very significant re-

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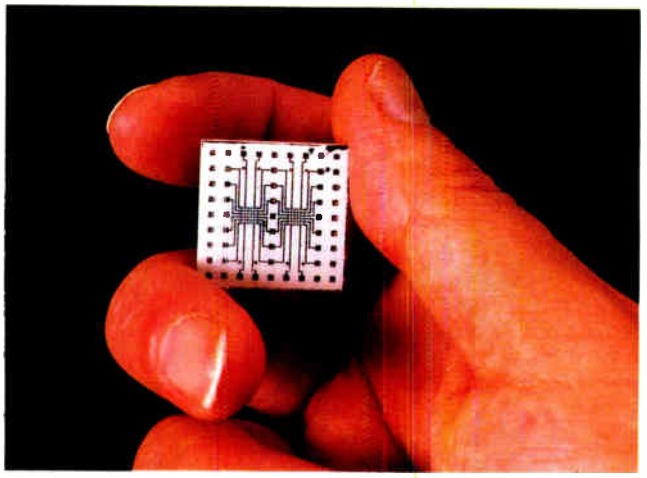
Magnified more than 500 times, the first thin-film, high-temperature superconducting quantum interference device—or SQUID—is shown here.



The above photo shows a ceramic substrate patterned with high-temperature superconducting wires made via IBM plasma spraying.

cent discoveries in the field of superconductive research, it has been IBM that has made the major inroads. For example, the 1987 Nobel Prize for Physics went to Georg Bednorz and Alex Mueller, two IBM researchers at the company's Zurich facility. The award was for the discovery that a new class of materials exhibited superconductivity at much higher temperatures than ever before thought possible. From 1973 until the IBM discovery in 1986, there had been no progress in superconductors above 23 degrees Kelvin (absolute zero is 0 degrees Kelvin, -460 degrees Fahrenheit).

As a point of order, superconductivity is a phenomenon in which materials lose all their resistance to electricity and can therefore carry current without producing wasteful heat. This phenomenon was discovered in 1911 in Holland by Kamerlingh Onnes, who found that at temperatures close to absolute zero certain metals, alloys, and chemical compounds lose all their electrical resistance. The effect has been employed in medicine, oil exploration, and high-energy particle physics research—all areas that can afford the expensive liquid helium required for superconductivity.

The recent discoveries of other properties of $YBa_2Cu_3O_7$, however, have permitted the ceramic compounds to be cooled by liquid nitrogen, which is both less expensive and operates at a higher temperature. Obviously, these are desirable conditions for finding practical uses for superconductors. Still, the fundamental barrier to widespread applications in both heavy, magnetic field applications and in the smaller, electronic circuitry area is: How do we get materials or conditions that will permit superconductivity at higher temperatures (above the 77 degree K boiling point of liquid nitrogen—equivalent to -321 F).

Perhaps the biggest obstacles to practical application are the transition temperature of the superconductive materials and the physical nature of the materials themselves. The transition temperature refers to that temperature at which the material begins to exhibit superconductive properties; the more it is cooled below the transition temperature, the more superconductive it gets. As to the physical properties, the commonly used yttrium-barium-copper-oxide (which now has a transition temperature of 90 K) ceramic that is used in advanced superconductors is very brittle, thus limiting its use.

However, as Dr. Gerald Present of IBM Research notes, "High-temperature thin films have been made by IBM researchers resulting in a device called a SQUID (Superconducting QUantum Interference Device). The SQUID is an extremely sensitive magnetic field detector and, though these devices had previously existed, they were not in the 'high' temperature range of 90 K. This, of course, opens the door to more practical applications permitting scientists to use the common industrial technique called plasma spraying. This is used to coat large and complex shapes with superconducting material with the possible future application being the fabrication of magnetic shields for sensitive electronic equipment."

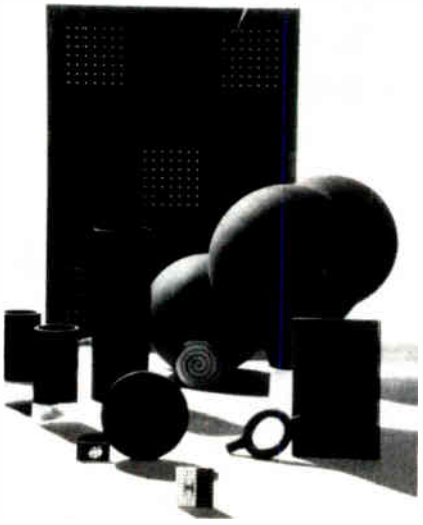
Subsequent to this development, it was discovered that the new materials were inherently capable of carrying 100 times more electrical current than was previously believed. The measured critical current capacity of more than 100,000 amperes per square centimeter at liquid nitrogen temperatures is sufficient for most potential applications. So the current is there, but what about efficiency?

Again, IBM's Present relates, "By developing techniques to produce pure bulk crystals of the new material, researchers can examine the fundamental properties that bear on superconducting behavior. One of the first important results of this work was the discovery that the superconducting current can vary by as much as a factor of 30 depending on its direction in the crystal. This property, called anisotropy, might par-

tially explain why typical samples of the new oxide, which are generally composed of a multitude of tiny crystals oriented in random directions, show low values of critical current.

Elsewhere, AT&T's researchers have been able to develop the superconducting compound, modified through a new melt-processing technique, resulting in 1000 amperes per square centimeter in a field of one Tesla at 77 degrees K. One Tesla is roughly 30,000 times the intensity of the earth's magnetic field. "This opens up another area of research," states AT&T Bell Labs' Bruce van Dover, "namely operating newly developed applications within a magnetic field. That is a condition you cannot escape. A positive aspect of current research is that there is no evidence that there is any fundamental barrier or natural block to getting the materials to work at higher temperatures and greater magnetic fields. It's just a matter of development."

All right. When will it be here? How soon can we expect practical applications to begin showing themselves? No one is willing to answer that question. For the video/audio world the impact seems a bit further away than other areas such as high-speed rail transport or fields in which long transmission lines carrying high current are necessary. Nevertheless, computers and electronic instruments are prime targets. One of the remaining stumbling blocks is that it is not yet clear if it is possible to develop switching devices that would take advantage of the high temperature superconducting material, thereby replacing semiconductors, computer chips, and the interconnectors between chips.



Shown here are a large variety of objects coated—by plasma spraying—with high-temperature superconducting material.

Until then, we can only dream about levitation experiments and our floating, superconducting digital video plant of the future. And while you're trying to repair a 15-year-old quad machine or patching around a decrepit routing switcher, remember the SQUID.

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Bang.

ABC Receives Engineering Gold For Winter Olympics Coverage

By Joe Roizen
Photos by Donna Roizen

ABC proudly displays its shield for the 1988 Winter Olympics in Calgary.

As we head into the winter games, scheduled for February 13 to 28, ABC will tackle the awesome technical challenge of covering a greater breadth of venues with more live broadcasting and an even higher level of production value than ever before. Remembering the excitement of the U.S. hockey team's triumph in Lake Placid or the first U.S. downhill gold medal will thrill both viewers and engineering managers alike as the network commits more time, more money, and a more elaborate, though temporary, facility than has been seen anywhere before.

ABC, the network that has acted as both the host broadcaster for two sets of games (Lake Placid 1980, Los Angeles 1984), and the U.S. rights holder for eight more Olympiads, is easily the most experienced in covering the quadrennial extravaganzas of the ultimate in world-class sports competition. The 1988 Winter Games in Calgary, AB, are ABC's sixth overall and fifth sequential Winter Olympics, a forum in which they have had an unbroken string of technical successes that started with the 9th Olympiad in Austria, and has continued for more than 24 years.

Efficient use of space "modular" facilities to

ABC's engineering concepts have left no stone unturned in applying the most advanced video and audio technologies to the coverage so as to bring into the living rooms of its viewers the best images and sounds possible. Combined with an excellent team of experienced commentators, some of whom are Olympic medallists in the sports they cover, ABC will bring more in both quality and quantity than ever before.

From the modest 17.25 hours the network covered in Innsbruck in 1964, it has steadily increased its coverage by almost six times to the nearly 100 hours it plans for Calgary (see Figure 1). New

equipment, some specially configured for cold weather sports coverage, employing the most modern technology, will provide the best pictures even from the most distant of sites.

Even as the hours of broadcast time have gone up significantly, so has the cost for obtaining the Olympic rights mushroomed. Olympic television rights for the Winter Games have gone from what now seems like a paltry $50,000 in 1960 (Squaw Valley) to a record high of $309 million in 1988, an increase of 6,180 times the original cost. In fact, even when compared to the $15.5 million ABC paid for the Lake Placid Games just eight years ago, the over 1800 percent increase is truly staggering.(See Figure 2.)

These figures represent the first time in Olympic history that a U.S. broadcaster has paid more for the basic TV rights of a Winter Olympiad than for the longer and more universally popular Summer Games ($309m in Calgary versus $300+m a percentage in Seoul) and, in fact, there is speculation that this development may price the winter games off the commercial broadcast networks for the future since it is unlikely that commercial stations alone can support the price tag. It should be noted, however, that NBC has an undisclosed profit-sharing arrangement with the Koreans for the Summer Games.

as a prerequisite in designing the e used at this year's Olympics.

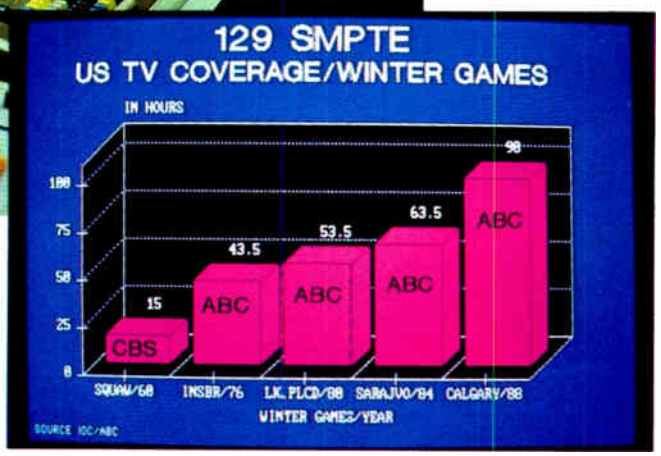

Figure 1: Historical perspective on hours of Olympics coverage.

At a pre-Games press conference in Calgary in late November, Roone Arledge, ABC's perennial Olympic executive producer admitted that his network might lose as much as $30 million, even though 30-second prime-time spots were going for $265,000 apiece, and even though most of the available commercial time (96 percent) was already sold. As a result of this financial dilemma, Arledge predicted that future Olympic television coverage may have to be on a shared basis between several networks or networks and cable, and others are predicting that 1988 may be the last year of "free" Olympic television for American viewers. Even so, the 1988 Winter Olympics as broadcast by ABC will have an American audience estimated at something over 200 million.

Regardless of the mounting fiscal pressure, ABC does not seem to be skimping on the Olympics, as Cap Cities has been doing in other areas. Most statistics relating to the network participation in the 1988 Winter Olympics is up from Sarajevo four years ago. More hours on the air, more production space, more miles of cable, more technical equipment, even more microphones for better audio, and, of course, more people both from the home base as well as local hires.

Another unique burden that confronts ABC's engineers will occur after the games are over, oddly enough, when they must remove the mountains of equipment in five days to accommodate an incoming trade show. Much of the equipment will see duty at the Democratic and Republican national conventions later in the year.

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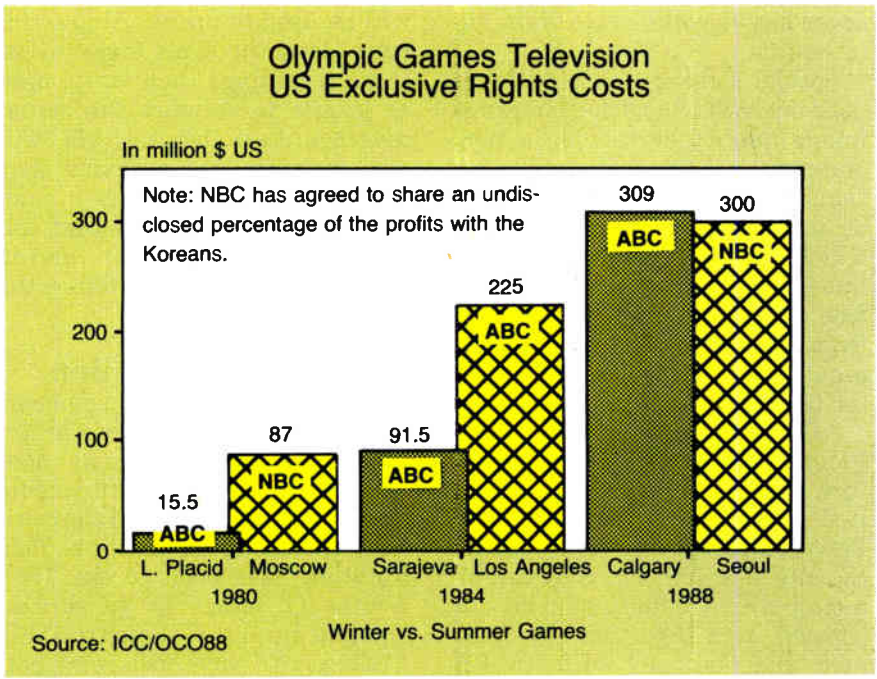


Figure 2: Inflation grips Olympic Rights Costs

The technical facility

Due to the demands of ABC's vast coverage of the Olympics, both in equipment and personnel, ABC was the only outside broadcaster to be allocated a completely separate building, the Round-Up Center, adjacent to the IBC in Stampede Park. ABC will occupy 65,000 square feet of space, more than double that of Sarajevo. The space is split between 55,000 square feet of interior area and approximately 10,000 square feet of outside trailer space. The relative size of the operation may be appreciated by comparison to the next largest international broadcaster—a 30-country consortium of the European Broadcasting Union (EBU) and the Organization of International Radio & Television (OIRT)—which has a combined total of just under 31,000 square feet in the IBC.

Naturally, planning an event of such scope requires engineering management with experience in design and construction of large-scale facilities. Olympic operations veterans Herb Kraft, VP of operations, and Dave Elliot, director of engineering, supervised the planning and installation of the large television center whose three-camera main studio for host Jim McKay was larger than that of any ABC affiliate. The rest of the temporary installation was described by Dave Elliot in some detail:

Using the word temporary is somewhat misleading. There are fully functional walls being built to house the various departments located within the center. What is most unique about the structure and design of the facility is that it combines tractor-trailer units connected to standing, permanent buildings with walls and other separating structures to make for a "modular" facility. The electronics and the structure design are interconnected in such a way that they must be considered together.

The core of the operation in Calgary consists of two control rooms, and four master control communications units. Control Room A, which is the main operations center, achieves a new record for winter games in that it has a wall of 100 video monitors that can simultaneously display feeds from all of the venues, as well as what is going on in the anchor studio adjacent to it. This is all in a trailer with a fold-out wall that integrates the trailer into the building in which it is parked. The monitors, in fact, fill up 13 racks along the wall of the trailer.

In 1988, ABC also has the follow-on task of covering both the Republican convention in Atlanta and the Democratic convention in New Orleans. As a result, ABC engineers have designed the Calgary control rooms and master control units so that they can be removed intact, shipped to New York where they will undergo slight modification, and be ready for service at the political conventions. Following the conventions, the production trailers will be stored in New York for future remotes of major proportions.

This innovative approach to handling a series of large television events with the same equipment is considered a significant first by the engineering staff. ABC actually assembled the central part of its production facility in New York, ran some tests on the system, then shipped it in a 20-unit tractor-trailer convoy to Calgary for on-site installation.

The switching and technical control of the broadcasts is augmented by 38 Ampex VPR 3 Type-C one-inch machines, each with Zeus digital signal processors on board. Enhancing the visuals will be three Chyron character generators, a variety of special effects, and other computer graphic services. Two trailers house the graphics area, where the computer graphics systems can create or reproduce Olympics-oriented images to support or better explain the competitors' activities. Five Dubner character background generators illustrate the action, or information, through animation and displays stored in the computer. ABC graphic artists have, in fact, created an abundance of premade graphics that can be called up as needed.

As an example, ABC has three Abekas A42 digital disk still stores, each holding 700 frames of video with pictures of the athletes' faces, various scenic backdrops, and computerized graphics. ABC will also use a variety of computer graphic systems such as the Quantel Paintbox, Grass Valley Kaleidescope, and the Cubicomp PictureMaker to

create and manipulate both live and digitally-generated images.

Camera coverage

Camera coverage of the XV Olympiad will also be at an all-time high for ABC. While having full access to the 146 cameras that CTV uses to provide the international pool feed, ABC will also use some 45 exclusive cameras and seven mobile units to give U.S. viewers Olympic coverage tailored to American tastes.

Geoff Mason, an Olympic TV veteran of past games and who is now ABC's VP of Olympic production, says that the network has critically selected different camera positions from those of the host broadcaster because experience has taught them where the most exciting points are in an Alpine event or hockey game, for instance. As a result, ABC's viewers will get a somewhat different, and, according to Mason, a more exciting visual image of the athletic events. For the first time in Olympic history, there are sufficient cameras and mobile units to cover any downhill race from top to bottom.

Special cameras are also being used by ABC to either improve image quality or to give a new perspective to the fast moving action. Some ABC cameramen will be using the Ikegamic CCD770, which features solid-state color image sensors that are relatively free of tube-induced blurring effects. This new ENG camera will provide a new level of flexibility for following the athletes.

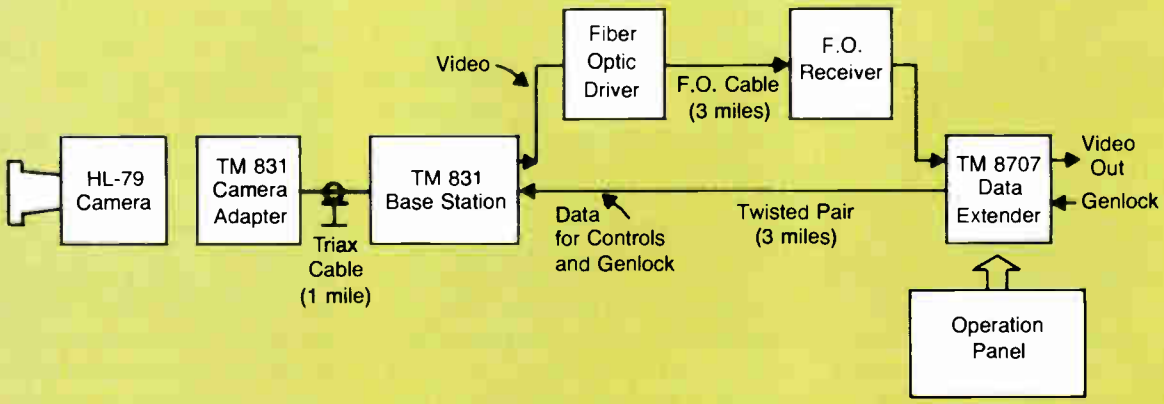
ABC has also improved its Point-Of-View (POV) sub-miniature camera, first used in a limited application in Sarajevo. The POV cameras are so small (about the size of a fist) that they can be mounted on a helmet, a ski boot, a bobsled, or a luge. Battery operated and equipped with an RF backpack or a tiny VCR, these micro camera images can be relayed or recorded to give viewers the vicarious thrill of being inside the arena or on the bobsled track.

While POV cameras will not be used in actual competition (perhaps it is against IOC rules), they will be used to prerecord practice runs along the same trajectories, these recordings then being used as inserts to enhance the actual coverage. As in the past, ABC will also probably use a device they call a Skycam, which is a computer controlled camera that can be raised, lowered, or moved sidways along a cable to follow the action in front of it.

Slow and stop motion

ABC has always been a pioneering network in the use of the latest technology to present non-real-time images of sports events that give clearer views of the critical moments of competition. This tradition goes back to the 1964 Winter Olympics at Innsbruck, and continues in Calgary in 1988. ABC has two ways of showing better slow and stop motion images than ever before. For the ultimate in crystal-clear frozen images, or sharp slow motion, the network will have the Sony Super Slo-Mo system, employed with acclaim in Los Angeles, and for good standard non-real-time images, it will

System Block Diagram of Camera Control System at the Olympics



ABC, in an effort to expand its variety of coverage of the Olympics, has ordered from Telemetrics a video camera control system. The system is designed to control a video camera from a distance of four miles away. The unit will include all normal camera control functions such as iris, master pedestal, and genlock over a twisted pair. In combination with a fiber optic transmission path and a Telemetrics triax base station, complete control of a standard ENG camera located at the top of a mountain will be accomplished.

The TM 8707 data extender unit consists of (a) video distribution amplifier (b) genlock circuitries (c) data encoder and driver. Together with the fiber optic system, the extender unit enables the triax system to extend the operating distance for up to three miles.

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A Clean Sweep

For every one of their new cameras, CTV Television Network, Ltd., host broadcasters for the '88 Winter Olympics, selected Fujinon — more than 78 lenses in all. In the strongest domination of the games, all the action captured by CTV cameras — from the widest panoramas to the longest, tightest close ups on the slopes — will be through Fujinon lenses.

Covering the downhill like it's never been covered before, Fujinon is providing a new secret weapon...the longest focal length lens ever used in broadcast television. Watch the races and see the difference.

Twenty-eight new CTV cameras will be equipped with the industry-proven A44X9.5ESM. From a wide 9.5mm out to 420mm and an F1.4 maximum aperture flat to 240mm (F2.5 at 420mm), the 44X takes first place for the best ramping characteristics in the long focal length competition!

Fujinon's brand new 13kg A34X10ESM will be on 10 new CTV cameras. No larger than the lens it replaces (the A30X11ESM), its coverage is wider and longer. From 10mm to 340mm with an F1.6 that's flat to 229mm. Naturally, it has a built-in 2X extender.

In the handheld competition, Fujinon wins hands down with 28 new CTV cameras equipped with the A14X9ERM, 7 cameras with the A8.5X5.5ERM ultrawide zoom, and five cameras with the A18X8.5ERM. All three compact, lightweight, weatherized lenses have built-in extenders.

Long the industry's favorite ENG lens, the A14X9ERM zooms from 9mm to 126mm while the maximum aperture is F1.7 out to 103mm. For events demanding wider and longer coverage, the 18X provides 8.5mm to 153mm range with an F1.7 aperture constant from 8.5mm to 116mm (F2.3 at 153mm). And for wide angle abilities, nothing beats the A8.5X5.5ERM. It's an F1.7 that zooms from 5.5mm to 47mm. And even with its 1.7X extender in position, it provides a familiar 9.4mm wide angle.

In addition to the CTV cameras, most of the production companies supporting the coverage will be bringing Fujinon equipped cameras. And, naturally, Fujinon will be on hand to provide field support. After all, one reason Fujinon lenses are so widely used is Fujinon service — it's as good as gold, too.

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use Ampex VPR 3s with Zeus.

Super Slo-Mo is a combination of a special color camera and a one-inch helical VTR where the original images are taken at 180 fields per second, three times the rate of normal television. Individual fields are then reconstructed into interpolated frames, thus rendering pictures that have one-sixth the interfield motion of a normal TV frame of 1/30th of a second. As an example, a skater moving at 30 miles per hour goes about 44 feet per second, so in the time of a normal TV frame he or she will move 17.6 inches. With a camera "exposure" of 180 fields per second, the actual movement is only 2.9 inches.

In Calgary, Super Slo-Mo will capture and detail a variety of sports such as Alpine skiing, figure skating, hockey, ski jumping, and even the luge and bobsled events. Super Slo-Mo is an expensive, bulky device that requires a substantial crew to operate it. As a result only a few units will be available in Calgary for the most important sports events where such time manipulation is almost mandatory. However, ABC has another potential for good non-real-time images through the use of the Ampex-developed, Zeus-type processors on the standard one-inch Type-C recorders.

The Zeus processor makes the best of the ability of helical recorders to operate in slow or stop motion because each head track contains a full video field. Zeus uses digital processing to reconstruct individual fields into television frames by accurately displacing a repeated field into a perfectly interlaced frame. This process removes the basic interfield motion, and avoids the vertical jitter often inherent in non-real-time VTR playbacks. As a result, slow and stop motion instant replays on Type-C machines give clearer still images.

Prerecorded inserts

ABC's coverage of past Olympiads has always greatly benefitted from the extensive preparations the network makes ahead of time to provide highly relative program material during the actual competition, but shot well in advance. Following that tradition for the XV Games, the ENG crew dedicated to this activity, which is called the "Up Close and Personal" unit, has been very busy recording segments that reflect the "human" side of the Olympics and its participants. This unit is supervised by Noubar Stone, an ABC producer who has ranged all over the world with his team to profile the athletes, coaches, or national teams in their own environments.

For the '88 Winter Games, this unit has produced 82 such profiles ranging from East German speed skater Karin Enke, who managed to get two Gold Medals in Sarajevo in 1984 but now finds motherhood a more important personal activity, to Ingmar Stenmark of Sweden, the Slalom and Giant Slalom hero of Lake Placid, who got himself disqualified in Sarajevo and is now a "laid back" resident of sunny Monaco, a long way from his Nordic roots.

This peripatetic crew has also produced some 55 feature stories on the training methods in various countries, and these try to explain the reasons why certain countries, in spite of their smaller populations, dominate in some sports. The mystery of how the East Germans, with only one tenth the population of the U.S. can come within 3 percent of the Americans in Olympic medals has been revealed in the piece on the critical methods of choosing and training athletes in that small European country. That was Stone's opinion after doing the feature, and he has equally interesting segments shot in Moscow, Norway, and even Marion, IN. Features made in these, and many other places, will serve to round out the ABC coverage of the Calgary Games.

The sound of the games

Audio, the stepchild of television that has recently been coming into its own, will occupy an important role in ABC's coverage of these games. The "natural sound" aspect of the coverage has been carefully studied by acoustic engineers given this task by both ABC and CTV, the host broadcaster. As a result, both have cooperated in the installation of additional microphones to provide a vivid aural backup to the images that will be distributed. Both Roger Goodman, the director of ABC's Olympic coverage, and Ralph Mellanby, the executive producer for CTV, stated that the viewer will literally hear the athletes breathe.

Suprisingly, stereo is not a factor in these games. CTV staff members explained that few of the international broadcasters wanted stereo feeds because they don't have stereo on the air in their home countries, and didn't want the extra expense. ABC itself has no stereo on the air in New York, and only 20 percent of its affiliates are currently broadcasting MTS with their pictures. Instead, it was decided to add a special punch to the audio by going all out in the area of precise placement of microphones to catch every audio nuance clearly, and relay that to the viewer.

After the joint ABC/CTV engineering study last summer, they laid out a plan to use two to three times as many audio pickup points as has ever been used before at many of the venues. An unprecedented 60 microphones will line the men's downhill, and that is three times the number of color cameras that dot this precipitous 3097-meter course. Similarly, the 70- and 90-meter ski jumps will each have 20 mics, and no sound will escape detection. There will be a mic at the top of the jump, six along the downward ramp to the point where the skier takes off, one to catch the sound of the landing, four at the end of the run and six among the crowd watching the perilous event. If that is not enough, two handheld mics will follow the jumper's trajectory, and it is one of these that will catch the sound of the landing!

The rest of the audio highlights are in the same vein: 30 micro-

phones on the bobsled run and 20 on the luge; 25 to 38 mics at various cross-country skiing events; hockey will have special mics at each goal, over the rink, next to the players benches, and the penalty box. There will be additional mics around the 32 targets used in the biathalon, and Goodman claimed that viewers will hear the bullets hit the target.

Live broadcasts

One of the major advantages that ABC enjoys at these Winter Games as compared to the most recent ones in Sarajevo is the ability to go live from the venues in prime time. Sports that Americans love to watch like hockey and figure skating will be on the air at the best possible hours to assure maximum viewership and, hopefully, very high ratings. ABC has Also banked on its extensive Olympic experience and its unilateral flexibility to cater specifically to what they consider to be special U.S. tastes. For instance, at the new indoor speed skating venue, which is the only one of its kind in the world, ABC cameras will shoot toward the spectator stands while CTV cameras shoot towards the wall that acts as a backdrop to the skating oval. ABC staff members feel that the sense of speed is heightened against a stationary audience, and they decided to do it that way. Incidentally, this is the first time that speed skating has ever been conducted indoors and at night. The ideal conditions that will prevail in this venue are expected to lead to some new world records.

This is not the only area that ABC has gone out of its way with to assure American viewers a unique window on the unfolding athletic and ceremonial events. In summing up, Dave Elliot described some of the special technical features of the installation in Calgary to cope with the Winter Games: First, he was quick to point out that they have assembled the most equipment ever gathered for a Winter Olympics, and even with that, they have had the shortest setup and tear-down time in their own recent Olympic history. In the end, the 16 planned tractor trailers expanded to 20, and six of these are actually parked inside the Round-Up Center where they serve as the heart of the ABC television operation.

Elliot also described the nine edit bays, each equipped with three Ampex VPR 3 one-inch recorders, all with Zeus processors; a Grass Valley switcher; Kaleidescope effects; an ISC editor, now called a GVG 41; and a Graham-Patten audio console that will do the daily program production right on site. Backed up by all of the magic black boxes that modern technology can produce, ABC is prepared for an Olympics that will be long remembered. **BM/E**

About the author:
Joe Roizen is the president of Telegen, a communications firm serving the broadcast industry.

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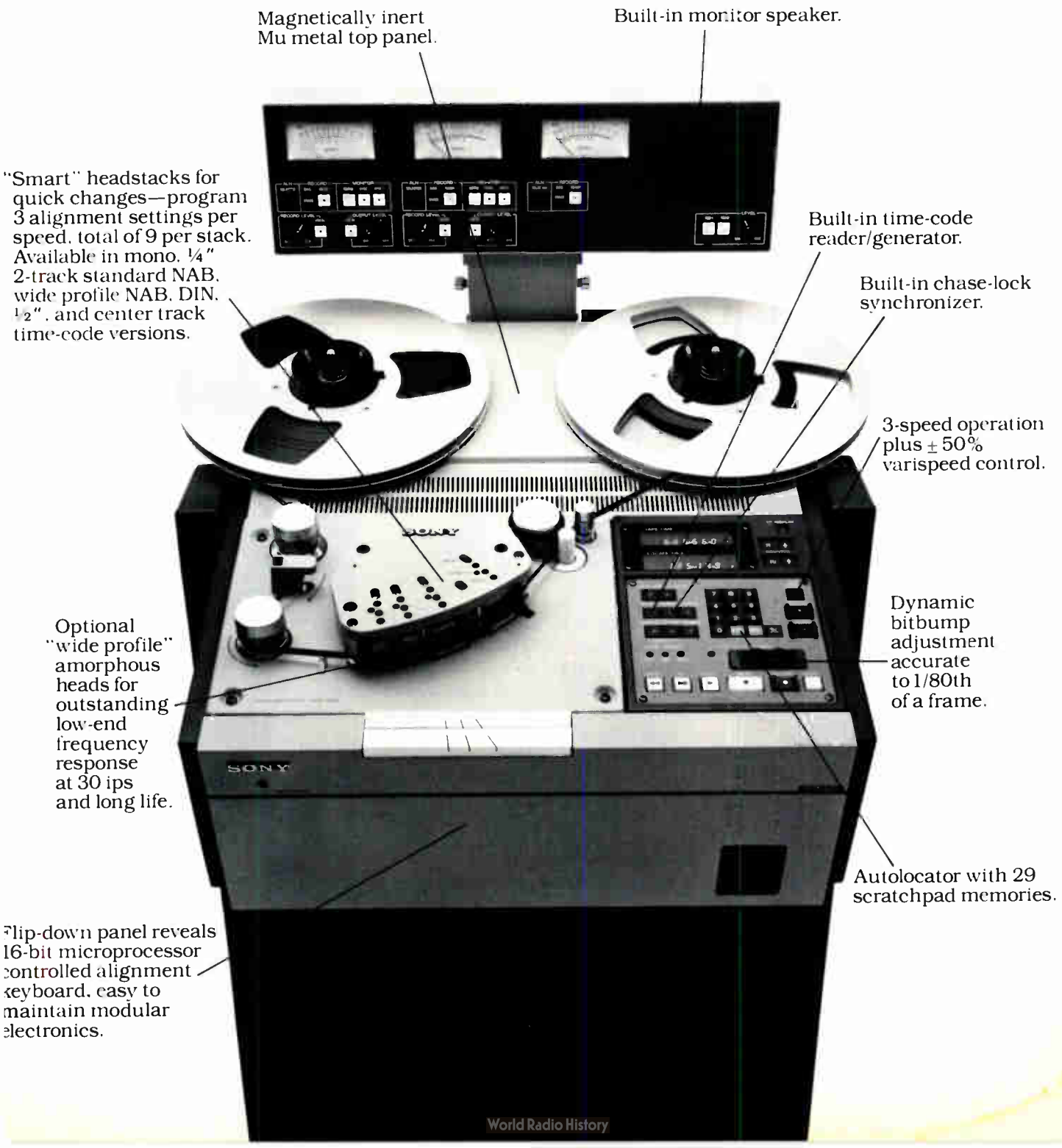

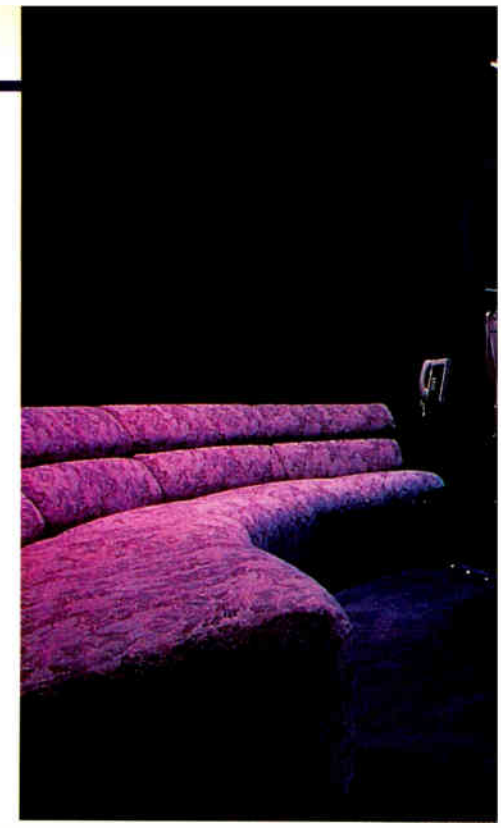

Partners In Innovation

By Eva J. Blinder

On-site beta testing at working facilities is an increasingly critical phase of product development. For teleproduction facilities, the partnership with manufacturers has big plusses and a few drawbacks, too.

"Be the first one on your block!" It's the watchword of teleproduction facilities in any market where more than one post house competes for a limited number of clients. And what better way to be the first with an innovative new device than to serve as a beta test site?

But beta testing is not without its drawbacks for busy facilities. Valuable employee and equipment time must be devoted to testing new—and possibly buggy—hardware and software before a device in beta test can be tried out on paying customers. If the facility is already booked, the time for testing and training may come out of the engineers' sleep. Besides, even if the manufacturer has tested the product or software rigorously in-house, unsuspected gremlins may appear in actual use. In seeking to be the latest with the greatest, teleproduction houses may also risk being first with the worst.

Nevertheless, beta testing provides unique opportunities for facilities, not only to stay ahead of their competition, but also to influence the development and final configuration of a device or system that may prove central to their operation. For manufacturers, a beta test program is the best way to get user and client feedback on a product while it is still in development.

"Manufacturers can find a good deal of the bugs in new equipment," comments Rich Thorne, senior vice president of The Post Group. "What they're looking for in beta testers is people who really can put the systems into use in ways that they can't in a manufacturing facility." In addition, Thorne suggests, manufacturers are "looking for a kind of expertise in different areas that they normally cannot hire out on their own." It is the exposure to client needs and ideas that makes beta testing so valuable, Thorne states.

"Many times, a client will come up with a particular need in software that will end up being a part

Edit One at Post Perfect. The facility, which officially opened its doors on October 1, has been a beta test site for Wavefront Technologies for a year and a half.

of a product," he continues. "Basically, what a manufacturer is looking for in a beta testing situation is the kind of feedback that will point out all the problems a system may have, but will also find out applications and enhancements that their equipment has the potential for achieving."

Pat Howley, president and chief engineer of Post Perfect, comments, "You've got to dedicate some time and energy and people" to testing new equipment and software, especially if you've got a clunker." Clunkers, fortunately, are few and far between at beta test sites. In its beta testing experiences, Post Perfect has run into "nothing that has really hurt us," Howley adds. "We've experienced only positive things from being a beta test site. Otherwise we wouldn't do it."

He notes, however, that beta testing has its own version of Murphy's Law: the first paying client to use a software prerelease "uses a feature in the software that you haven't checked, and bingo—you're down."

Rita Sitnick, vice president/general manager of Editel/New York, says that her facility is conservative in deciding which products to beta test.

"We have no fixed policy," she explains. "We entertain each case specifically as it comes up." The close facility-manufacturer relationship involved in beta testing is not always an advantage, she notes.

"The up side [of beta test work] is that you have the first information on a new product and get to work on something brand-new, immediately when it comes in," Sitnick says. "The down side is that if you lock yourself into a particular manufacturer, you may at a later point in time find that that's not the place you really want to be. In beta test deals, you have to make commitments that you may not be ready to make, especially in competitive situations."

This caution, however, does not

Paintbox artist in Editel/NY's digital design suite. VP/GM Rita Sitnick says her facility does beta work when it "benefits us in the long run to give that manufacturer our input on what we think about the changes."

preclude less formal testing relationships, where Editel may test new software releases for equipment already in-house.

Friendly criticism

Such informal arrangements are common, even at facilities that do extensive beta testing. Howley notes, for instance, that Post Perfect does both formal and informal "beta site" work. Currently, the facility has formal beta test site status with Wavefront Technologies (for its 3D graphics system) and with VTA/Utah Scientific (for the da Vinci color corrector.) Often, however, Howley and his associates simply will "sit down with the manufacturer in the early days of the device and tell them what we'd like to see."

For example, although Post Perfect has no formal beta testing relationship with Grass Valley, the company's interest in the GVG Kaleidoscope has led them to review and suggest on an informal, continuing basis.

"We saw the K-scope when it was first introduced," Howley recalls, "and we gave [Grass Valley] a list of about 30 things we'd like to see improved or added. At the next trade show, all these things were incorporated" into the device. As a rule, he says, manufacturers are "hungry for user information—and we supply them with it."

Howley adds that input from Post Perfect has influenced the development of some other Grass Valley devices as well, citing expanded keying in the 300 switcher. He concedes that his voice is only one of many in the post-production community, however.

"We like to think we were one of the people who shouted the loudest and got it done," he says. Howley and other engineers, such as Thorne, note that the suggestions most likely to make it into a product are those that come from many sources.

It is far from uncommon for facilities that test a new device to come up independently with the same idea or innovation, especially if that innovation would boost operations significantly. Even if no one facility may take complete credit for an idea, however, their independent suggestions and ideas augment each other and greatly increase the likelihood that the manufacturer will incorporate it into the final production model.

Even without a formal beta test site relationship, a post house may use its purchasing power to persuade a manufacturer to change a product. According to Howley, Post Perfect will sometimes sign a conditional purchase order for a new product that doesn't quite meet the facility's needs.

"It gives the manufacturer a real incentive to incorporate your desires" into the finished product, he says, "much more so than the 'build it this way and then I'll think about it' approach." For example, he relates, "We had a conditional purchase order with Chyron for two Scribes. We told them, 'We'll take it with a mass storage option and some way of networking the two together.' "

He adds, "We try to make sure that we write into the purchase order some guarantee that we're not going to be obsolete in a year, that the product will have upward compatibility."

Building on the research

According to Thorne, the role of beta testers has changed somewhat over the last few years, as manufacturers' market research techniques have become increasingly refined. In the past, he says, products were often launched with good ideas but inadequate research on real-world needs. Nowadays, major manufacturers tend to do extensive market research before and during product development.

"With the ADO, for instance," Thorne notes, "there were a lot of things that were discovered during beta testing that were lacking in the original ADO that were oversights on Ampex's part. In most cases they were complex software changes but fairly simple hardware changes." The device "developed based on customer feedback into what it is today," Thorne adds.

Charlex Paintbox artist Page Wood. "Generally, manufacturers want a beta site as close to home as possible so they can babysit," says CE Paul Mitchell.

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Much of the negotiation between a manufacturer and a beta site involves cost-benefit analysis of the proposed improvements, he continues.

In fact, Thorne opines, the increasing sophistication of the equipment itself poses new challenges for manufacturers that intensify the need for beta testing.

"At the time the original ADO was produced, it was a fairly good guess on Ampex's part that this product would be a smash hit," he says. The original ADO was a first-generation product, and therefore market desires were less clearly articulated at its introduction than they are now, however.

"At this point, the objective [of manufacturers] is to produce the next generation of product," he continues. "The leaders in the 3D graphics field, for example, knew that there was no product out there, so for the first products they put out they could essentially draw from their own experience and knowledge. The second generation, however, evolved with a lot of input from our people and other people in the industry. Now that you've got the basic tool, the specific features become a critical part of who buys what."

The Post Group's Wavefront Suite. "With a 3D system, generally, beta testing is also training for your people, " says senior VP Rich Thorne.

Give and take

Especially with an established product, beta testing often takes the form of refining existing features and trying out relatively small changes, rather than suggesting major operational or technical alterations. Depending on the manufacturer and the product, beta testers play a more or less active role in actually developing new features.

In its beta work for Wavefront, for example, Howley notes that Post Perfect rarely writes actual software changes.

"We write a lot of utility programs to use the Wavefront modules in different ways than other people," he explains. "But they don't release their source code, so we really don't modify Wavefront code." New software releases, therefore, come directly from Wavefront, although they are often in response to user requests.

For really new ideas, however, the facility may take a much more active role. Howley comments that when Post Perfect needed a 4:2:2 digital telecine, it approached Rank Cintel with the idea.

"They built one custom, just for us, and then they made it a product," he recalls. "We like it when something that's built for us becomes a product." Because of the difficulty of supporting a unique product, he adds, "We don't want to have the only one of anything. We want a one- or two-year jump on our competitors, but after that we want them to have it, too."

At Charlex, chief engineer Paul Mitchell says he and his staff initiate many product ideas.

"It usually works like this," he relates. "I have an idea for a product that I don't want to build myself, so I take the concept to a manufacturer that I think might be receptive. Sometimes it turns into a product and sometimes I end up building it myself." Even if manufacturers are initially cool, the concept may end up as a commercial product, he continues.

"As far as I'm concerned, the in-

The Post Group's Linda Rheinstein with Harry artist Helen Davis in the facility's Harry suite.

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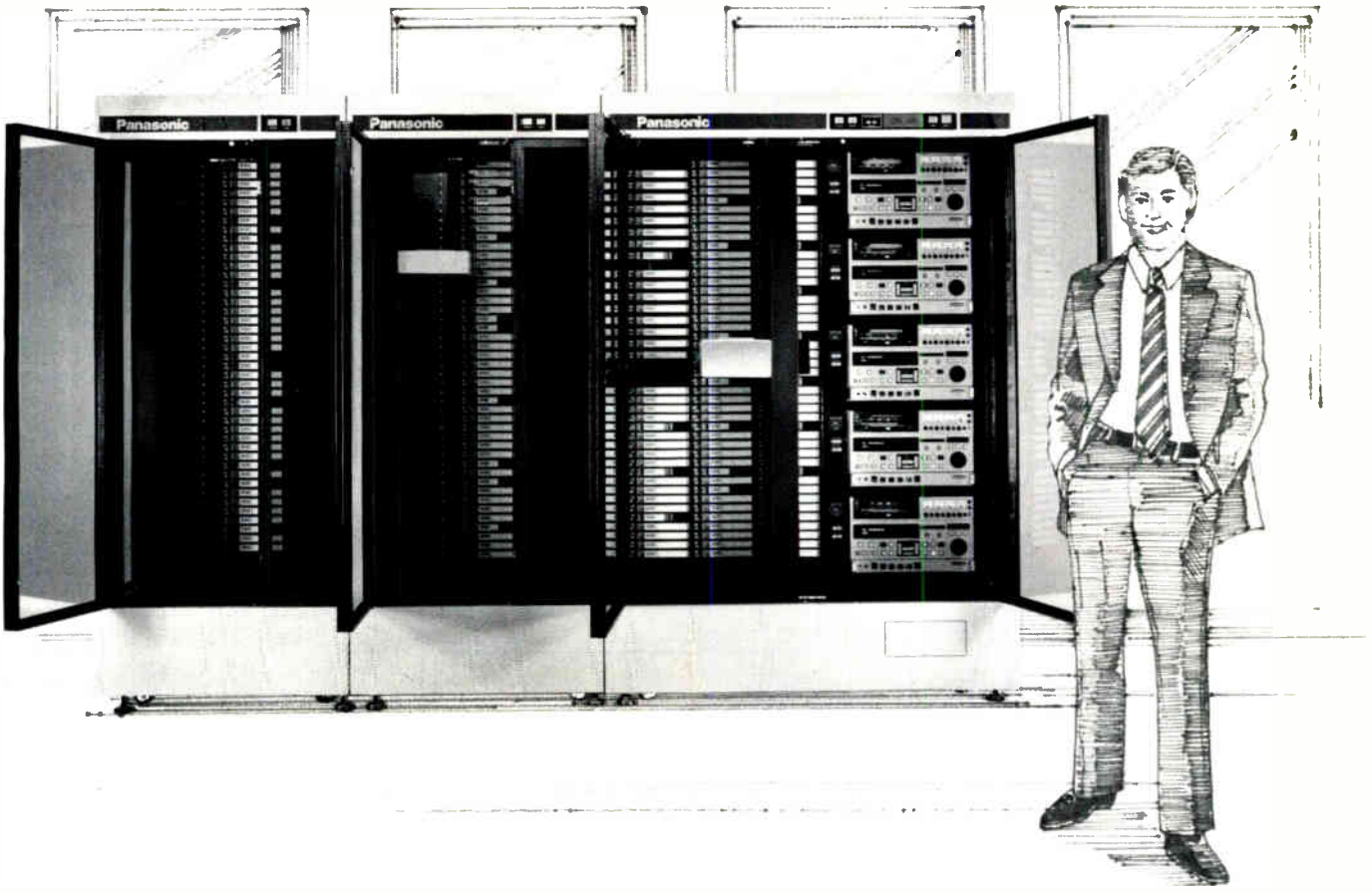

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dustry is a little staid as far as new product features are concerns," Mitchell suggests. "I think the industry is getting more cautious. There are not so many boxes anyone wants to buy these days at $150,000."

One idea that eventually ended up in a commercial product, according to Mitchell, was a cobbled-together "blur box" that created "a temporal blur, the old LSD effect." Mitchell had put together the device for a Police music video that was being postproduced at Charlex and was dismantled afterwards. While it was in use, however, Mitchell showed it to representatives of Quantel, and he believes it helped inspire a similar feature in the new Rainbow product.

At The Post Group, similar give-and-take aided the development of the Quantel Mirage, which was beta tested there, as well as at other sites.

"The Mirage is a product that you can tell has gone through serious renovation since its original introduction," Thorne states. "It's a completely different machine today than it was when it was introduced, and the changes came about through beta testing and customer feedback." He continues, "In the beginning, several things were missing from the design. First, the control panel had no true 3D functional capability on-line on the part of the user. The second was that there was no significant lighting in the machine that would make 3D really possible, and the motion capabilities of the machine really were inadequate." One by one, Thorne says, Quantel addressed each of these deficiencies in response to feedback from The Post Group and other beta test sites. The Mirage is now "a very usable machine, a great, inexpensive way to produce 3D graphics," Thorne says.

The Post Group is currently involved in active beta testing of the CMX 6000 random-access editing system, and Thorne relates some of the developments that have occurred since beta testing began on the system.

"The 6000 was originally planned to be a two-hour maximum system," he notes, "and it was originally planned to be much simpler than it currently is. In the original system, there was very little thought of in the way of auto assembly capability, absolutely no planning for late-arriving material, and probably no planning for multicamera, sitcom-type editing."

The Post Group got involved in beta testing the 6000 early on, Thorne says. "When we saw where the product was [when it was introduced], we immediately hit them with several things that we felt it needed to really be a system. Extended auto assembly was one of those, along with the absolute necessity to have the ability to input late-arriving material,

which is a frequent need in off-line situations." (The original 6000 was equipped with a Panasonic read/write disk player with 13 minutes' capacity, but this was intended for use as a video buffer to speed access time.)

"Any time you beta test site a product, there's a million other little details that were not a part of the original product that eventually get worked in," Thorne adds. "Probably 50 or 60 details in terms of the software and capabilities of the 6000 have been changed in the last eight months, although none of those were basic design flaws." The major agenda items have either been fixed or are in the process of being worked out, he notes.

"What's happening right now is that the multicamera system is under development," he continues. "There's tremendous interest in using the 6000 as a multicamera, sitcom-type editor." System capacity is also being upgraded to three hours and eventually to four hours.

"That's a significant evolution, considering that the original feeling was that the system was going to be a half-hour system," Thorne states.

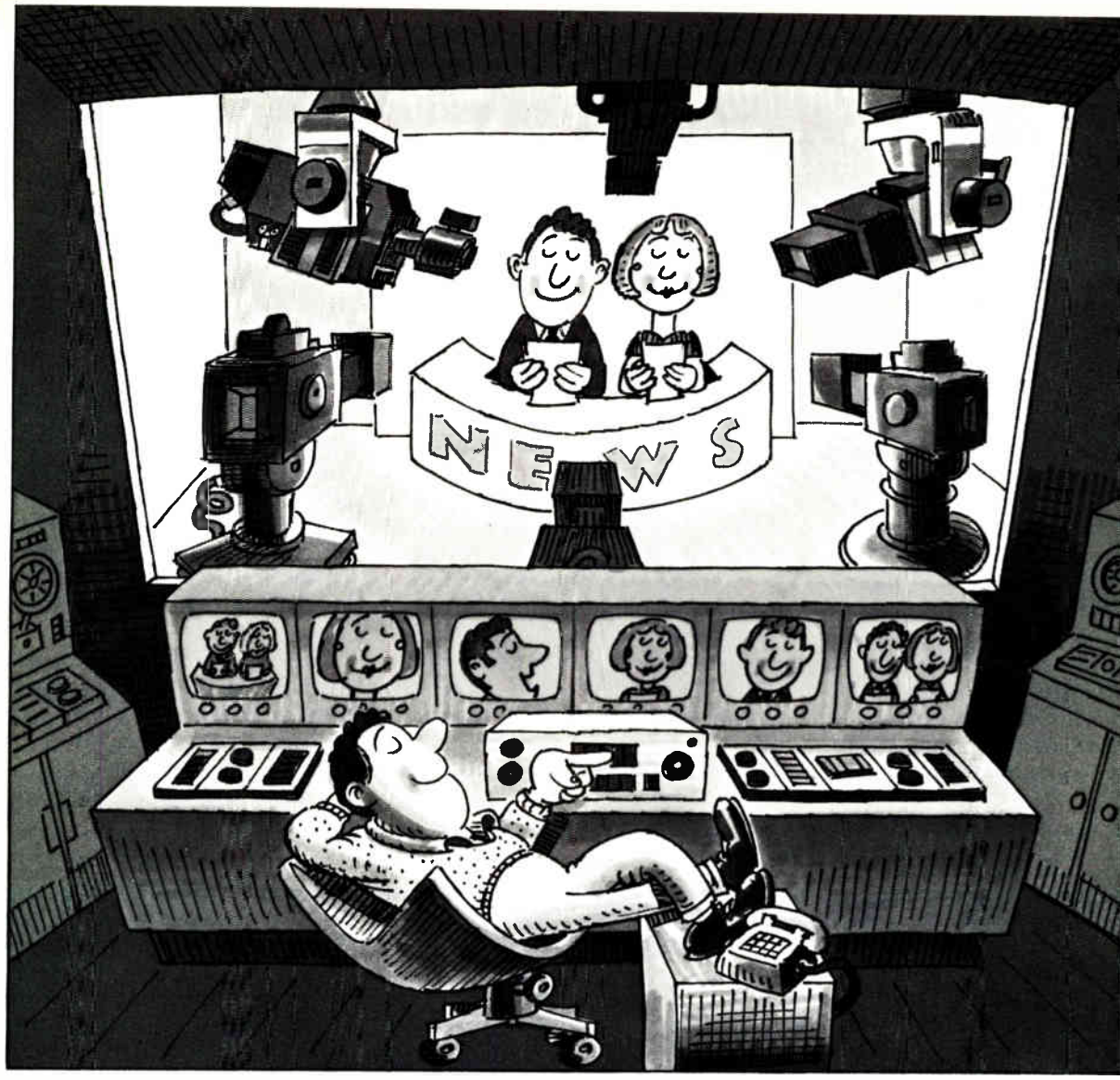
The relationship with CMX was particularly close during beta testing of the 6000, he adds.

"We started flying up there checking out the product as it was nearing delivery," he says. "After delivery, a couple of their people spent a couple of weeks here training our staff and finding any initial problems. Then we brought in some people to basically break the system and find out what was wrong with it." Meetings with CMX continued during a three-month period of heavy testing, and "by June we had a system that really worked and could be demonstrated."

Especially for major products, that give-and-take has become vital to development. Howley notes that in his experience, manufacturers have become much more sensitive to user needs and particularly interested in feedback.

"Years ago, manufacturers went to the biggest purchasers of equipment, which at that time were the broadcast networks," he says. "Nowadays, the post-production community buys 60 percent of what they sell and broadcasters buy only 40 percent." While the needs of post houses are very different from those of broadcasters, equipment in general has been designed for the broadcasters, he believes. Now, this is starting to change.

"Years ago, they all were reluctant to listen to the users," Howley states. "Over the last 10 years, the manufacturers are listening. Now they're asking everywhere. They're more receptive to input." **BM/E**



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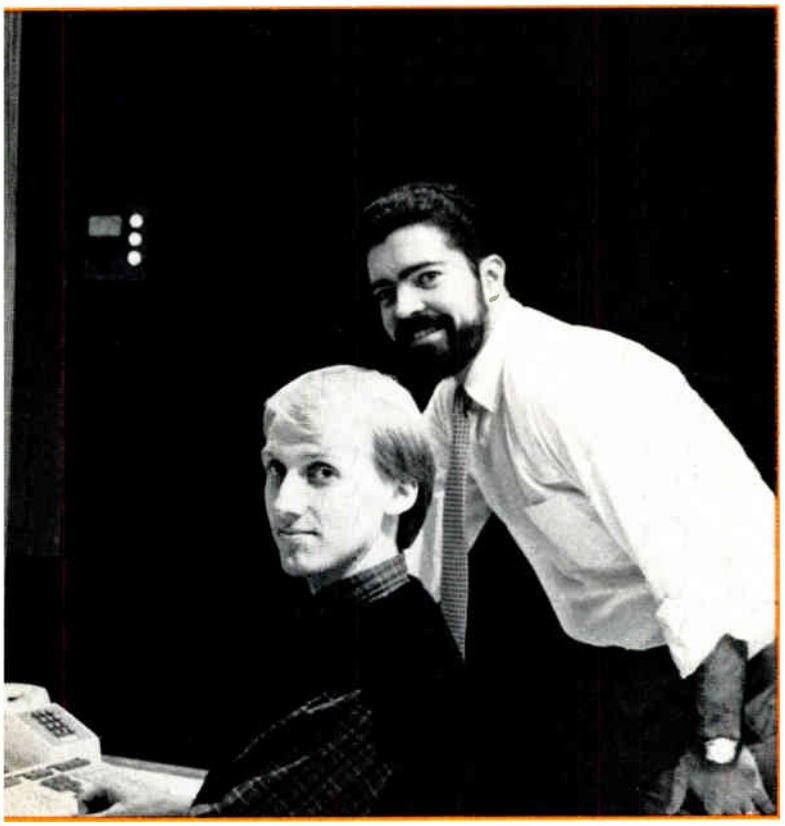

Engineering Solutions to Automation

By Tim Wetmore

Jonathan Horsley, left, project manager; Connolly Systems; and Rick Hamrick, automation interface expert, Columbine Systems, work on communication between CATS mainframe and traffic system data terminal.

The reasons for automating a television station vary according to whom the question is put. If you ask Harold Protter, vice president and general manager at WVTV, the reason is to have a state-of-the-art facility with minimum expense and maximum capability. "Our goal is not only one-man station operation, but also automated satellite recording." And to this end, WVTV has installed what is probably the first complete interface in the U. S. of the Sony Betacart system and the Connolly CATS automation software.

There are many stations that have automated to some extent, especially with the current availability of high-quality video cart automation systems from such companies as Panasonic, Odetics, Merlin, and Ampex. Other fine systems are available from Asaca and Lake Systems. But this is a case history of one station and how it achieved a radical turnaround in its engineering environment due to its particular mix of hardware, software, and design.

Automation in today's broadcast environment requires as much sophistication in software as it does in hardware. WVTV in Milwaukee provides a case history in hardware automation with customized software, taking the station from being an inefficient independent to being a technical leader in its market.

Of course, you don't just buy a cart system, install some software, flip a switch, and go home and sleep peacefully. There is much more to operating and maintaining an efficient automated facility than it may first appear. It takes a tremendous amount of planning and strategy to determine how the cart system will integrate into the overall plant, how it fits in with the programming aspects of the operation, and how to fold the system into the personnel picture. This takes time and care, though WVTV went from a costly, inefficient station to a smooth plant in the course of nine months.

The sensitive question of personnel versus automation, of course, comes up. Every aspect of the technical broadcast industry has been affected by such questions, ranging from recent NABET/NBC union negotiations to use of automated equipment at

the Olympics. Putting the controversy in perspective, WVTV director of operations and engineering Lyle Schulze says switching to automation was not intended to deprive engineers of their jobs.

"We were overstaffed with engineers, there's no doubt about it, and we pared it down through automation. Still, we didn't lay anyone off since we needed the engineers for other tasks. We had three engineers in our old operation scheduled for 24 hour on-air operations and we still do. The other, redundant jobs were eliminated but those people went over to our new paid production company. We were able to establish our production company because of the demand for the service and the efficiency of our new, automated operation, so everybody involved benefitted."

Indeed, management consulted with the engineers to see how the staff envisioned the newly automated facility operating and how they would fit into it. It was determined from these discussions and from technical management meetings that systems should work once the facility was remodeled. Also, input from a sister station in Houston was sought. In the newly renovated facility, engineering is on a computer flooring. Previously there had been an ill-conceived traffic flow plan and there was much wasted space. Therefore, the new engineering design team had to re-lay everything and start over. They did not rebuild master control where it was, but located it in a completely new area that displaced equipment, causing the removal of walls, the installation of new racks with furniture and places for the new machines.

The plan was so efficient, relates chief engineer Jim Hall, that "we ran all of the cable into the new control room and when it was ready for actual implementation, we went in and dismantled the systems at midnight and made the switch by hooking up the previously laid cables at the one end. Preparation was the tough part, the actual switchover was easy."

Electrical and air conditioning were also redesigned without missing any air time. Amazingly, this did not require a new AC unit, but only a redesign of the ductwork making the routing of air more efficient. In addition, the engineering team spent time detailing the operating nature of the engineers and determining the movement of people within the space. "When people are comfortable, when you make people feel good," maintains Schulze, "you get more production out of them and they enjoy their jobs more."

Schulze further explains that automation is intended to prepare the program material and the technical systems making them right before they are scheduled to air. A station does not want to have to correct problems after they air, which, in effect, is what you do with engineers.

In the inset is WVTV's old, cramped master control. The photo on the left shows the new master control operations center after a redesign made more efficient use of available space.

The technical operation

Fine. Redesign the station, change the layout and the concept of traffic flow, plan to automate, and consult everyone possible. That's the ideal planning stage. But the question arises, how do you actually implement the automation? What hardware and software are you going to use to make this beautiful plan become a reality? One thing that's most important is to consider the type of programming the station intends to air and the exact nature of its delivery and flow through the station up until it gets on-air. Vice president and general manager Hal Protter, Schulze, and assistant chief engineer Jim Hall met on what would be the best available equipment to bring the plan to fruition, given their mix of movies, off-network syndicated programs, cartoons, and live sports. Schulze, after having Sony Betacam recommended to him by Protter, sat down with Hall and decided what would work best. At first they looked at ¾-inch and even at two-inch machines, eventually settling on the Sony half-inch format. Initially, there were reservations about the possibility of having the BVW 75 Betacam SP recorder/players delivered in time to launch the new project.

Another element they had to consider was stereo. As part of the station's committment to high-quality technology, they chose to make it a stereo station using an Orban system.

As far as tape machines are concerned, currently the station has six units in operation in addition to the Sony Betacart machine that actually airs all the programs and which is the basis for the customized software package that drives the entire station. In addition to the six operating half-inch ma-

chines, there are two BVH 2000s acting as stand-ins (though Schulze says they like them so much they may keep them even after the BVW 75s arrive). Schulze expects three more half-inch units soon for the editing facility and four more for operations, rounding the count to 13.

Rounding out the tape machine list are four Ampex VPR 2Bs. In addition to the three previously mentioned BVW 75s, the edit suite contains a Sony 900 editor, a Grass Valley 100 switcher, BTS Vidifont V graphics package, and a Sony 12-channel audio mixer as a companion to the editor. All this may seem like a lot of equipment for a "fully" automated station, but, in addition to the live sports, WVTV is heavily involved in the paid production business. The station has a production company and is getting into the industrial video business. This aspect of its business has grown incredibly since 1984, and station management has developed a retail sales force paired with local staff to keep the facility busy.

The new layout that makes the hardware come together includes the control room with the traditional formats and a tape room adjacent to the switcher and audio gear. The tape room contains one of the Ampex one-inch machines. The other VPR 2B is with the Zeus in what is termed the "dub center" because everything is run through that correcting system in order to maintain consistent quality in the on-air product. If the source material is one- or two-inch, it goes through the Zeus dubbing process down to half-inch. In an unusual application, the Betacart is used for multiple source deck for the cartoons.

In other formats, the station runs over 30 movies per week, with other film source material consisting of older, off-net syndication and some cartoons. When film comes into the station it gets cleaned on a Lipsner Smith unit and then goes through the Rank Cintel ADS 1, and through one of two Lexicon 1200CS units if necessary to fix the time, after which the material is dubbed to the half-inch format for air. No live film is used.

Movies and programs come in on film and one-inch and, through the above process, are dubbed down. Other sources of programming are received via satellite. Satellite feeds are recorded on Beta SP, and this load consists of about 60 feeds per week.

Matching the software to the hardware

It wasn't always so clean and efficient. Formerly, WVTV was a union operation and was not run in a methodical cost-efficient manner. Protter arrived in January 1987 and, with Schulze, rebuilt the facility, remodelled the operational structure and made it a cleaner operation. Previously, in New Orleans at WNOL, Protter had required some custom software for a Betacart system he had on hand. Through Sony, he was put in touch with Bill Connolly.

When it came time to revamp Milwaukee, Protter thought about using the Sony Library Management System, "but the delivery date was too far away and others didn't get proposals in on time," states Protter. Recalling the successful association he had previously enjoyed in New Orleans, Protter called on Connolly to customize his CATS (Computer Aided Transmission System) software for the Milwaukee operation. It was soon realized, however, that the huge demands at WVTV exceeded those in New Orleans as well as those systems Connolly had worked on in Brussells and Paris. In Europe the systems were operating about 600 events per day whereas the schedule at WVTV was in excess of 1200 events per day. An obvious gap in memory and software requirements was an obstacle, so Schulze went to the European sites for a first-hand look at those operations.

Schulze relates, "They were possibly running five to 10 events per hour and we were looking at something like 50 to 60 per hour. In addition, we knew we were going to use the Columbine traffic computer interfaced directly through a PC to the Connolly system for downloading of data. All of these parameters required some special treatment." In addition to these differences from the European operations, WVTV had the complex task of inserting live sports into the mix of programming that is otherwise "totally" automated.

Connolly Systems has been manufacturing the CATS system for the last three years. It was originally developed by Channel 4 in London in 1982. The first instance of controlling Betacart by CATS was in Brussels at the film network there, an operation similar to HBO, though on a smaller scale. On Schulze's trip he saw the Brussels operation and a start up of the system in a Paris station. There are also installations in Africa, Finland, and the Australia 10 network where the nationwide broadcaster operates the CATS system on ACR 25s.

More than anything else, the trip confirmed in Schulze's mind that there were significant differences in operations but that they could also deal on a direct level, developing a responsive relationship with Connolly in the planning of the systems.

"The CATS System," relates Connolly, "comprises both hardware and software. The hardware is a mixture of a DEC computer with our own hardware for interfacing to television equipment such as Betacart, one-inch tape machines, Betacam players, and BVU VCRs as well as a master control operation. We can also control graphics systems, as we have done with WVTV's Vidifont."

As far as automating the traffic function, there were, initially, problems. After a great deal of work and co-operation between Columbine, Connolly, and WVTV, the system was developed to the stage where they can simply call up pages and interface to the Columbine computers receiving the log from traffic and return the log to traffic. The original problem occurred in the communications protocol for file transfer. The difficulty was in expanding

the database within the normal system to achieve a more detailed level of information. This is important since the start and end time code numbers are needed to achieve the full level of automation of which the CATS system is capable.

"At first," explains WVTV assistant chief engineer, Jim Hall, "it was difficult to get Columbine involved in time to meet our schedule because so many stations are automating, and, being at the forefront of this type of thing, they were so busy. But Rick Hamrick found the time and was instrumental in developing software upgrades we needed. The typical traffic system uses an IBM 36, but that unit couldn't handle our level of needs for memory for our program library and the normal transfer of information."

After much deliberation a solution to the problem was found. "We discovered," says Hall, "that we had to develop a partner system on another IBM PC in order to have our entire program library in memory. And we are still changing some of the log data. The traffic department now has to be aware of time code in or out in addition to user bit data codes. Like most things, lots of preparation by traffic, film, and engineering makes an automation system work well."

While Columbine's Hamrick devised the interface to the CATS system, he made two subsequent trips to the station to verify that all modifications were in working order, and they have been. If the interface had not worked, all the planning of the facility changes and the purchase of new hardware would have shown little progress because there would still be the manual duties of typing and transferring log information by hand. Such tedious work is very time consuming and counterproductive to what a state-of-the-art automation system is supposed to do. Now all that work takes place by simple downloading of information with no significant amount of manual keystroking to be done.

Though Connolly Systems has a standard package, there is, typically, customizing to be done for each job, which is very easy on the DEC PDP 11 computer. This is important since there are many situations not covered in the standard system. At WVTV, because of the heavy commercial load typical in the states, the log has to have on it the source material and type, i.e. whether it is one-inch or Betacart or exactly what form the source material is in.

Even though the station's engineering managers try to get everything to Betacart for air, sometimes the machines are busy or they must take a hurried satellite feed, for example, and they might be forced to put it on one-inch or whatever is available. If the BVW 75s are busy dubbing movies, they may have to go direct to air from one-inch. Until the remainder of the 75s arrive, this will be standard procedure and the software has to be able to handle it.

This is not the only situation where software had to be customized. WVTV broadcasts over 105 live yearly events, fully a third of its broadcasting year. These events, schedules of the Milwaukee Brewers baseball team and the Bucks professional basketball team, demand a lot of commercial preparation. In addition, the timing of commercials in a live event quite clearly demands a great deal of flexibility.

The CATS system is intended to allow fairly extensive manual intervention, permitting the user to go to one, two, or three levels of intervention. This is in the basic package, and the live nature of American sports creates an even greater need for flexibility.

The manual intervention operates off the live feed this way: the automation system plays the last show, the commercials, and the station ID and then switches to real time at the live site. The first break, is then designated to be a manual intervention in the CATS system, one button is pushed, and it takes the Betacart within five seconds after the button is pushed to fall within the system. The station is now looking to get a one-second preroll.

Facility integration with automation

It's important, in all the excitement, to remember the rest of the facility and to keep in mind that the "fully" automated plant incorporates within its operation equipment beyond the tape machines. Indeed, the routing and master control switchers are arguably the most important pieces of hardware in the whole mix. It was here that Schulze ran into another obstacle in automating his facility—the interface between the CATS and the master control switcher was not a perfect fit. The station had on-hand a Utah Scientific MC 502 audio-follow-video switcher from 1983. The engineering team soon discovered that it was going to be very difficult to write protocol for the CATS interface.

Further, they had to decide if they wanted to wait up to a year and a half while the customized protocol was developed or if they were going to go ahead and automate with an interim system. The team opted not to delay automating any longer and thus were forced to customize a system while they awaited the protocol. Using two Grass Valley 10XL switchers chained together they managed to get a very good interim system and have been happy with it since it was put together in the fall of 1987.

Since then, however, the station has received word that Utah Scientific had sent the protocol to Connolly in England for software development. WVTV should have the newly automated headend to the switcher up and running by March of this year.

And so the automation system at WVTV has come together. The plant is operating much better, new business opportunities in the form of the production company have become available, and the engineering management team reports an overall more efficient operation. At this medium market station, sophisticated automation has meant better jobs for the engineering staff, more business, and a better bottom line. That's what automation should be about. **BM/E**

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Circle 126 on Reader Service Card

Setting Up for Sound

Dr. Ken Charles, sales executive and on-air annoucer for KJLS, in the station's control room. The production studio is visible in the background through the glass.

Designing a state-of-the-art radio studio doesn't necessarily demand a large budget. For stations in all markets, system flexibility, expandability, and ease of operation are the true keys to success.

by Steven Schwartz

Each year, scores of radio stations across the country part company with their antiquated spaces. Some opt to fully renovate and upgrade their existing facilities; others move on to new quarters. In both cases, past experience dictates a fair share of the design criteria while ergonomics, equipment needs, department budgets, and deadlines decide the rest.

Planning a station's new design often requires engineers to be part statesman and part mystic (in addition to being *all* craftsman). They must be prepared for compromises along the way—in spending, never in quality. At the same time, they need to anticipate the needs of the station 'x' number of years down the road, confront any unexpected difficulties, and...well, you get the picture.

Still, the rule of thumb for any new studio setup is to enhance the overall quality of the station. A cohesive, flexible wiring scheme is always desirable, as is reducing studio maintenance. Both were prime goals when Federated Media's AM/FM operation WCUZ in Grand Rapids, MI, decided to leave its downtown base of 11 years on the first floor of the city's McKay Tower. Fortunately, the stations didn't have far to go; the company had purchased a four-story building (formerly a clothing store) that was physically attached to the tower—which made for a move of about 300 feet.

WCUZ has been operating from its new location since last April. The stations now occupy the entire second floor of the building (about 11,000 square feet) with two production rooms and back-to-back AM and FM on-air studios, which complement the stations' double-country format. Because both stations rely on numerous sources—including four remote production units (RPUs), a computerized newsroom, nine satellite feeds, and two two-way communications systems—each studio is served by three 25-pair of overall shielded cable for audio, plus another three 25-pair of control cables, and eight coax runs.

"We experimented a lot before we moved," notes staff engineer Tom Bosscher. "Everybody always puts in multiple pairs of individually shielded cables. We tried to figure out if that was really necessary, and we saw that we could save about 30 percent using overall shielded cable, but that wasn't the only consideration. It was just that multiple-pair, individually shielded cable is a real bear to work with and takes so much time. This cable is much quicker, and we found out that as long as there are no unbalanced feeds and you use all low-impedance sources at matching levels, there's absolutely no crosstalk present; we can't even measure it."

At the heart of the facility's operation is the "tech center." Designed under the guidance of Tom Montgomery, director of engineering for Federated Media, Bosscher and WCUZ chief engineer Dave Gale constructed the tech center as a central location for all the studios' wiring via more than 200 Gentner 50-pin punch blocks. It also houses all of the distribution amplifiers, monitoring and processing gear, the intercom system, and all external sources such as RPU and satellite feeds. In short, everything is looped through this single command station, without a single cable run between studios. The engineers also equipped the center with a monitoring panel using a Ward Beck meter and a simple rotary switcher.

"The old adage about getting on your hands and knees behind the console to track down a hum doesn't apply here," says Bosscher. "If we ever have a hum on the air, I can climb across any of our 72 audio sources and bridge monitor and measure everything here on the speakers. This makes it very easy to troubleshoot problems."

He adds that this approach simultaneously affords system expansion. "Just the other day, I spent about two or three hours putting new circuitry in there for a remote feed. When I was done, I did nothing more than ask the remote site to feed a signal to test it. I listened to it, it sounded okay, then I just got on the intercom with the studio to make sure that they had it. And that was it. I never had to go into that studio. Everything on the consoles that is not wired into something is already wired back to the tech center. For example, I know that board position number 13 is multi-input number five here with left and right on such-and-such punch block. So, everything is already in place."

Doubling up

Since both stations feature identical country formats (with C-Quam stereo used on the AM), the announcing staff is often shared. It was therefore mandatory that the on-air studios have a common design scheme. Although the AM studio is somewhat larger (it hosts a daily morning show with two DJs that is also simulcast on the FM), both rooms are similarly equipped with Technics SL-P720 CD players (two in the FM studio), ITC Delta series cart machines for music and commercial playback, and 16-channel Wheatstone A-500 consoles. According to Bosscher, the boards have been custom-modified with specially designed modules for intercom and telephone switching, that allow announcers to use their main microphones for two-way communications and for talking on their speaker phones using the cue buss.

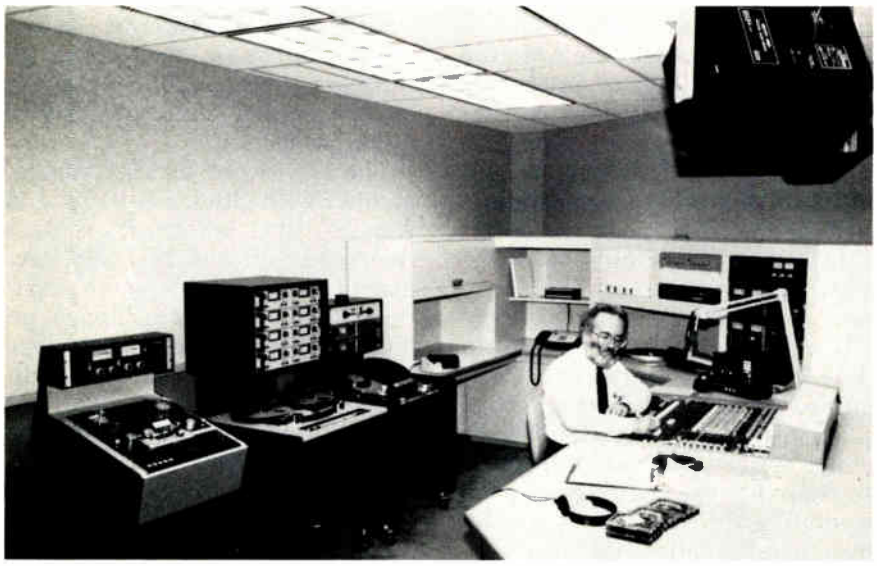
WCUZ's operations manager Bill Ashford adjusts the RPU monitor panel in the facility's tech center.

The new facility also accommodated expansion of the production department. Two production rooms were built: one for "simple" commercial preparation, and another for more elaborate eight-track productions. Nevertheless, both studios use four-channel Auditronics 110B consoles. For eight-track assignments, an eight-knob monitor panel was constructed, which effectively doubles up the output on the board for monitoring the mix off the JH-110C MCI recorder—a feasible approach, according to Bosscher, since eight tracks are never recorded simultaneously in radio production.

The rooms are further supplemented with Studer A-810A and Ampex 440C two-track, reel-to-reel recorders and ITC 99B cart machines for dubbing to cart. Bosscher notes that although an effort is underway at the stations to play more music on the air direct from CDs, up to 90 percent of the CD cuts currently played are off of carts. "We've done double-blind tests, and our listeners cannot hear any difference. The announcers also prefer carts; they're just easier to work with." He adds that WCUZ uses Scotch carts exclusively, with approximately 6000 units in service at all times.

A recent addition at the station is the computerized newsroom, which uses the Jefferson Pilot Data system to increase and speed up its news coverage. Computer communications also plays an important role in the on-air studios. Both rooms are served by two independent video systems. On one screen, a character generator displays weather information from the National Wire Service, while a second screen, controlled by a Commodore 64 computer in the newsroom, supplies traffic and road updates, lottery and contest results, and sports news. Bosscher notes that there is also a dedicated video character generator, operated downstream from the C-64 in the newsroom, that serves as

an alarm system for 16 different inputs. Each alarm (e.g., the building's fire alarm, the EBS receiver, UPI, the studio hotline phone, off-air alert, etc.) triggers a sentence on the screen as well as a warble tone in the studio cue speakers. Furthermore, if the EBS receiver is tripped, a 30-second timer is activated that prevents the announcer from resetting the receiver until he hears the complete announcement.



Production director John Howard behind the Auditronics 110B console in WCUZ's production room #1. Behind him is an MCI JH-110 eight-track recorder, flanked by Studer A-810A (left) and Ampex 440-C (right) two-track decks.

"Everything has to be at the announcers' fingertips," Bosscher concludes. "That was our main aim in designing these studios."

Rocky Mountain way

Establishing a centralized location for all studio connections has become a common practice at large- and medium-market stations. When KQKS-FM, a Western Cities Broadcasting company in Westminister, CO, moved into its new studios in this Denver suburb last year, the station's engineering staff decided to route all interconnections between studios and outside sources through a small room next to the chief engineer's office. Like WCUZ's tech center, KQKS's interconnect room employs wall-mounted equipment racks with frame wire and telephone punch blocks on the rear panels. The station's on-air studio, production room, and news studio are individually serviced by a nine-pair, 15-pair, and 19-pair shielded cable, with an additional 19-pair of unshielded cable reserved for DC control voltages (e.g., on-air lights).

However, chief engineer Karl Shipper points out that not all equipment at the station is looped through the room. "Basically, I guess we didn't see a need to have every cart machine and tape deck wired through there," he says. "If, for some reason, we wanted to put a reel-to-reel in the production studio on the air, we could just put the whole studio on the air rather than going through the effort of patching in individual pieces." He adds that system flexibility was the chief concern in wiring the facility.

"We wanted to leave room to expand when the time comes. It's always more expensive to add wires a second time. This way, for example, we have the capability to run a full compliment of remotes if the need ever arises." Indeed, although the station does not presently use satellite technology, rack space and audio DAs have been reserved, while a heliax for two satellite dishes is already in place. Meanwhile, the room currently houses all processing gear, two Moseley PCL-606C composite STLs, EBS and weather monitoring equipment, audio DAs, and a McCurdy audio level meter.

At the same time, the station opted to cut back on maintenance (and simultaneously promote a consistent level of quality) by equipping the on-air, production, and news studios with as much of the same audio hardware as possible. ITC 99B and Delta 3D cartridge machines, Otari MX-5050B two-track reel-to-reel recorders, Shure SM-5B microphones, and BGW model 85 amplifiers are common in each room, while Technics SP-25 turntables can be found in both the on-air and production studios. Each studio also features custom-designed furnishings from Denver's Benchmark Woodworks that are constructed with panels underneath the console area to provide access to the room's punch blocks and air conditioning controls. Shipper adds that in the on-air studio, the microphone processing is also kept in this compartment to prevent any tampering with the settings. The on-air studio is further equipped with a 14-channel BMX-II console from Pacific Recorders, two hidden turntables, an Advanced Microdynamics TC-8 remote control system, and JBL 4412 speakers.

Shipper notes that, with the exception of the morning show, which has its own producer, the announcers operate their own boards. Therefore, an effort was made to keep the studio as open and spacious as possible. "We didn't want to make the jocks feel claustrophobic," he says. "I guess it promotes cleanliness, if nothing else. If you get tight and cluttered, then nobody cares. But if it's kept neat, then everyone benefits. You have less equipment failure too with less dirt floating around in the air."

Although the station employs a variety of sound sources, it has opted to exclusively use music delivery on cart for the immediate future. All music is transferred to

cart on an ITC 99B in the dubbing studio, which is located in the station's music library. The brain of the system is a Pacific Recorders LSM-10 line selector, which controls inputs from a Straight Wire Audio CDQue player, Otari MX-5050B, and an SP-25 turntable. "At the present time, we're using no noise reduction whatsoever," Shipper explains, "electing instead to rely on meticulous recording practices and properly maintained equipment. Many listeners have complemented us on the quality of our sound, as opposed to other stations in the market that promote their use of 'live' CDs, but which may use inappropriate processing techniques." He further notes that the station is currently considering implementing Pacific Recorders' Dolby SR system for cartridge recording.

The production studio is equipped with a four-channel Auditronics 110A console, as well as all of the aforementioned audio sources. It also features two Otari MTR 10-II open-reel recorders, a Nakamichi MR-1 cassette deck, and a full rack of processing gear and effects, including an Orban 622B parametric equalizer, Eventide 949H Harmonizer, Lexicon PCM-60 digital delay, and Thompson VE-1 vocal eliminator. The news studio is additionally outfitted with a 10-channel BMX-II console and Gentner SPH-4 phone hybrid. Both rooms are also supplied with ADC patch bays that allow taping from all sources when the console is in use.

Shipper notes that the station strived to maintain a physical similarity (i.e., keeping the console on the same side of the room, using the same equipment) between the studios to make the staff feel comfortable when working in different environments. "It also allows engineering to do maintenance on one studio while we're operating out of another," he adds. "This is not an outrageously large station; we have a staff of about 18 people. If we were going to add another production room, I suppose we'd have a problem. But for the meantime, everyone here has projected that this is going to suit our needs for at least the next five years."

Sound thinking

Planning for an increasingly discriminating listening audience seems to be the motivation behind many studio upgrades these days. With the advent of digital-quality audio sources in the home, broad-

Neatness counts: KQKS evening announcer Doug Hammond does his own mixing on a Pacific Recorders BMX-II console in the on-air studio.

casters are noting that a studio upgrade today often means better ratings tomorrow. Consider KJLS-FM in Hays, KS.

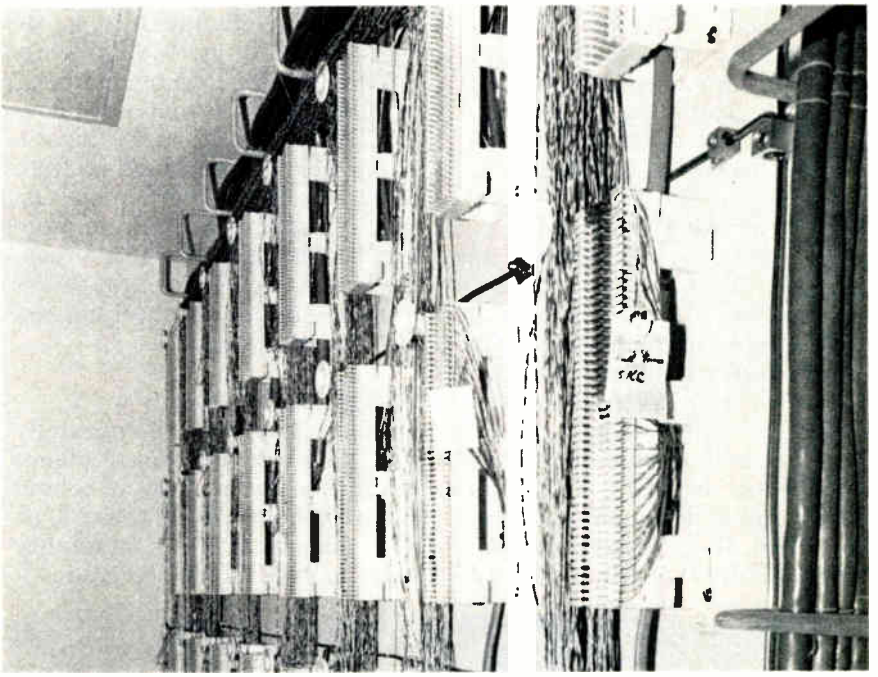
Although the 100,000-watt CHR station serves a community of only 17,500 households, station manager Michael Rogers has a lot to be proud of. Like many of his contemporaries in the smaller markets, Rogers must wear a variety of hats around his station—and, without the help of a full-time engineer, he's got to be pretty handy as well. While he admits that money was a "major consideration" when KJLS moved into its then-newly built facilities inside a health club/restaurant complex in November 1985, Rogers opted to break with tradition in order to make his station work as smoothly as possible.

For example, he points out that since cart decks usually account for a large share of most stations' maintenance orders, a decision was made back in 1982 to use cassettes instead. There was also another consideration. "Here in western Kansas all the commercials used to be done strictly in mono," Rogers explains. "Engineering was somewhat scarce, and it was just so easy to have a mono cart and stick it into the deck. You had no phasing problems, and if it sounded a little muddy, so what? I just couldn't accept that. I knew that you could do so much more with stereo production, and I just didn't want to do spots in mono. Since we couldn't afford the type of cart machine I wanted, I began looking at the characteristics of a good cassette machine."

The station selected several Tascam 122 decks, which, Rogers says, performed extremely well, although there were some initial difficulties cueing the tapes. Due to the lack of engineering assistance, the station management was wary of using a system with 25 Hz cue tones. A decision was finally reached to cut the leader tape off the cassettes, which, according to Rogers, provided the cue within .7 seconds every time upon playback. Although the transports on the machines ultimately gave out, Rogers notes that after three to four years of continuous use at $600 per machine, it wasn't such a bad investment. All of the 122s have since been replaced with new Revox B-215 decks (four in the on-air studio, one in production), which, in addition to their high performance, can be cued via an automatic sensor.

"They're extremely easy to maintain" says Rogers. "One of our machines needed a slight adjustment in the head sensor. So, Studer Revox sent the instructions for the adjustment and a schematic of the machine and I did it myself in a few minutes. Everything is modular—it's built just like a cart machine except it's got a cassette transport."

Equipment offering modular construction is generally preferred at KLJS. In addition to providing a high degree of flexibility, Rogers has found that it's easier to replace modules than to set up test equipment. For example, the 24-channel Ramsa WR-8724 console in the on-air studio has been modified with 25-cent "mickey knobs" that double up on the monophonic inputs to provide 12 stereo channels. "Murphy's Law dictates that we will lose a channel or two at any given point in time," he confides. "When that happens, we simply turn a pan pot and feed our processor two channels of mono. Within 15 to 20 seconds, we pull out that module, put in a replacement, turn the pan back, and go back to stereo. Then we put a stamp on the defective module and mail it in for repairs." The on-air studio also uses two Pioneer 6-Pack stacking CD players (which are played "live" for 50 percent of the station's programming), two Technics MK-1200 turntables, and an AKG C414 microphone. Meanwhile, processing is supplied by a CRL FM-4 fed into a new Harris MX-15 exciter.



Rear view of rack in KQKS's interconnect room shows punch block layout, cable lacing, and grounding technique.

While the station is not equipped with a central wire room, the floors of the on-air and production studios were raised 2.5 feet to accommodate an underground wiring scheme that provides quick and easy access to all cables. Rogers further points out that the studios face each other from opposite sides of the reception area to allow visual contact between announcers when two-man operation is required, such as

when a weather alert is in effect.

Both studios also take a rather unique approach to acoustics. The rooms feature the same boxcar pine panels as found in the station's reception area. This would appear to add a lot of undesirable sound reflections, but apparently, that's the idea. "The old school of thought, which is actually the current school of thought, teaches us to deaden those rooms to get rid of unwanted reflections," he explains."But as you head toward an anechoic room, you must rely on the integrity of the sound source itself. That's great if you can afford to hire Gary Owens. However, we decided to go in the other direction. Since the ear hears only 10 percent of the sound from the source and 90 percent reflective sounds, the obvious choice was to use the warmth of the wood. In other words, when they start making violins out of acoustic tile, that's when I'll use it on the walls of a studio." Rogers adds that the windows in each room are tilted to a 45-degree angle so some of the reflected sound hits the floor and cabinetry, both of which are carpeted. Antistatic mats are also used between the carpet and equipment. The result, he maintains, is that "there are six general managers at competing stations trying to figure out why our announcers sound bigger than life."

The production studio also offers some surprises of its own. Centered around a 20-channel Tascam 520 console, the room is equipped with an Otari MX-5050 Mark III series eight-track recorder and two MX-5050 two-track machines for stereo mixdowns. Although Rogers admits that an eight-track deck is somewhat elaborate for his market, he points out that the station handles quite a bit of spot production for local clients. Thus, he maintains that the extra flexibility is actually cost-effective when considering the amount of time saved on each assignment.

The studio is also outfitted with a Sea-tex color radar and 3M Stormscope system for weather tracking. "We're in a hole here as far as the weather bureau is concerned," Rogers explains. "It's not their fault, it's just that their radar locations are 120 to 130 miles away from here. So, we went out and bought our own weather equipment. And now, we can beat out the National Weather Service by about 20 to 30 minutes in the event that some serious weather comes this way."

Still, is all this really necessary in such a small market? "I suppose in reality we didn't need the type of equipment we acquired," answers Rogers. "We could have gotten by with a lot less, but then, you're just getting by. My definition of quality is go beyond what's merely needed. Broadcasting is a long-term investment and quality always pays in the end." BM/E

PROFILE:

Ira Goldstone: KTLA-TV

Ira Goldstone, KTLA director of engineering, seen in the station's master control room.

By Ric Gentry

Ira Goldstone always seemed to know what he wanted to do in life. Born 39 years ago in the Bronx, he later attended school in White Plains, NY, where federal programs were then providing funds for educational television. "I was in one of those schools," Goldstone recalls, "and that particular medium just caught my attention." By the time he enrolled at Emerson College in Boston in 1967, he began preparing in earnest for a career in television engineering.

In effect, Goldstone worked his way west to his present position as director of engineering at KTLA-TV, Channel 5 in Los Angeles. After graduating from Emerson in 1971, and completing technical seminars at MIT and Purdue, Goldstone began at WHDH-TV in Boston and then moved on to WCVB-TV as director of technical services, where he remained until 1981. For two more years he was vice-president of corporate engineering at the Standards Communications Group in Salt Lake City. It was in July of 1983 that Goldstone made the transition to Channel 5 in L.A.

KTLA, as Goldstone well knew, was arguably the most progresive independent television station in the U.S. Not only was it the first commercial television station in L.A. as of 1939, but it was also the first licensed television station in the Western U.S. KTLA's chronology of "firsts" almost reads like the history of independent television itself: first on-location news coverage; first Emmy winner; first to televise a President's speech live; first to telecast a movie premiere; first regularly scheduled remote program; first kinescope syndication of a news program. All this by 1949.

In the 1950s KTLA would be the first to televise an atom bomb detonation live, and then first to cover a major political convention (from Chicago). Later KTLA would be the first independent to have its news transmitted on stations throughout California, live on national network, and to Europe via Telstar; first to create its own programming department; first to win a record eight Emmies; first and only commercial station to win an Oscar.

When Goldstone stepped in at KTLA, however, he was confronted with a myriad of issues and complications that would determine the stations future as a leading independent. Some of the issues were specific to KTLA, others were indicative of changes facing the industry itself.

Three months before he started, KTLA had been purchased from previous owner Gene Autrey by Golden West Television, Inc., a new corporation formed by Kolber, Kravis, Roberts & Co. (KKR), an investment firm with offices in San Francisco and New York. Furthermore, the station at the time was cast into two seperate business concerns. One was KTLA's over-air broadcast operation. The other was a facilities business entitled Golden West Videotape, that leased crews, equipment, and production stages to such syndicated TV shows as *Truth or Consequences* and *Solid Gold*. Both concerns were vying for greater influence over KTLA's engineering department. It was then up to Goldstone

KTLA's John Ferguson watches the helm in the station's transmission control room.

to ostensibly centralize the engineering department to more effectively serve both on-air and Golden West.

Soon after, however, senior management at KTLA determined that Golden West Videotape was not a venture they wanted to maintain. Efforts had been made to keep it profitable, ut by the end of 1983, a decision was reached by KTLA to divest itself of the facilities business.

But at about the same time, complicating the situation, KTLA had also elected to make several important technical upgrades. The 18-year-old transmitter at Mt. Wilson was to be replaced and the station wanted to take the opportunity to be one of the first stations to sign on in stereo, as well as SAP, to deliver Spanish-language programming to L.A.'s large Hispanic community. There was also a decision to upgrade production equipment.

Streamlining operations

The responsibility of station management then became two-fold: to negotiate a contract with IATSE and to streamline the facilities business and on-air operations. The latter objective was intended to adopt a more efficient use of personnel in an era of ever-increasing automation and high-tech equipment.

Talks began with the union in January, 1985 and ended in an IATSE strike. In the former contract, KTLA's engineers had arranged for considerable wage increases for each of the previous three years. Among other things, management wanted wages to conform more with what other stations in the city were paying the union for identical labor. "There was just a huge aount to change," he says.

"The next goal of these changes was to modify our approach to the facilities contract and allow the (production) stages to be operated by a third party. Then we would have two different working groups on the lot. One would be KTLA, under the (new) IATSE agreement, and another would be, in this case, Studio Management Services (SMS).

The next objective was to restructure personnel in order to establish a much more pragmatic number of people in operating positions. This was achieved by combining jobs, reorganizing facilities, and operating spaces to accommodate a smaller staff.

"Basically," Goldstone says, "there were often more people at a position than were needed. For example, we reduced the number of tecnical directors in the air booth. There used to be maybe more people in videotape than there are now. There used to be required seniors, so that no matter what happened, you always had to have one person who was 'the senior of the shift.' But we eliminated that, and we eliminated a lot of the upgrades that dealt with that because it was really based on tradition.

Staff changes

Thus, of the number of engineers on hand when Goldstone started at KTLA, there is now a significant differential with the divestment of Golden West Videotape and, with restructuring, the remainder was further distilled. Negotiations to achieve this included voluntary and/or involuntary retirement packages, and changes in the normal seniority structure to facilitate certain positions.

"This was in 1985," Goldstone says, "so we were early on in this. It's no different than what's been happening in the last couple of years at all the networks and a lot of the broadcasting facilities. All you have to do is read the literature in the trades, or look at the newspaper to see that stations are realizing the magnitude of people they once had to operate a station is no longer required in a modern broadcast plant.

"Part of it is the result of automation. Part of it is a result of the equipment itself which, although more complex, has less for someone to do with it. What it does is done automatically. Therefore, you don't have to do the same labor."

Such equipment includes the more automatic setup cameras like Phillips LDK 6s. KTLA also upgraded the automation system to a Grass Valley 200.

"The older automation system did a very poor job of translating the Bias data from traffic into a form that the computer could use for air," Goldstone says. "We basically streamlined that to a point so that bias information went right through to the air computer. We put in a bar-code system for material identification so that the computer automatically knew the source media.

"We eliminated all slides and went to an electronic still store, so all stills are accessed automatically. We wouldn't have a person loading and cleaning slides and that sort of thing.

"We combined projection and videotape. There used to be a projectionist and a videotape operator, but there could only be one program one at a time. So we combined the departments into one. We put them physically next to each other and called the shifts 'program load.'

"Technology has just lead us to more automated facilities and sophisticated techniques that are forcing us to look at changing the way we've customarily done things," Goldstone says.

Equipment acquisition

Calculated use and acquisition of equipment was of course essential to a more efficient, even, "modernized" restructuring at KTLA. But all of this coheres with a philosophy on upgrades that Goldstone had developed early in his career.

"When I was with WCVB in Boston," he says, "I worked with McCurdy radio on development of a microprocessor-based communication system that you could configure any way you wanted to. We built that in Boston, and then some years later we implemented that out here. What we wanted to do was build a station that would be able to grow with the times. In other words, we wanted to create equipment that was basically good hardware but which was software upgradable for a number of years to come.

"And since I've been here, that's pretty much proved itself out. For example, we bought a Utah Scientific switcher, which had the PL 150 control system in it. It was a good system, but it didn't have individual audio level capability. It didn't totally lend itself to the type of flexibility you need in an MTS plant today. But Utah has since come out with the PL 160 system, and so we upgraded it.

Control Room 8 at KTLA serves as the newsroom and production control area.

We're in the same switcher that people are buying today."

Another example is the Phillips LDK 6 studio cameras. "At the time we bought those," Goldstone says, "the (Ikegami) 322s were out, and we were kind of being pressured by both sides to get those. But we felt the LDK 6 had spent a lot of time on diagnostics, and our LDK 6 is a 6A, and our LDKs are current with what Phillips is selling now."

Goldstone also worked with Grass Valley when KTLA built its automation system. That accounted for the first three-level master control switcher with stereo control panel, including three meters, for such a switcher, and is now up to date with what Grass Valley has on the market.

"We also get new software revisions for the McCurdy system," Goldstone adds. "We bought CMX 340 XLs for the editors, which were the only ones that were upgradable. Now they're 3400s.

"I bought all this stuff in 1984. What we tried to do back then was to really take a look at where things were and where things were going, and select hardware that could be open-ended. Although it employed a heavier level of sophistication, it saved us a great deal of money overall. And there is nothing now, really, that isn't on the market today."

Digital speculation

Goldstone's speculations on the impending merit of digital VTRs is a good case in point of how he weighs the complexities involved in a purchase of looking toward the future.

"D-1 for a broadcast environment dosen't make sense," he says. "We're very seriously looking at D-2, with the first application being spot playback. My feeling is that analog component is an interim format that has a reasonable life expectancy in the news area and in very low-generation applications. It's okay for something like record and playback signal time—something off satellite to be played back that day.

"But long-term, you aren't buying a cart machine for two or three years. If you look at ACR 25s, you see that you're making an investment that could be for eight, 10 or 12 years. So you want to buy the system with the best quality or the potential for error-free playback on the air.

"With D-2, there are several pluses. Price is one. Then there's multigeneration capability, virtually 20 without degradation. Also the error concealment. You can lose a head and still not recognize it. I think it is an important factor in a playback system. So we're looking at D-2. We're just going to wait and see where the manufacturers go."

But Goldstone also sees implications for digital when considering a move toward high-definition. "I don't rule out that we'll help pioneer HDTV," he says of KTLA. "It's a little bit early to tell. But if you go out today and buy a D-2 machine, it's not going to be a HDTV machine. So if I spend the next couple of years upgrading my Type-C VPR-2Bs to D-2, what am I going to do if I'm HDTV?

"HDTV is interesting. I think a

lot of people are impressed with the 5:3 aspect ratio of HDTV. But no matter what happens to HDTV, it's going to have to be a 6 MHz compatible system somehow.

"One thing that's always bugged me a little bit is that I never felt we went far enough with enhanced NTSC. Faroudja has showed a lot of promise in building encoders that didn't have a lot of the cross-color problems that we see in the standard encoder in a TV camera or film chain. If anybody's looked at a feed coming in from an RGB monitor, they'll see magnitudes of improvement over what they would have seen with the same feed on an NTSC encoded signal.

"So I think what I'm saying is that HDTV does have a place. It may very well be something we're forced into if we can find a compatable system. The key is that it must be compatable to the 6 MHz bandwidth. But we also need to continue to investigate NTSC, or at least a 525/60 Hz system just to make sure that we have taken it as far as we can. The possibilities are out there."

MTS implementation

On October 23, 1984, as KTLA installed the new transmitter on Mt. Wilson, the station also signed on as a full MTS facility, enabling KTLA to be the first in the city to broadcast in stereo. Then, because MTS consists of three audio channels, only two of which are used for stereo, KTLA decided to use the third channel and also be the the first in L.A. for SAP-simulcast in Spanish.

"There was always a considerable amount of spectrum for subcarriers on the aural area of the signal," Goldstone explains. "But when the FCC began looking at how to best use the spectrum, the concept of MTS cropped up. The 'pro channel,' which is used to control our microwave sites at Saddle Peak and Santiago Peak, was moved from 67 kilocycles to 102 kc. We took the additional space and provided additional subcarriers, which were the stereo difference channel and the SAP channel."

The added expense was a relatively meagre $20,000 in SAP and stereo generator equipment. At the station, all we did when we ordered the switcher was include a three-level switcher instead of a single-level audio switcher and some additional routing. So we didn't spend a lot of money on it, doing it incrementally (as many other stations are doing), allowing us to get into stereo and SAP minimally and grow as the station's need arose.

The stereo and SAP pro generator used in the project was a Modulation Sciences, Inc., stereo generator, which at the time was a mere prototype—the only one then available that met all the technical requirements of the FCC approved BTSC's OST #60.

But a number of difficulties ensued. It was often a problem for KTLA to determine the availability of programming material in stereo, or whether or not programs would be available in Spanish through the usual international distributors.

There was also the question of format. "Would tapes be shipped to us with left on Channel 1, and right on Channel 2, or the reverse?" Goldstone once asked. "Would matrix sound be laid on tape with L+R on Channel 1, and L–R on Channel 2? Where would the Spanish translation be laid down?"

With no precedent to resolve these pressing concerns, Goldstone and KTLA decided to establish their own standards. "In order to avoid adding sum and difference equipment," Goldstone said, "to achieve some latitude in the relative levels in the right and left channels and facilitate easy monitoring through the plant, we elected to standardize on discrete left and right distribution and transmission up to the imput of the stereo generator on Mt. Wilson. Maintaining the de facto standard already set up by syndicators distributing stereo programs with left on Channel 1 and right on Channel 2 worked out for them as well as for us."

The next consideration was with programming transmitted to KTLA via satellite. "Right now, there's a number of distribution systems available," Goldstone remarks. "One of them is the Wegener-based Wold system, which is a companded subcarrier stereo distribution technique making use of very specific subcarrier frequencies. What we did at KTLA was settle on a receiving stereo with left 5.8 MHz, right on 6.2, and mono at 6.8. It was a compromise, but there should be a standard by which subcarriers could be identified universally."

Quality control was another concern. Goldstone saw that XY monitors, initially developed for KTLA by B & B, were installed at all critical monitoring points to ensure each channel was in phase, of equal level, and exhibited minimal phase distortion.

"At that time," Goldstone says, "the XY scope had not yet found its way to control rooms yet. No one was doing stereo, so no one cared if something was being broadcast in or out of phase, and no one was keeping a close watch on audio levels. So at that time, B&B was making a device that was two channel with a third being used to time code in an editing configuration. And we reconfigured that and used that for monitoring systems for television. Today Tektronix makes it, and other companies. But early on B & B did it for us."

En Español

Spanish language programming began with news at 10, which KTLA achieved through translations simultaneous to the news in English, much as translations are managed in the U.N. For programing such as *The Love Boat* and, later, *Magnum P.I.*, the show is first edited to accommodate the number of breaks and regular program length to fit KTLA's format. Later, the Spanish is cut to video on a 1/4-inch audio tape and later synchronized with the English master and transferred to Channel 3 of a new composite one-inch video tape, along with the video and vertical internal time code and the English audio on Channel 1.

Goldstone describes KTLA's multichannel routing, distribution, switching, and transmission systems for stereo on-air: "It's a standard TV plant with additional levels underneath," he says. "All we're really doing is duplicating that into a second or third level. We have some output switching to the STL, which defines whether or not we're feeding synthesized stereo or true stereo, or whether we're putting English or Spanish on the SAP channel. That's a downstream switch between the output of the master control switcher and the STL."

Increased purchases of stereo televisions are justifying KTLA's move into MTS. The lingering problem is viewer awareness of using the channels properly. "People call in and tell us they're getting the news in Spanish when they want it in English," Goldstone comments. "There's an educational process that needs to take place."

KTLA is addressing that need by running announcements every 15 minutes on the SAP channel during non-Spanish programming to instruct the viewer in adjusting to English. KTLA is also suggesting to TV manufacturers that a list of instructions for proper use of stereo be enclosed with each set.

The program loading area of the Los Angeles station is located in the back of the tape machine room.

"People don't adapt easily to these type of changes," Goldstone says. "Imagine if we go to HDTV with separate antennas, some with channels on UHF and some on VHF. It's going to be a nightmare."

One of Goldstone's prevalent in-

dustry concerns is, in fact, that advancing technologies often exceed their practical applications.

"Again," he says, "as we've discussed a little about HDTV. Here we sit with this 1125-line system NHK has shown us. We've also looked at bandwidth reduction to 8.1 MHz. Still not the 6MHz available to broadcasters. We've looked at the NTSC enhanced system. We've got people developing digital composite and digital component tape machines. The trouble is, everybody is going in different angles. They're developing things for the sake of developing them and showing them—but their showing them as single, independent entities. They haven't dealt with how we're going to put them all together.

"As we move along, the sky is the limit on what the technology should give us, but how are we going to use it effectively? If we're going to be channeling it all through 6 MHz and take and degrade a system to do it, was it really worth doing? Should we then have looked back at doing something to enhance 525 versus high definition for what we get out of it?"

Goldstone believes that only the distribution got ahead of itself in terms of SAP. "In particular, the distribution of home sets capable of receiving it." he says. "But today, we also have the technology to do surround sound. Whether you want to or not is another issue. We can do it today. But no one's got surround decoders, and if they did, it's kind of like the quad stereo and quad receivers of five or six years ago. The fact that you can do it doesn't necessarily mean you have to, or that there's a need for it."

Transmission operations

On December 17, 1985, about mid-way through Goldstone's tenure, KTLA became part of Chicago's Tribune Broadcasting Company of television stations. The purchase, from KKR, was made for $510 million, the largest amount ever paid for a single TV station.

Two years later, KTLA erected their own Ku-band uplink facility, and is currently building a new broadcast tower. "We're going to eliminate the diplexer," Goldstone says, "and we're going to use one antenna for visual and the other for aural. The main reason we're doing that is we found the notch diplexer requires us to compromise our video and audio performance to get good stereo and video on air."

Earlier, KTLA had initiated a new ENG system, establishing receiver sites at Saddle Peak, Santiago Peak, Mt. Wilson, and Snow Peak. Satellite newsgathering began in 1987 when KTLA decided to outfit its own truck. "We had some money to build a fixed Ku uplink," Goldstone says. "So, since we had the truck, we decided to just make it work for Ku.

"But in the Ku world, we're still investigating good communications systems (such as) Hubcom and CNN.

"As a result, we're pursuing methods and communications for IFB return, mix-minus out to the field, and two-way communications for setup cross-pole and discussion between reporter and producer. We're working on that, and still investigating the pros and cons of going with a demand-accessed system like Skyswitch versus a specifically accessed system using an (SCPC).

"There are still some challenges out there."

But the challenge is what Goldstone enjoys. "I look forward to coming to work each day," he says. "I guess the main ambition I have for the future is to see the television industry continue to develop at the pace it has and to even improve—but temper that with the practical application of what we can use, what is cost-effective, and what in the long-term will improve what the viewer's getting, both in content and in quality." **BM/E**

About the Author:
Ric Gentry is a television producer and writer living in the Los Angeles area.

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Audio Processing Roundtable: Cleaning Up AM

New approaches to audio processing in conjunction with the NRSC standard provide hope for putting AM on a par with FM.

Edited by Steven Schwartz

The establishment of the NRSC standard for AM improvement is widely perceived as a necessary step toward salvaging the AM band following years of qualitative and economic stagnation. Although many factors have contributed to the band's decline, perhaps the most harmful component has been the traditional practice of excess signal modulation, which has resulted in severe adjacent interference problems across the dial—as well as extremely low fidelity receivers in the consumer market.

The roundtable participants, from left to right: Bob Orban, Glen Clark, Eric Small, Stan Salek, and moderator Tom McGinley.

The problem of overprocessing has been specifically addressed by the NRSC in the implementation of its 75-microsecond pre-emphasis and the so-called "brick wall" filter that limits bandwidth to 10 kHz. Processor manufacturers had an active role in the Committee's deliberations and have similarly taken the initiative in making NRSC-compatible equipment and upgrade kits available to their clients. Not surprisingly, new developments in audio processing for AM was a hot topic at last year's NAB Radio '87 convention in Anaheim.

The comments presented below were taken from a panel discussion at the show, which brought together some of the best-known names in the processing field. Moderated by Tom McGinley, director of engineering for the First Media Corporation in Washington, DC, the panel was composed of Orban founder Bob Orban; Glen Clark, president of Texar; Eric Small, vice president of Modulation Sciences; and Stan Salek, engineering manager for Circuit Research Labs.

New NRSC Optimod

Bob Orban has been called the father of modern audio processing. He is the founder and chairman of the San Francisco-based Orban Associates, which manufacturers a full line of professional audio products—including the Optimod, the most widely used audio processor in radio broadcasting.

Bob Orban: I'm going to briefly talk about a couple of things, starting with our new 9100B audio processor, which incorporates both the 75-microsecond pre-emphasis and the 10 kHz filtering required under the NRSC standard. The processor is designed to work either in mono or for any of the current stereo systems. Most people familiar with the 9100 probably know about the number one circuit card slot. The first card offered for the slot was a filter for the nonlinear stereo systems back

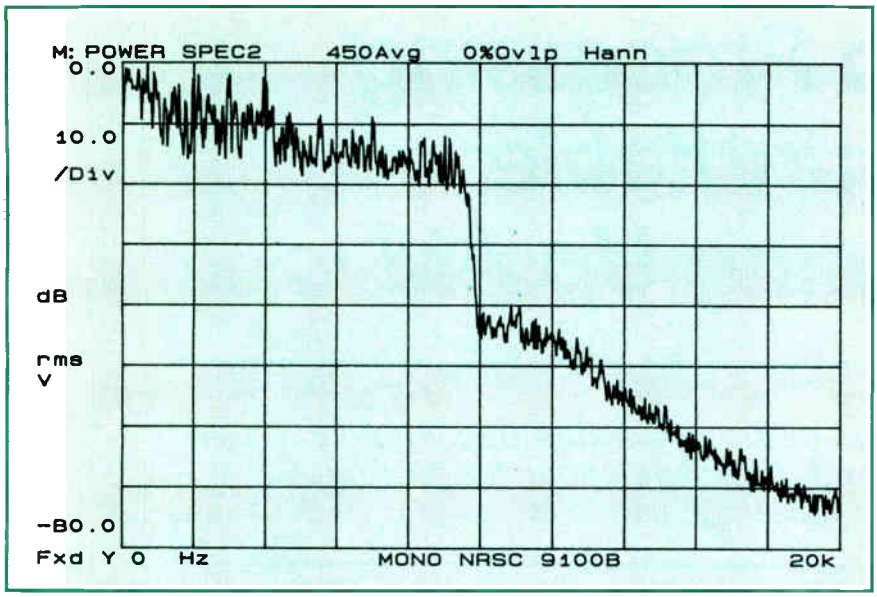


Figure 1: Mono spectral power density graph of the 9100B.

when the 9100 was first designed. The availability of that slot has since served the processor and its users very well. There have been a number of cards that have been offered for it and the current NRSC stereo card goes there too, even though we have to have a piggyback card just to get all the circuitry in. The rest of the processor is basically a slow AGC followed by a multiband limiter with some distortion cancellation that's proprietary to us.

The signal is processed mostly in the sum-and-difference mode, because the sum in any of the current AM stereo systems represents the envelope modulation. It's important to control the envelope so the negative peaks are not pinched off and the positives are limited to 125 percent. However, any AM stereo system is going to be cleaner when you limit yourself to symmetrical modulation. This is to say, keep your positives at a hundred percent. That way, you're clipping symmetrically and not creating any even-order distortion products—IM or harmonic—and you can really hear the difference.

The 9100B's NRSC filter, which is the brick-wall 10 kHz filter, is actually designed to be a seventh-order notch filter that works with the unit's existing 12 kHz filter, so you get a very, very sharp cutoff at 10 kHz. The NRSC filter deals with the area from approximately 10 to 13 kHz, while the 12 kHz filter keeps the rest of the spectrum under control. We also have a 5 kHz filter available on the card. Not only is this appropriate for international use, but there's also been some talk that it may be a good idea for some stations to go to 5 kHz at night—particularly under conditions of mutual first-adjacent interference. There are no FCC first-adjacent protection standards for skywave, and this is one of the major problems that AM has had in terms of getting cleaner reception once the sun goes down.

Following the filters there's some clipping to get rid of any slight overshoots that might be caused by the filters. There is also the single-channel limiter section that controls the single channel—that's to say, the left channel or right channel—modulation to a maximum of 75 percent negative peaks only. Control is asymmetrical because you don't need the control on the positive side. This is a specification that Motorola created for C-Quam to avoid some problems that can otherwise exist in the receiver chip.

Then comes the stereo enhancer, which simply gives you the ability to increase the level of the L-R before it goes into the single-channel limiter. There is a VCA in the L-R path, which is controlled by a circuit that looks at both the left and right channels. If either tries to exceed 75 percent negative, the VCA reduces the gain of the L-R channel, momentarily reducing the separation until you're back within your limits. So, if you boost the L-R, you're automatically prevented from boosting it too hard because the control circuitry will grab any excess L-R that would otherwise cause problems and then pull it back.

Let's look at some measured results:

This is a mono power spectral density graph (Figure 1) done with an 801-line FFT. It's a linear frequency scale, 0 to 20 kHz. You can see clearly where the filter starts grabbing at about 9.6 kHz, and, by the time you hit 10 kHz, you're down in the region below 40 dB. There are two little peaks that just barely hit the limit there. Incidentally, this is made with program material using a ten-minute peak hold on the analyzer. Consequently, all of those little peaks indicate the highest energy that occurred in any one of those 801 bins over a ten-minute period. So, even the slightest little bit of trash doesn't get missed by this kind of measurement. What's particularly important is that the spectrum declines rapidly as you go to 20 kHz. You can imagine that you're wanting to listen to a second adjacent, which would be 20 kHz removed from the desired carrier. You're tuned to this second adjacent and the radio is going to be flat to about 2 kHz if it's following the NRSC de-emphasis, which is more or less a 75-microsecond de-emphasis. Then, as the radio falls off, the amount of trash goes up. But the radio is giving you a lot of help because of its high-frequency rolloff, and, presumably, by the time you get to 10 kHz, there's a notch in the radio's response.

Anyway, processing for AM improvement. That's some of the stuff that we're doing.

Transmitter talk

After enjoying considerable success with its Audio Prism and Eagle processors for the FM and AM markets respectively, the Monroeville, PA-based Texar recently introduced the Phoenix, an NRSC-compatible version of the Audio Prism for AM'ers. Texar president Glen Clark was an active participant on the NRSC.

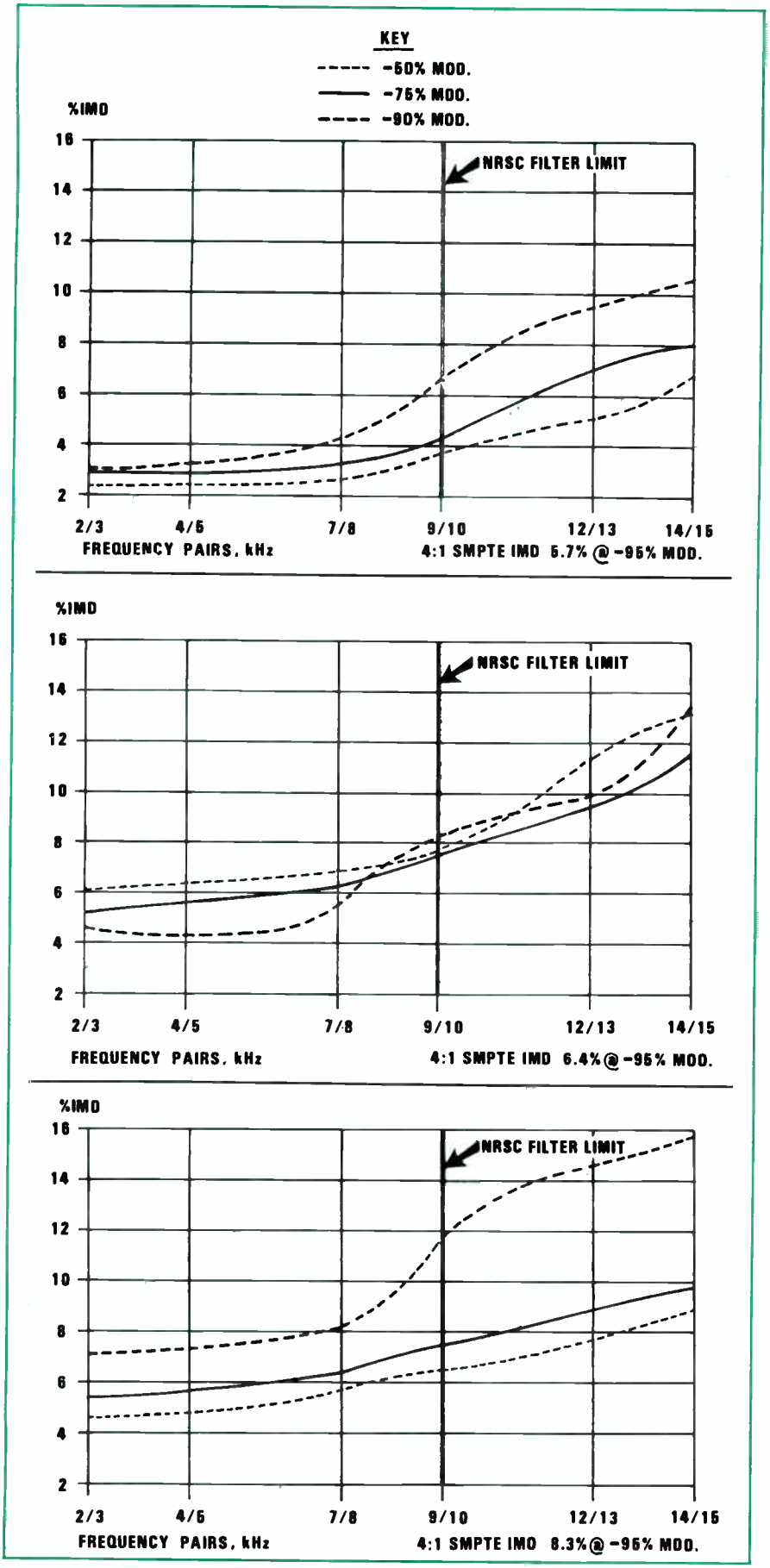
Glen Clark: One of the things that people should keep in mind as they look at the graph of the NRSC spectral output is that is done under a very specific input condition. It's pulsed-USASI noise; it's not pink noise, therefore it's not flat. It is, I emphasize, pulsed because it comes on very strongly for a period of time, then it goes to a reduced condition, and then it comes back up. And the reason for that was that the Committee recognized the fact that practically anybody could handle a steady state condition because just about any intelligent clipper (or clipper integrated with VCA) is going to come to rest at some gain condition below the clip threshold if you just leave it with the sine wave.

Now, a lot of people ask, "If I take my sine wave oscillator and I run it through this filter, what am I going to get?" First of all, you've got to kill the multiband and the VCA to do that effectively. Secondly, you're going to find that the response of the filter is considerably different from what you'd expect from seeing a standard. So, if you try to plot the filter and compare that versus the standard and they don't match exactly, don't feel bad; there's nothing wrong with your measurement technique.

Let's talk about AM processing in general. You've got to keep one thing in mind when talking about AM. That is, it's a situation that is much more likely to change than FM. The truth of the matter is that you can get a 1949 three-kilowatt, grounded-grid Westinghouse FM transmitter and put a modern-day exciter on the front end of the thing and not sound too awful. Now, somebody's going to say, "But you've got VSWR (voltage standing wave ratio) problems," or "You've got a narrowband PA." Yeah, you're right. But FM is determined primarily up to and including the VCA in the FM exciter. Once you get past that, you've hopefully got a broadband enough amplifier and antenna radiating system that what the guy gets in his car is essentially what has left the varactor or whatever is in your exciter. Those are low-level stages—whether you're talking about your multiband processor, stereo generator, or high-frequency limiter—in controlled environments and they don't tend to drift. What you set it at today is hopefully where it's going to be three months from now.

AM, on the other hand, is much more prone to changes and to outside effects. It needs a little bit more adjustment. Everybody knows that if you've got a directional antenna system—particularly if it's on a hill—that it's going to walk in a rainstorm. After the storm, the ground starts to dry up at the top of the hill and you may have the water table below the ground system on towers one and two, while three and four are very damp and the array has walked around. Also, you can get some soft tubes in there that will cause some problems—especially in a plate-mod transmitter, or even in a PDM. AM transmitters will walk away from you, and plate-modulated ones in particular. Make sure that you've got that emission capacity in the cathode; that your PAs will do at least one hundred percent positive peaks and your modulators are both in health. Run some triangle waves and some sweeps through the thing, and make sure that it will go up to a hundred percent—or, if you want asymmetrical, a hundred and whatever.

Some transmitters just won't do asymmetrical. And it's not always the PA. For instance, just to pick a company that's no longer in the business, the old green GE 50 would do a hundred and one percent positive peak and that was it. It wasn't because of iron; it wasn't even because of the modulators. It



Figures 2, 3, 4: CCIF second-order difference IMD analysis for 10 kw plate-modulated transmitter (top), 50 kw PDM transmitter (middle), and 50 kw Weldon (Doherty) transmitter (lower).

was because of the cathode follower driver that drove it. There just wasn't any more swing in there. And if you try to put more audio into it—it doesn't matter how hard you push it—it's just not going to come out the other side.

So, when you're thinking about AM processing, keep in mind the fact that just because it sounded good and passed these tests three, four, or five months ago, it does not mean that you're going to get the same results now. It will walk away from you a lot faster than an FM transmitter will.

Stereo to the maxx

Modulation Sciences in Brooklyn, NY, manufactures several audio processing devices that are specifically designed for stereo broadcasting. The following presentation by the company's vice president, Eric Small, examines some of the ongoing needs of the AM stereo market.

Eric Small: Most everybody here has been talking about processing in the loudness domain. But there are other areas of processing that have become a lot more interesting over the last couple of years. We of late have involved ourselves in processing in the spatial domain. One of the salient features of the spatial image enlarger is that it has no impact whatsoever on mono, which is an important point. I think that's particularly significant and useful in AM stereo, where—because of the considerably more restricted bandwidth—there are fewer stereo cues to work with than you have in FM stereo. So anything that increases the stereo cues is going to increase the impression, the illusion, of separation and depth of sound.

Over the years there have been a number of consumer products for stereo enhancement and enlargement. They've had a bunch

of trade names, and they've worked rather well on consumer hi-fi systems. The problems with them, however, have been primarily with regard to mono compatibility; nobody ever mono sums the output of their stereo systems. Most of the commercially available stereo enhancement techniques that have been sold on the hi-fi market—or actually all of them—have had dreadful mono compatibility. Another problem, because of increasing peak L-R levels for FM, has been increased multipath. A lot of people who have played around with various matrixing techniques to increase their stereo image have found that it really sounds pretty good—and maybe the mono loudness degradation is acceptable—but then they drive around and say, "Gee, where did all that multipath come from?"

The trade name of the product we've introduced is StereoMaxx. Conceptually, it's rather straightforward. Stereo audio comes in, we take a difference—an L-R—which then goes into a digital delay, which is adjustable from about three to 15 milliseconds. The output of the digital delay is then split into two channels, which are set out of phase with one another, and then that L-R signal is summed back into the stereo left and right. It's an amazingly simple technique. It meets the requirements of mono compatibility because the enhanced signal is decorrelated. It no longer bears any kind of direct relationship to what's going on in the stereo channel, so, electrically, it's considered noise; it fills in the holes. And, because it's added in out of phase, it has no impact at all on the mono.

What happens when you have a gizmo like this and a record opens up only on the left channel; what do your listeners hear on the right channel? And, last but not least, what happens when the DJ, who is supposed to be L-R with zero phaseshift, has got a couple degrees of phaseshift and maybe a few tenths of a dB of level imbalance? Those are problems that take us from nice theoretical

things that work on the bench to stuff that doesn't work when you put it in the program line.

The StereoMaxx measures the width continuously. What we consider width, by the way, is the ratio of L+R to L-R, not the correlation coefficient. We also take that width measurement and run it through something that is vaguely reminiscent of an audio processor; it's a threshholded, nonlinear device that reduces the amount of the effect. The device also looks at each of the overall levels and each of the channels. If either one of them falls below about -20 it shuts off. We also check to see whether the signal is nearly mono. When it becomes nearly mono we also shut it down. All of this, by and large, prevents anomalous effects.

Hidden benefits of NRSC

Circuit Research Labs (CRL) in Tempe, AZ, manufactures a full line of NRSC-compatible processors as well as retrofit kits to convert other companies' processors to NRSC performance.

Stan Salek: The NRSC standard is apparently being very well received by the industry. Proof of that comes from some of the stations that have installed our conversion products or new equipment that already includes the NRSC specs. We've also been getting some interesting calls from station owners saying, "I can't understand it. I thought I had to wait for the wideband radios to sound better, but we're already sounding better on these narrowband receivers when we use the standard. How can that be?" We believe that there might be intermodulation problems and other things like that that might be solved now by implementing the standard. This is evidenced further in the following U graphs, which are representative samplings of three different types of transmitters: plate-modulated, PDM, and Weldon (Doherty)-type models.

These are swept measurements rather than dynamic measurements, so they're very easy to do. Interpretation leads us to see why it may be a good idea to implement the NRSC standard right away—regardless of whether the wideband radios are available soon or not.

Here's an example (Figure 2) of a plate-modulated transmitter, 10 kilowatt into a dummy load, operating at five kilowatts, so we've got plenty of headroom here. The light dotted line is 50 percent modulation. The solid line is 75 percent modulation, while the heavier dotted line represents 90 percent modulation. It's all negative modulation that's represented here, called CCIF second-order difference intermodulation distortion, which is different from the IMD that we're used to talking about. When we refer to IMD, we usually mean SMPTE IMD, which is 7 kHz and 60 Hz, at a

four-to-one ratio. In this type of IMD there are two frequencies that are separated by 1 kHz and are at equal amplitudes.

You can see that the left side is the 2/3 kHz frequency pair, then 4/5—all the way up to 14/15. The vertical axis, percent IMD, is the calculated percentage of the component that comes up at 1 kHz. So that's the difference between the two, which is caused by mixing in the transmitter. This is measured only through the transmitter, not including audio processing. At 9 and 10 kHz, the NRSC filter limit, you can see that this type of distortion at higher frequencies would mix together and give you a higher distortion reading. This is peaking at about 10.5 percent at 90 percent modulation at the 14/15 kHz frequency pairs—where if you stop at the NRSC filter limit (i.e., the 9/10 kHz frequency pair), the NRSC filter would prevent modulation at any higher frequency, which limits it to about seven percent. That's quite a difference. And, for reference, at the bottom, you can see the SMPTE IMD is stated at 5.7 percent for this transmitter.

The following graph (Figure 3) shows a popular 50-kilowatt PDM transmitter, and you can see that we're hitting close to 16 percent distortion on this, while there's only a small peak of distortion that goes much over 10 percent with the NRSC filter installed. Of course, there are other conditions that these graphs don't cover, but they're not meant to be all-encompassing. We haven't put one into a narrow antenna system or anything like that. The expectation, of course, is that it would only get worse. We do, however, have one into an antenna system.

This is the Doherty-type transmitter (Figure 4); 50 kilowatt. And this one is a little more interesting in that our measurements cross into each other. This is explained by the way that the Doherty transmitter operates with a carrier and a peak tube, and at the point at which they switch on or cross over. But as you can also see, we're way less than 10 percent if you stay into the NRSC pass-band (i.e., below 10 kHz), while we're way higher than that—13 percent.

These are examples of how implementing the standard could make your station sound better even on a narrowband radio as it exists now. It's a simple test that can be done at most stations. Of course, these transmitters were not particularly tweaked for anything. They were just test subjects, so I'm sure that other transmitters could be made to work better than the ones we have here.

These are just numbers that came out. Still, it's a safe bet that the difference IMD will be higher above 10 kHz than below for virtually all transmitters, regardless of age, condition, or the present loading conditions. **BM/E**

Band Pro Distributes Cam-Rail

Developed by Swedish cinematographer Lars Hansare, the Cam-Rail portable film and video monorail tracking system is the latest product to be distributed by U.S. firm Band Pro Film/Video.

Designed for versatility and easy setup, the system consists of a trolley carriage that runs along a monorail track of extruded aluminum alloy. Spring-balanced trolley wheels grip the edges of the rail to provide secure operation and smooth camera movement. The rail system conforms to a standard Cam-Rail tripod or any tripod with 100 or 150 mm leveling heads.

In addition, a 12V DC motor is available for motorized camera movement. List prices start at $4200.

Circle #200 on Reader Service Card

330A Debuts from CMX

A new mid-range, multifeatured video editing system, the CMX 330A, has been introduced by CMX Corp. Intended to replace the 330XL as CMX's standard-model large-scale system in the 3100, 3400, and 3600 series, the 330A's major design innovations include five ports, a general purpose interface (GPI) port, and the ability to connect up to eight devices.

The unit's EDL accommodates 500 events with 500 lines for notes; dedicated video/audio keys and short cut wipe dissolve functions are included. Other features include match-cut calculation, autoclean, frame bump, learn keys, and motion memory. List prices start at $17,500; current 330XL owners can upgrade for $1995.

Circle #201 on Reader Service Card

Dual-Channel TBC from For-A Bows

The FA-740, a new dual-channel time base corrector from For-A Corp., offers a unique combination of dual-channel capability, full frame correction, and an array of effects for professional A/B roll editing.

The FA-470 has the ability to operate as two independent TBCs when the application is required. The unit features eight-bit quantization and internal analog component signal processing as well as independent time base correction, freeze-frame, and dropout compensation for A and B channels. Effects include mosaic, paint, and strobe freeze on both A and B, while a variety of other effects—including push, pull, dissolve, wipe, fade, compression, multimove, and negative image—are available on a separate program output channel.

Circle #202 on Reader Service Card

Telemetrics Hangs by New Trolley

Telemetrics, Inc., has introduced the model 68060 camera trolley assembly, which comprises a ceiling- (or any overhead surface) mounted camera that is motor-driven by remote control along a trolley track. In the installed system, the camera is mounted on a remote-controlled pan-and-tilt device, and zoom and focus are also remote controlled along the same cable—no modifications are necessary on standard portable cameras.

Standard track lengths are five, 10, and multiples of five feet, with custom lengths available as options. The remote unit is effective up to 1000 feet and utilizes standard Belden cable for remote control communication. Camera movement speed goes up to one foot per second, and joystick-controlled pan (20 degrees per second), tilt (40 degrees per second), focus, and zoom is available. In addition, up to 16 function and motion presets can be programmed in and repeated.
Circle #203 on Reader Service Card

New Ramsa Console

Ramsa/Panasonic has annouced the release of the WR-T820B recording console. The eight-bus console features flexible routing and switching, allowing up to 48 inputs and eight addressable aux sends; high-speed operational amplifiers for critical gain stage operation; "MRP" 300,000 operation faders; and full-function LED and VU metering of all inputs and outputs.
Circle #204 on Reader Service Card

Vii Upgrades Test Pattern Unit

The Model 2502B video test pattern generator, an upgrade of the previous 2502A version, incorporates several new features that enhance display high voltage stability evaluation.

Features include front panel pattern polarity, now pushbutton selectable; a bounce function, to allow programming of polarity reversal rate; and internal signal processing, now refined to improve timing accuracy of output signals.

The 2502B is fully programmable, compatible with virtually any scan rate, and RS-170, RS-330A, and RS-343 compatible.

Additional features include front panel controlled RGB adjustment, separate switching for each output, a preset/variable mode, and a variey of test pattern functions—bars, dots, flat field, window, V stripe, color bar, resolution, character Cx, gray scale, video, and combination.
Circle #205 on Reader Service Card

StarSignal Links Still-Frame, Telephone, and PC

StarSignal, Inc., has introduced a color still-frame video phone based on a standard AT- or XT-compatible personal computer. The system will store, retrieve, and send full-bandwidth color video pictures over conventional phone lines. The heart of the system is a StarSignal Starlite video compression card that compresses the video image for transmission over a 9600- baud modem. Average transmissions of full-color video range from five to fifteen seconds.

A 40-megabyte hard disk can store approximately 2000 full TV-resolution color stills, and the entire system can be upgraded to NTSC specs for broadcast applications.

The system includes a PC AT, dual-purpose RGB/NTSC monitor, video-compression and frame-capture board, 40-MB hard disk, color camera, custom software, 9600-baud modem, and mouse; system options include video printer, WORM storage, and speaker phone. List price is $12,995. The Starlite board lists for $1995.
Circle #206 on Reader Service Card

E-V Consoles Enter the Mix

Spurred on by the recent success of the BK-1632 console, a new series of BK-32 stereo mixing consoles has been introduced by Electro-Voice, Inc. Additional configurations for the unit include 24-, 16- , 12-, and rackmountable 8-channel versions.

Features include subgroup capability, individual channel effects logs, multiple sends, phantom power, and prefade listen.
Circle #207 on Reader Service Card

Solid Support's Stand

Solid Support Industries has introduced the AM-10 adjustable mixer stand, which provides lightweight, solid support for midsize mixing consoles. Constructed of heavy wall steel, the unit will conform to any mixer ranging in size from 27 to 47 inches wide, nearly any height, and weighing up to 250 pounds.

Two cross bars mounted with allen wrench screws provide easy adjustability, and a two-inch metal lip prevents slipping. The $325 unit moves around on four casters; two of which lock for stability.
Circle #208 on Reader Service Card

Artel Intros FiberWay Bridge

New from Artel Communications Corp. is the new Fiberway 802.3 bridge. Integrated into the company's FiberWay 100 Mbps fiber optic LAN product line, the bridge allows the connection of an entire Ethernet or IEEE 802.3 network to connect to the system fiber backbone. Up to 128 Ethernets can be connected up to the fiber token ring via 802.3 bridges.

The device eliminates the need for complex branching and daisy chaining for multiple network communications—the primary message travels along only one intermediary system: the

high-speed fiber backbone.

Additional network management features include subnetwork utilization, bridge filtering rate, and traffic count. List price for the device is $19,000.

Circle #209 on Reader Service Card

S-VHS TBC from Nova

The Nova 700S, the second in a series of S-VHS TBCs from Nova, has been recently introduced. All the standard features of the conventional Nova 700 TBC are available; with the added capability of S-VHS processing. S-VHS inputs (Y/C 3.58) or standard composite video inputs can be utilized. Other features include full proc amp with presets and eight-bit 4x fsc sampling for optimum transparency.

The 700S enables high resolution and optimum bandwidth while processing S-VHS, thus allowing the signal to be utilized in existing system configurations. Current Nova 700 owners can obtain a factory installed upgrade to move up to the 700S's capabilities.

Circle #210 on Reader Service Card

EECO Still-Frame Cost Redux

EECO, Inc., has annouced a 40 percent price reduction for its VAC-300 still-frame audio decoder unit. The device, used primarily for interactive, POP, audio archiving, and home shopping applications, now lists for $1800.

The EECO system provides up to 150 hours of audio (or up to 221 MB of digital data) on a single laserdisk side. To further expand audio capacity, the system compresses audio into an NTSC video picture, which is then recorded on the premaster production tape. The compressed audio from the laserdisk is stored on the VAC-300 and played back as audio while a user views disk video images.

Circle #211 on Reader Service Card

Nagra Modifies T-Audio Keyboard

In response to industry comments, Nagra Magnetic Recorders has introduced a new keyboard for the T-Audio time code post-prodution recorder. All shift function keys have been assigned to separate dedicated key positions, adding to the number of keys on the panel but simplifying the functions of each. A newly added numeric keypad allows quick and easy entry of numeric and time codes.

In addition, an expanded capability LED display has been introduced.

Circle #212 on Reader Service Card

Lydcraft Preamp/DI Amp Available in U.S.

Now distributed in the U.S. by Audiotechniques, Inc., the Lydcraft Tube-Tech dual mic preamplifier/DI amplifier provides two balanced mic inputs with switchable 48 V phantom power and a switchable -20 dB pad. In addition, the direct inputs are unbalanced with gain ranging for +10 to +60 dB. The MP 1-A amps are tube based with DC-fed heaters to avoid excessive hum. List price is $1655.

Circle #213 on Reader Service Card

Microwave Radio Corp.'s Portable Transmitter

A compact 40 GHz transmitter/receiver that tranmits quality video plus two audio channels over distances up to one mile is being intorduced by Microwaqve Radio Corp. The 40MX/40 MR unit provides 28-channel broadcast-quality video transmission over supplied antennas (one 15 dBi, one 25 dBi); signal range can be extended with an optional one-foot parabolic antenna (39 dBi).

The 40MX/40MR features weather-resistant construction, and list prices start at $20,000.

Circle #214 on Reader Service Card

More Olympic updates: **3M** will be offering comprehensive videotape support services to broadcasters at the 1988 Winter Games in Calgary in two forms. The company will not only sell on site 3M tape, cassette, and diskette products, but will also provide a team of technical service people, stationed at the **International Broadcast Center (IBC)**, to assist attendees with any tape-related problems... **Fidelipac**, too, will be involved at the Calgary Games. A combination of Dynamax CTR12 and CTR14 machines, as well as the new Dynamax CTR34 three-deck recorder/reproducer, are making their way to host broadcaster **CTV** via McCurdy and Canadian distributor Oakwood Audio Labs, Ltd. Later, at the Summer Olympics in Seoul, 56 Dynamax CTR14s, purchased by the Republic of Korea's Supply Office (OSROK), will aid in coverage of the games...Three mobile units from **Northwest Mobile Television** are being dispatched to Alberta to aid U.S. Olympic network **ABC** in its coverage of several events, including the closing ceremonies. For a more in-depth look at ABC's involvement at the Calgary Games see this month's cover story, "ABC Receives Engineering Gold for Winter Olympic Coverage," p. 30.

KPNX-TV, a Gannett-owned NBC affiliate in Phoenix, AZ, is reportedly the first television station in the U.S. to switch its news operation from **Betacam to MII** equipment, it was annouced by Panasonic Broadcast Systems. The order, valued at over $1 million, involves over 50 pieces of major equipment, including AU-650 studio VTRs, AU-620 studio players, AU-550 field edit recorders, AU-500 field recorders, and AU-400 camera recorders. KPNX VP and CE Leon Anglin cited cassette length, high quality, and eventual universality as reasons for the purchase...On the flipside, **Cap Cities/ABC** Inc., has accepted initial shipments of **Ampex Betacam SP** equipment, headed for the ABC news bureau in Washington, DC. Twenty-eight SP CVR-75 studio VTRs, 41 CVR-5 portable VTRs, and 18 SP CVR-35 portable VTRs round out the purchase.

Comark Communications has announced the recent purchase of a 120 kW klystrode-equipped UHF TV transmitter to the Georgia Public Telecommunications Commission, a Southern **PBS** affiliate. Culminating years of research and product development, the new transmitter offers enormous power consumption economy over existing pulsed-klystron UHF transmitters (For a closer look at the klystrode's use by UHF broadcasters, see "Treading the Tightrope," in Crosstalk: An Engineering Management Journal, p. 20)... Columbus, OH's NBC affiliate, **WCMH-TV**, has taken delivery of three **Sony BVP-360** production cameras, slated for use in all in-studio tape sessions and for the station's four daily news telecasts... **PAG America, Ltd.**, the U.S. distribution arm of British-produced PAG products, has been acquired by **Frezzolini Electronics, Inc.** As of the New Year, Frezzolini will be the sole U.S. distributor of PAG chargers, belts, and batteries.

Dubner Computer Systems, Inc., recently received an Engineering Emmy Award for its contribution to the colorization process for black-and-white video. Colorization, Inc., the Canadian company who contracted Dubner for the colorization software, also received an award. Above, Dubner president Harry Dubner is congratulated at the Emmy ceremoney by Dan Wright, Grass Valley Group (Dubner's parent company) president.

Dubner's comments on the award: "Colorization is a controversial process and we all have our viewpoints, but, quite clearly, the viewers are saying they like it. Dubner's Emmy is a reflection that the company's technology and expertise is at the cutting edge of new developments in the field of animation and character generators." The Emmy is Dubner's second such award in recent years—in 1982 it received an Engineering Emmy for the development of the CBG-2 video graphics generator.

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